

THURSDAY, MAY 28, 2015

14.00-15.28 SCIENTIFIC SESSION 1 - RESEARCH I

Moderators

Daniel KALBERMATTEN – Basel, Switzerland

Hans-Günther MACHENS – Munich, Germany

14.00 THE EFFECT OF NORMOVOLEMIC AND HYPERVOLEMIC HEMODILUTION ON A PERFORATOR FREE FLAP MICROSURGICAL MODEL AND ON A PERFORATOR FLAP WITH TWISTED PEDICLE MODEL: EXPERIMENTAL STUDY IN RATS

Matteo AMOROSO, Fabio SANTANELLI DI POMPEO,

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Rome, Italy

Introduction

Flap perfusion impairment still occurs in free perforator flaps and pedicled perforator propeller flaps; despite several studies the impact of hemodilution on free flap survival is still extremely controversial. Moreover, the combined influence of hemodilution on flap survival and pedicle twisting on perfusion impairment has never been investigated. The aim of the study was to evaluate the effects of Acute Normovolemic (ANH) and Hypervolemic Hemodilution (AHH) on flap viability in a perforator free flap microsurgical model and in a perforator flap with twisted pedicle model.

Materials & Methods

Our microsurgical model enrolled 40 female Wistar rats divided in four groups of 10 rats each: group 1, SIEA flap was elevated until femoral vessels were isolated, sectioned and anastomosed without hemodilution; group 2, surgery with previous ANH; group 3, surgery with previous AHH; group 4, femoral artery and vein were only ligated, proximally to the flap perforator, to validate the microsurgical model used, excluding the presence of a distal reverse reflow in the flap. Our propeller flap model enrolled 27 female Wistar Rats divided in 3 groups of 9 rats each: group 1, SIEA flap, was bilaterally elevated and transposed back to the abdominal wall with different angles of rotation (90°, 180°, 270°, 360°);

group 2, surgery with previous ANH; group 3, surgery with previous AHH. Direct observation, computerized picture analysis, microangiography and histopathological analyses were performed.

Results

The rats were hemodiluted until a mean hematocrit of 26.80 ± 0.05 for ANH group and 28.11 ± 0.04 for AHH group was reached. In both models, skin flap survival after 7 days was significantly higher in both hemodiluted groups compared with the control group (p -value $< 0,05$).

Conclusions

Hemodilution was an affective way to provide better microcirculatory blood perfusion, significantly increasing flap survival rates in both our rat models.

14.08 COMPARISON OF BONE PREFABRICATION WITH VASCULARIZED PERIOSTEAL FLAPS, HYDROXYAPATITE AND BIOACTIVE GLASS IN RATS

Burak ERSOY, Mehmet BAYRAMICLI, Hakan SIRINOGLU, Pinar TURAN, Ayhan NUMANOGLU
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Introduction

Periosteal flaps possess osteoprogenitor cells and an osteoinductive potential that can be further augmented by combination with a biodegradable scaffold; therefore various osteoconductive and osteostimulative biomaterials are frequently combined with periosteal flaps in studies of bone prefabrication. An experimental study was designed to determine and compare the contribution of bioactive glass and hydroxyapatite to osteoneogenesis in rats when combined with a periosteal flap.

Materials & Methods

In 60 Sprague-Dawley rats, saphenous artery-periosteofasciocutaneous island flaps were transposed to abdomen. In group 1, the flap was left alone, in group 2, an empty artificial pocket made of Gore-Tex was sutured onto the periosteal layer, and in groups 3 and 4 the pocket was filled with bioactive glass and hydroxyapatite, respectively. Following sampling for histological analysis, a 4-point scoring system was used to grade inflammatory cell infiltration, osteogenesis, angiogenesis and cell migration into the bioactive material.

Results

Combination of the periosteal flap with any of the bioactive materials resulted in significantly higher percentages of animals exhibiting osteogenesis (80% in hydroxyapatite group and 93.3% in bioactive glass group; $p=0.0000528$) and angiogenesis. Comparison of the bioactive material groups revealed that a significantly higher proportion of animals in the bioactive glass group exhibited moderate or severe inflammation (80% vs. 20%; $p=0.002814$).

Conclusions

Periosteal flaps prefabricated with hydroxyapatite or bioactive glass in rats exhibit osteogenic capacities that are not dependent on direct bone contact or proximity to vascular bony tissue. The innate capacity of the periosteal flap when utilized alone for osteoneogenesis was found to be rather insufficient.

14.20 GLPP INHIBITS APOPTOSIS OF FREE SKIN FLAP THROUGH THIOREDOXIN-DEPENDENT PATHWAY DURING THE EARLY STAGE OF ISCHEMIA REPERFUSION

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Beijing, China

Introduction

In defending the early oxidative damage of free flap ischemia/reperfusion (IR), thioredoxin plays an important role by inhibiting ASK-1 activated cell apoptosis. Ganoderma Lucidum Polyaccharide Peptide (GLPP) is the polysaccharide-peptide component of Ganoderma lucidum, which has been proved to possess potent antioxidant activity. Our study aimed to identify the protective effect of GLPP on free flap survival against IR and possible mechanisms.

Materials & Methods

Apoptosis-related proteins were tested by Western blot in GLPP pre-treated 293T cells incubated with CoCl₂, with thioredoxin-overexpressed 293T cells treated by CoCl₂ as positive control. 80 male ICR mice were administered intraperitoneally by GLPP or saline for 5 days before IR. The dorsal island flap was elevated with its pedicle clipped for 4h before reperfusion to simulate IR. Half of the mice were sacrificed 24 hours after reperfusion. The flap tissues were tested by SOD and MDA measurement, TUNEL assay, immunohistochemistry and Western blot. The flap survival percentage of the residue mice was evaluated 7 days after reperfusion. 10 clinical specimens were also collected and tested.

Results

No significant cytotoxicity of GLPP was shown up to 100 g/ml by CCK-8. Thioredoxin-1 depletion and increased ASK-1, phospho-p38, and caspase-3 expression were confirmed significantly ($p < 0.05$) in 293T cells, IR flap models and clinical specimens. Moreover, increased flap survival percentage, higher total SOD activity, lower MDA concentration, more thioredoxin-1 abundance and less apoptotic signs were observed significantly ($p < 0.05$) under GLPP preconditioning in vitro and in vivo, indicating that GLPP raises flap resistance to IR induced apoptosis by upregulating thioredoxin-1.

Conclusions

GLPP can inhibit the oxidative damage during early IR through the thioredoxin-dependent anti-apoptosis pathway. The novel mice model perfectly simulates free flap IR and can be rescued by GLPP pre-treatment, which may lead to new considerations of this extract from Ganoderma for its clinical application.

14.28 EFFECTS OF DESFERRIOXAMINE ON FLAP DELAY PROCEDURE

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Hakan SIRINOGLU, Emre GÜVERCİN
Istanbul, Turkey

Introduction

Delay procedures are effective methods to increase survived flap amount. There are several methods for flap delay in the literature. Desferrioxamine (DFO), an iron chelator, up-regulates the expression of angiogenic factors. We hypothesize that it may also use in chemical flap delay.

Materials & Methods

In this study 28 adult Sprague-Dawley rats were divided into four groups. Before flap harvesting (caudally based dorsal rat flap 10x3 cm) in group 1 (sham chemical delay) animals were injected with 0.9% saline every other day, group 2 had surgical delay which is described in the literature before, group 3 had DFO injection every other day, for seven days, and group 4 was control which had not any precondition. During flap harvesting, transillumination photos were taken. All flaps were sutured in to their origin and one week after, photos were taken for computer-supported viable flap areas calculation. Then samples were obtained for histopathological examinations. Statistical analysis was performed.

Results

In DFO group the improvement of vascularity were seen in transillumination photos. Data of increased measured viable flap areas and microscopically calculated vessels were statistically different from control and sham group. Inflammatory cells were significantly lower in DFO group than the others.

Conclusions

These results support that DFO administration stimulates angiogenesis and increases vascularity of flap, and has comparable results to those obtained after surgical delay.

14.36 PRE-CONDITIONING WITH NON-INVASIVE CYCLICAL EXTERNAL SUCTION IMPROVES SURVIVAL OF CRITICAL-SIZE FASCIO-CUTANEOUS PEDICLED FLAPS IN MICE

Giorgio GIATSIDIS, Jorge LUJAN-HERNANDEZ, Michael CHIN, Franco BASSETTO, Dennis Paul ORGILL
Padua, Italy

Introduction

Partial flap necrosis is a substantial burden for modern reconstructive surgery. External suction (ES) can induce angiogenesis in soft tissues as a response to temporary sub-critical hypoxia, as shown in the fields of wound healing and fat grafting. We extended the same concept to Fascio-Cutaneous Pedicled Flaps (FCPF) to evaluate whether pre-conditioning with ES could positively impact flap survival.

Materials & Methods

Thirty nine-week old C57BL/6J mice underwent dorsal skin pre-conditioning using a silicone bell connected to a suction pump (-35mmHg). Two experimental groups (N=10) investigated different stimulation patterns (Group A: continuous; Group B: 1hrx6times/day). Group C was the control. After 5 days of treatment and 5 days of recovery a critical-size 1.5x3.5cm dorsal FCPF based on the right lateral thoracic artery was raised and re-sutured after inter-positioning of a silicone layer. Flap necrosis was measured daily for 7 days after surgery by digital imaging while Hyper-Spectral Imaging (HSI) was used to monitor oxygenation of tissue. Animals were sacrificed 7 days after surgery and flaps harvested for microscopic analysis (HE, IHC, PCR).

Results

Only continuous ES caused minor skin inflammation. Pre-conditioning in group B significantly increased flap survival by 55% (SD+/-10%) at 7 days compared to control ($p < 0.05$) limiting overall necrosis of the flap to less than 6% of total area. Group A showed an amount of distal necrosis higher (25%, SD+/-10%) than controls at all time-points.

HIS confirmed the capacity of cyclical ES to induce a temporary sub-critical ischemia (tissue de-oxygenation) leading to angiogenesis and an enlarged vascular network (tissue oxygenation). Histology/PCR confirmed a 2-fold increase of capillaries (CD31+) ($p < 0.05$), a 2-fold reduction of hypoxic cells ($p < 0.05$) and a remarkable decrease of inflammatory infiltrate (CD45+) compared to control.

Conclusions

Cyclical external suction represents a promising approach for effective non-invasive flap pre-conditioning. This approach may support more innovative reconstructive strategies.

14.44 A NEW TECHNIQUE FOR BREAST RECONSTRUCTION, USING AN ACELLULAR GEL AND A VASCULARIZED POLYCARBONATE CHAMBER

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Introduction

Regenerative therapies aim to repair or replace damaged tissues. Clinical applications may vary from organ replacement, to breast reconstruction or limb regeneration. In growing 3-dimensional tissue constructs, access to a nourishing vascular network is essential. The aim of this study is to regenerate an adipose tissue flap in vivo without the need of adding cells.

Materials and Methods

In rats, an arteriovenous loop was surgically established from the femoral vessels and positioned inside a perforated chamber in the groin. Chambers were filled with 2 ml Adipogel, a novel acellular tissue engineering gel containing growth factors and polymers. Constructs were harvested at 6 and 12 weeks ($n=6$) and assessed for volume and histological content.

Results

The chambers filled with tissue to about half of their content ($0.946 \text{ ml} \pm 0.161$). Histological assessment showed growth of different tissue types within the chamber; not only had a vascular network grown throughout the construct by 12 weeks ($50.4 \mu\text{l} \pm 13.5$), adipocytes within a connective tissue matrix were abundantly present as well. While small numbers of adipocytes had formed by 6 weeks ($29 \mu\text{l} \pm 44$), significantly more adipocytes were present at 12 weeks ($135 \mu\text{l} \pm 76$). ($p=0.014$) A small amount of muscle cells was also found. The grown tissue-types seemed to resemble surrounding groin tissue.

Conclusions

This in vivo study makes use of a novel technology for tissue generation. In a surgically established vascularized chamber in the groin, spontaneous tissue growth within an acellular gel was achieved. Most likely, stem cells residing in adjacent tissues were driven to the chamber to form new tissue. This study demonstrated that a pedicled adipose flap can be generated in vivo, offering perspectives for larger reconstructive flap surgery. With this technology, hope rises for a variety of novel patient-tailored therapies in soft tissue repair.

14.56 USING CLOSTRIDIUM HISTOLYTICUM COLLAGENASE FOR THE REDUCTION OF CAPSULAR TISSUE AROUND SILICONE IMPLANTS: AN EXPERIMENTAL STUDY

Nebil YESILOGLU, Gökhan TEMİZ, Murat SARICI, Kemalettin YILDIZ, Ali Cem AKPINAR
Istanbul, Turkey

Introduction

In recent studies, collagen organization was blamed in the formation of capsular contracture which is still a challenging problem after silicone implant based breast operations. In this study, effects of different concentrations of collagenase enzyme derived from *Clostridium histolyticum* on the capsular tissue formation around the silicone implants are investigated.

Materials & Methods

32 Wistar albino rats were randomized in 4 groups. A 2x1x0.3cm sized silicone block was inserted inside a dorsal subcutaneous pocket in all groups. After six weeks capsule formation was confirmed and animals were prepared for injection. Isotonic saline, 150IU, 300IU and 600IU in Groups 1, 2, 3 and 4, respectively inside the capsule pocket, under ultrasonographic view. All animals were sacrificed at the end of first week for histologic sampling to determine cell proliferation, vascularization, necrosis, apoptosis, collagen distribution and capsule thickness. All the data were statistically analysed by using and compared for significance of the results.

Results

There is no significant difference in terms of capsule thinning between 300IU and 600IU groups but in both groups thinning was significantly higher than sham group. In 150IU group there is no significant thinning as compared to sham group ($p>0.05$). However, complication rates such as skin necrosis, infection and seroma formation were significantly higher in the 600IU group ($p<0.001$). Apoptosis was significantly higher in the 600IU injection group than others ($p<0.001$), while there were no significant differences between 150IU, 300IU and control groups ($p>0.05$). The optimal safe and effective dose of the enzyme was accepted as 300 IU. 300IU injection provided up to %89 thinning in the capsule tissue.

Conclusions

However the late results and recurrence rates of capsular contracture was not included in this study, collagenase seemed effective for the reduction of capsular tissue around the implants.

15.04 XIAFLEX FOR THE TREATMENT OF CAPSULAR FIBROSIS IN SILICONE IMPLANTS

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Introduction

The collagenase Xiaflex is approved for the treatment of Dupuytren's contracture, owing to its ability to selectively dissolve collagen subtypes. Collagen is the main constituent of capsular fibroses. Aim of this study was to demonstrate applicability and effectiveness of Xiaflex injection in the treatment of capsular fibrosis.

Materials & Methods

Silicone implants were inserted subcutaneously in the dorsum of 80 rats and allowed to develop capsular fibroses for 100 days. For optimal dosage finding capsules of 20 rats were incubated in-vitro with different concentrations of Xiaflex. Subsequently, the optimum dose of Xiaflex was injected in-vivo (n=30). Saline solution was injected in the control group (n=30). Outcome measures involved high-resolution ultrasound, 7-tesla MRI as well as histology, immunohistochemistry and PCR analysis at 2, 10 and 60 days after injection.

Results

In-vitro studies suggested an optimum dosage of 0.3mg/ml Xiaflex. In-vivo, significant reduction of capsular thickness with respect to control groups was observed on days 2, 10 and 60 after injection of Xiaflex. Immunohistochemistry and PCR analyses revealed decreased concentration of collagen subtypes 1, 2 and 3 as well as underexpression of pro-fibrotic markers in the treatment group. Of note, digestion of the skin was seen in 15% of animals who received Xiaflex injection, and euthanasia was mandated.

Conclusions

This study demonstrates the effectiveness of Xiaflex at dissolving capsular fibrosis. Damage of adjacent structures, however, remains a challenge and requires further studies regarding dosage adjustment to individual capsule thickness and density.

15.12 ANTIPSYCHOTIC DRUGS AND ADIPOGENESIS

Vincenzo VINDIGNI, Chiara PAVAN, Barbara ZAVAN, Paolo PINTON, Alessandro RIMESSI
Padua, Italy

Introduction

Atypical antipsychotics (APDs) are currently used in clinical practice for a variety of mental disorders but they exert a very strong impact on body metabolism, leading to the development of severe obesity, dyslipidemia and changes in insulin sensitivity, which are major risk factors associated with the development of cardiovascular complications. The WHO considers this as a problem of global importance, not only because metabolic syndrome is a major cause of death in the general population, but also because it affects patients treated with APDs; up to 60% of deaths in this group are caused by this disease (with a mortality ratio of 1:57, compared with the general population). The mechanisms underlying pharmacologically induced weight gain are still controversial.

Materials & Methods

We tested in vitro the effects of different APDs on adipogenic events in cultured human pre-adipocytes and in rat muscle-derived stem cells (MDSCs), aiming to identify a common intracellular event contributable to these drugs. Culture behavior was evaluated in terms of cell proliferation, lipid accumulation, gene expression and morphological features.

Results

Results indicate that APDs influence adipogenic events through changes in the differentiation and proliferation of pre-adipocytes and MDSCs that are brought on by protein kinase C- β (PKC- β) activation. These data identify a signaling route that could be a potential target of pharmacological approaches for preventing the weight gain associated with APD treatment.

Conclusions

Our further step is now to demonstrate in vivo that PKC-b null and wild-type mice treated with PKC-b inhibitors are protected from APD-induced weight gain and yet retain their ability to counteract anxiety (otherwise, what is the benefit of preventing weight gain if APDs are also inhibited from performing their main function?), as well as defining the detailed mechanism by which APDs are activating PKC-b is needed.

**15.20 A NOVEL MODEL OF HUMAN SKIN PRESSURE
ULCERS IN MICE**

Lara CRISTOBAL, Andrés A. MALDONADO, Javier MARTÍN-LÓPEZ,
Natalio GARCÍA-HONDUVILLA, Julia BUJÁN
Madrid, Spain

Introduction

Pressure ulcers are a prevalent health problem in today's society. The shortage of suitable animal models limits our understanding and our ability to develop new therapies. This study aims to report on the development of a novel and reproducible human skin pressure ulcer model in mice.

Materials and Methods

Male non-obese, diabetic, severe combined immunodeficiency mice (n = 22) were engrafted with human skin. A full-thickness skin graft was placed onto 4x3 cm wounds created on the dorsal skin of the mice. Two groups with permanent grafts were studied after 60 days. The control group (n = 6) was focused on the process of engraftment. Evaluations were conducted with photographic assessment, histological analysis and fluorescence in situ hybridization (FISH) techniques. The pressure ulcer group (n = 12) was created using a compression device. A pressure of 150 mmHg for 8h, with a total of three cycles of compression- release was exerted. Evaluations were conducted with photographic assessment and histological analysis.

Results

Skin grafts in the control group took successfully, as shown by visual assessment, FISH techniques and histological analysis. Pressure ulcers in the second group showed full-thickness skin loss with damage and necrosis of all the epidermal and dermal layers (ulcer stage III) in all cases. Complete repair occurred after 40 days.

Conclusions

An inexpensive, reproducible human skin pressure ulcer model has been developed. This novel model will facilitate the development of new clinically relevant therapeutic strategies that can be tested directly on human skin.

16.00-17.40 SCIENTIFIC SESSION 2 – Research II

Moderators

Andrew HART – Glasgow, UK

Bernardo HONTANILLA – Pamplona, Spain

16.00 SKIN-TARGETED IN VIVO ELECTROPORATION OF HUMAN HOST DEFENSE PEPTIDE LL-37 REVEALS ANGIOGENIC POTENTIAL

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Introduction

In contrast to common growth-factors, we could have shown that host defense peptides promoted wound healing and simultaneously could reduce bacterial growth. In this study we investigated, whether direct targeting of the skin by non-viral electro gene transfer of host defense peptide LL-37 could induce angiogenesis in muscle ischemia.

Material & Methods

Hind-limb ischemia was achieved by microsurgical dissection of femoral artery and vein in C57B6 (n=6 per group), and 100µg DNA were intradermally injected above the ligation area, followed by in-vivo electroporation (EP). Blood perfusion was evaluated by laser doppler over 12 days. At the end of the experiment, the gastrocnemius muscle weight of treated and control mice were compared. Skin and muscle tissues were then analysed by RT-PCR and histological staining. The skin areas above the induced muscle ischemia were treated with DNA plasmid pLL-37 as positive or pGFP as negative controls. EP was performed by one high- (700V/cm, 100 µs) and low-voltage (200V/cm, 400 ms) electric pulses, delivered by a Cliniporator system (IGEA, Carpi, Italy).

Results

Skin-targeted EP of LL-37 increased blood perfusion significantly by the factor two, 85±7% compared to 42±11% (p<0.001) and reduced muscle weight loss by average 68% (p<0.05). Histology of the muscle fibers confirmed the protective effect of LL-37 against muscular atrophy during ischemia. IHC staining of LL-37 treated skin revealed significant higher CD31+ expression.

Gastrocnemius muscle samples demonstrated significant induction of the angiogenic cytokines VEGFa and SDF-1a, and their receptors VEGFR-1 and CXCR-4, ($p < 0.05$).

Conclusions

We introduced a non-viral gene therapeutic technique to successfully induce angiogenesis with LL-37 during ischemia. By expressing LL-37 transiently in the skin we achieved induction of neovascularization by upregulation of angiogenic cytokines and cells beyond the targeted tissue area. Our treatment indicates great potential for its application in wound healing, surgical flaps, and tissue engineering.

16.12 ISOLATION OF ANGIOGENIC FACTORS FROM HUMAN PERIPHERAL BLOOD FOR THE DEVELOPMENT OF A BIOACTIVE DRESSING

Arndt SCHILLING, Ektoras HADJIPANAYI, Anna-Theresa BAUER, Philipp MOOG, Haydar KÜKREK, Burak SALGIN, Lukas BAUER, Andreas SCHLÜTER, Milomir NINKOVIC, Hans-Günther MACHENS Munich, Germany

Background

Chronic wounds show a limited capacity for adaptive angiogenesis, although this capability is preserved in other tissues of the same patient. Our group develops strategies to isolate autologous angiogenic proteins (AAPs) from healthy cells to transplant them to the non-healing tissue (Project EmaCure).

The aim of the current work was to test if peripheral blood cells can be used as source for AAPs and what kind of carriers qualify for efficient delivery of these proteins.

Materials & Methods

For this, we cultivated blood of healthy human donors under normoxia and hypoxia (3% O₂). The produced AAPs were collected in cell-free gel-carriers (collagen gel, hydrosorb gel, polyhexanid gel). AAPs that diffused out of the gels (VEGF, Angiogenin, Thrombospondin-1), were quantified by ELISA and their effectiveness was analysed in in-vitro angiogenesis assays (tube formation assay, directional migration assay, microvessel sprouting assay).

Results

We could show that hypoxia influences the expression of the angiogenic proteins VEGF, Angiogenin, Thrombospondin-1 relative to the normoxic baseline. The AAPs could be collected in cell-free carriers. Release of VEGF from those carriers was significantly higher from collagen, than from hydrosorb or polyhexanid gels.

Conclusions

We show here a method that allows to produce a personalized bioactive dressing from autologous blood which activates angiogenesis.

We hope that this will help to improve the treatment of chronic wounds.

16.22 THE PROXIMAL MEDIAL SURAL NERVE BIOPSY MODEL: A STANDARDIZED AND REPRODUCIBLE CLINICAL MODEL FOR THE EVALUATION OF BIOARTIFICIAL NERVE GUIDES

Ahmet BOZKURT, Sabien VAN NEERVEN, Kristl CLAEYS, Simone SCHRADING, Christina BECKMANN, Jörg SCHULZ, Joachim WEIS, Norbert PALLUA
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Background

The step from experimental studies to the device implementation of bioartificial nerve guides in the clinical setting is often substantial and the clinical outcome unpredictable. This is mainly linked to the clinical heterogeneity of peripheral nerve injuries which is very different from standardized animal studies. In search of such a reproducible human model for bioartificial nerve guide implantation, we propose the reconstruction of sural nerve defects after routine nerve biopsy as a standardized model.

Methods & Results

Our concept uses the proximal medial sural nerve in patients with clinically indicated diagnostic nerve biopsy ($\geq 2\text{cm}$) under local anaesthesia. As part of an ongoing clinical study, a total of $n=16$ patients were treated with the novel bioartificial nerve guide Neuromaix. Inclusion criteria were patients between 18-70 years with clinical and electrophysiological diagnosis of peripheral neuropathy. Exclusion criteria were alcohol-related or paraneoplastic polyneuropathy (PNP), peripheral vascular disease, diabetes, infectious diseases (HIV, hepatitis) etc.

The operative technique included exposure of the proximal medial sural nerve between the medial and lateral head of the gastrocnemius muscle. After excision of the 2cm nerve biopsy, the nerve guide was implanted by means of entubulization using 8.0 microsurgical interrupted mattress sutures.

Despite limitations, the presented model is a safe, effective, standardized and reproducible human model for nerve guide implantation enabling the transition of nerve guides that have passed all preclinical testings into the clinical setting (“from bench to bedside”)

Multimodal sensory testing was performed pre-and postoperatively directly after surgery, at 1, 3, 6, and 12 months after surgery at the ipsilateral and contralateral (untreated) site for intraindividual comparison. This included clinical evaluation, nociception (VAS- Visual Analog Scale), loss of sensation at the lateral aspect of the foot, Tinel's sign, spatial resolution (static and moving two-point discrimination), pressure (Semmes-Weinstein monofilament test), thermoception and vibration (128Hz tuning fork).

Conclusions

Despite limitations, the presented model is a safe, effective, standardized and reproducible human model for nerve guide implantation enabling the transition of nerve guides that have passed all preclinical testings into the clinical setting ("from bench to bedside").

16.32 PERIPHERAL NERVE REPAIR: MULTIMODAL COMPARISON OF REGENERATIVE POTENTIAL OF ADIPOSE DERIVED CELLS IN A BIODEGRADABLE CONDUIT

Elisabeth A. KAPPOS, Patricia E. ENGELS,
Moritz MEYER ZU SCHWABEDISSEN, Mathias TREMP,
Stefanie VON FELTEN, Arne FISCHMANN, Arnaud SCHERBERICH,
Dirk SCHAEFER, Daniel KALBERMATTEN
Basel, Switzerland

Background

Tissue engineering is a popular topic in peripheral nerve repair. Combining a nerve conduit with supporting cells appears to offer an opportunity for improved clinical outcomes, which have been poor to date. The aim of this study was to provide a broad overview over the most interesting and promising transplantable cells under equal experimental conditions over a long term period.

Materials & Methods

1 Mio. of each of the following cell types were introduced into biodegradable fibrin conduits: rat adipose-derived stem cells (rASCs), Schwann cell (SC)-like differentiated rASC (drASC), rat SCs (rSCs), human (h-)ASCs from the superficial and deep abdominal layer as well as human stromal vascular fraction (SVF). The sciatic nerve injury model was used creating a 10mm gap in the left nerve of female Sprague Dawley rats (7 groups of 7 animals, 8 weeks old) and was bridged through this conduit. As a control we re-sutured a 10mm cut nerve segment backwards as an autograft. Long-term evaluation was carried out after 12 weeks in a multimodal manner comprising walking track and morphometric, as well as MRI analysis. The Sciatic Function Index (SFI) was calculated with the help of a functional evaluation tool. Moreover, cross sections of the nerve proximal, distal and in between the two sutures, corresponding to the former gap, were analysed. Furthermore gastrocnemius muscle weights between groups were compared and in addition imaging analysis (MRI) was performed.

Results

MRI revealed muscle atrophy across all groups and proved biodegradation of the fibrin conduit. Correlating trends throughout the different evaluation techniques could be shown: Superficial human ASC supported regeneration better than deep, in line with published in vitro data. SC-like drASC had the best regeneration potential when compared to the other adipose tissue derived cells.

Conclusions

We compared the most interesting transplantable cells in peripheral nerve repair, analysing them in a multimodal manner comprising functional and morphometric, as well as MRI analysis. In conclusion, particularly differentiated ASCs could be a clinically translatable route towards new methods to enhance peripheral nerve repair.

16.42 IMMUNOLOGIC, PROANGIOGENIC AND NEUROGENIC ASSESSMENT OF ALLOGENIC EPINEURIUM OF THE HUMAN PERIPHERAL NERVE FOR POTENTIAL APPLICATION IN PREVENTION OF NEUROMA FORMATION

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Wroclaw, Poland

Introduction

New technologies supporting nerve regeneration in poly-trauma patients suffering from painful neuromas at surgical and hand or lower limb amputation sites are needed. Natural biologic material, the most immunologically neutral, would be appropriate as a protective barrier following peripheral nerve injury. We assessed the immunologic, neurogenic and proangiogenic properties of the human epineurium, for potential application in prevention of neuroma formation, as an allogeneic tissue.

Materials & Methods

Twenty-eight nerve samples, obtained from 10 deceased donors from the ilioinguinal nerves (n=19), and 9 samples taken from 5 sciatic nerves from limbs amputated due to critical limb ischemia, were examined. Cross-sectioned samples, and empty epineural sheath created after nerve fascicles removal using pull out technique, were prepared. The assessment included hematoxylin+eosin (H+E) for histology, and immunohistochemistry for: neurogenic (S-100, GFAP), proangiogenic (VEGF, CD31) and immunogenic (HLA-class-I, HLA-class-II, CD3, CD4, CD8, CD68) markers.

Results

Normal architecture of nerves was confirmed by H+E staining and by S-100 expression in all axons. Epineurium from deceased donors were characterized by: less intensive expression of HLA-class-I on vessel endothelium and HLA-class-II antigens on infiltrated cells; the presence of single T-lymphocytes; and moderate number of macrophages CD68+, as compared to epineurium from amputated limbs where T-lymphocytes were more abundant and formed clusters (>50 cells). The vessel density CD31+ and VEGF+ was greater in epineurium from deceased donors compared to these from amputated limb (3.42 ± 1.5 vs 2.57 ± 1.39 and 2.00 ± 0.99 vs 0.67 ± 0.53 ; $p=0.0002$ respectively).

Conclusions

Immunohistochemical analysis confirmed less immunogenic and higher proangiogenic properties of epineurium from deceased donors over amputated limb, which may serve as a potential biologic material for prevention of neuroma formation for allogenic recipients. Supported by grant POIG.01.01.02-02-003/08-00

16.50 EARLY DEVELOPMENT OF A BRAIN-BODY INTERFACE SYSTEM FOR UPPER LIMB REANIMATION FOLLOWING SPINAL CORD INJURY

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Introduction

Current brain-machine interface (BMI) technology restores lost function by decoding recorded cortical signals and encoding them to drive artificial devices. Several limitations exist and we propose that a brain body interface (BBI), where cortical signals are fed directly into paralyzed muscles, is superior. Neural plasticity is relied upon, rather than a decoder, to re-organize synapses and 'relearn' how to control movement. Our aim is to restore autonomous motor control in a non-human primate (NHP) using cortically driven stimulation of nerves via implantable nerve cuffs. To facilitate this, we have developed a selective, reversible paralysis model of elbow flexion in a NHP. The aim of this study was to demonstrate selective fascicular stimulation using acute and chronically implanted nerve cuffs.

Materials & Methods

8-channel stimulating cuffs were wrapped around sciatic nerves of Sprague Dawley rats (n=5) and C57 Black 6 mice (n=5). Cuff electrodes were connected to a Tucker-Davies stimulation/recording system. Electromyography (EMG) needle electrodes were inserted into the tibialis anterior (TA) and gastrocnemius (G) muscles to record muscle activity. Single pulses and pulse trains were delivered to each whilst pulse parameters were systematically varied. In one survival rat, a stimulating nerve cuff and EMG recording electrodes were implanted chronically to assess stability of the equipment.

Results

Muscle activity was recorded in all animals. In 9 animals, selective activation of tibial and common peroneal fascicles was possible, allowing the plotting of muscle recruitment curves as a function of stimulation amplitude. Following 30 days of chronic implantation, successful stimulation and recording was still possible.

Conclusions

We have shown that selective fascicular stimulation can be achieved using implantable cuff electrodes in sub-1mm nerves. These cuffs will be used to deliver cortical signals directly into upper limb nerves during reversible paralysis and, through operant conditioning and feedback, should enable the NHP to regain movement.

17.02 SUPPRESSED INFLAMMATORY GENE EXPRESSION DURING HUMAN HYPERTROPHIC SCAR FORMATION

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Amsterdam, The Netherlands

Introduction

Hypertrophic scar formation is a result of adverse cutaneous wound healing and its pathogenesis and time of onset is still poorly understood. A problem next to the lack of suitable animal models, is that frequently in research normal skin is compared to hypertrophic scar (HTscar) and not to normotrophic scar (NTscar) tissue. Another drawback is that often only one time period after wounding is studied, while scar formation is a dynamic process over a period of several months. In this prospective study, we compared the transcription of 32 genes involved in inflammation, angiogenesis and extracellular matrix (ECM) formation between normal and hypertrophic scar formers over a year.

Materials & Methods

Biopsies were obtained from pre-sternal skin before open-heart surgery, and pre-sternal scar tissue at 2, 4, 6, 12 and 52 weeks from 5 patients who developed HTscar and 6 patients who developed NTscar. Microarray analysis was performed and immunohistochemical staining was done to support the array results, and to study number and type of infiltrating macrophages.

Results

During HTscar formation RNA levels of inflammatory mediators (TNF α , IL-1 α , IL-1RN, bFGF, CCL2, CCL3, CXCL2, CXCR2, C3 and IL-10) were significantly ($p < 0.05$) decreased compared to NTscar formation over time, whereas levels for factors involved in matrix production, remodelling or degradation (Col3A1, THBS1, PLA1, TGF β 3) were significantly increased. The RNA data was confirmed by immuno-fluorescence protein staining of tissue sections for CCL2, bFGF and TGF- β 3. In NTscar an increased number of both CD68+ and CD163+ macrophages was observed at 2 weeks and in HTscar at 4 weeks after surgery.

Conclusions

These results indicate that a reduced initial inflammatory response results in a suppressed local but prolonged inflammation during HTscar formation. Our results suggest that early immune stimulatory therapies may improve scar quality.

17.14 EFFECTS OF LIPOSUCTION TRAUMA ON AXIAL PATTERN SKIN FLAP SURVIVAL IN EXPERIMENTAL RAT MODEL: CAN LIPOSUCTION PROVIDE A FLAP DELAY EFFECT

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Hakan SIRINOGLU, Nebil YESILOGLU
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Introduction

The opinion that traumatized areas have the risk of flap failure makes plastic surgeons restrict their indications in flap surgery. Liposuction is a surgical trauma for skin and soft tissue that may affect the vascularity. In this experimental study, effects of liposuction trauma on axial pattern skin flaps were investigated and the usability of the liposuction as an outpatient flap delay procedure was discussed.

Materials & Methods

Thirty-two Wistar albino rats were randomized in 4 groups (Figure 1). In all groups, a 6X6 cm sized superficial epigastric vessels pedicled skin flap was harvested and data that were obtained from laser Doppler flowmetry, digital photographic planimetry for necrotic/viable tissue proportions and histologic analysis were statistically analysed for significance (Figure 2).

Results

The areas of necrosis were significantly higher in control group than all other groups. However maximal viable flap areas were detected in combined suctioned and surgically delayed group (Gr. 4), difference was not significant as compared to only surgery (Gr. 2) and only liposuction groups (Gr. 3) ($p > 0.05$). There was no significant difference between Gr. 2 and Gr. 3 ($p > 0.05$) in terms of ratios of necrotic/viable areas, fibrosis, apoptosis, vascularization and inflammation which are significantly higher than control group ($p < 0.001$). Laser Doppler flowmetry results showed a significant increase in the blood flow in all study groups as compared to control group ($p < 0.001$). However combined suction and surgical delay groups showed no significant difference in laser Doppler as compared to other delay groups.

Conclusions

As it is one of the most common procedures in aesthetic surgery, liposuction may also be used as an alternative flap delay method as a less invasive and outpatient procedure in flap surgery to enhance the blood flow of axial pattern skin flaps.

17.22 ADIPOSE TISSUE EFFECT ON METASTASIS DEVELOPMENT IN HUMAN BREAST CANCER MODEL

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Introduction

It has been reported that isolated adipose stem-cells encourage migration and early metastasis. In order to mimic a surgical situation as realistic as possible, we developed a human breast cancer model to evaluate in vivo, if human adipose tissue (HAT) from abdominal lipoaspirates (AL) promotes tumour growth and invasion.

Materials & Methods

HAT was obtained from AL of 4 patients. Human breast cancer cell-line MDA-MB-468 was cultured with a lentiviral vector encoding a puromycin resistance gene and Cherry fluorescent protein. Viral infected cells were selected after puromycin culture. Animals were injected in left renal capsule and divided in 3 experimental groups. A) MDA-MB-468 cells (n=4). B) MDA-MB-468 cells/HAT (n=4), C) DMEMF-12 medium (Negative control, n=4). Metastatic development was monitored through In-Vivo Image System. Small Breast Epithelial Molecule (SBEM) and hypoxanthine-guanine-phosphoribosyltransferase from human (HPRTh, human tissue control) and mice (HPRTr, murine tissue control) expression (ΔCt) were analysed by RT-PCR to detect multi-focal metastases in right/left renal capsule (rRC, IRC), liver, spleen and pancreas.

Results

Metastasis was observed between days 37-44 post-injection. No significant differences were found in survival rates between groups (A: 157 ± 42.60 ; B: 169 ± 40.17 days). All samples expressed HPRTr. HPRTh and SBEM were expressed in IRC from all A (13.25 ± 0.91 , 15.39 ± 3.04) and B (11.56 ± 1.30 , 14.82 ± 5.43) mice, spleen (A: n=3, 19.54 ± 0.94 , 7.36 ± 2.82 ; B: n=3, 19.25 ± 1.61 , 7.99 ± 3.62), liver (A: n=2, 16.49 ± 2.35 , 15.1 ± 10.64 ; B: n=1, 20.12 ± 0.32 , 12.93 ± 0.71), pancreas (A: n=1, 12.03 ± 0.17 , 7.37 ± 0.36 ; B: n=1, 16.06 ± 0.27 , 5.71 ± 0.27) and rRC (A: n=2, 17.66 ± 0.85 , 8.32 ± 5.09 ; B: n=1, 17.31 ± 0.51 , 11.98 ± 0.52). No statistical differences were found between groups in HPRTh and SBEM expression.

Conclusions

These results suggested that HAT used for immediate reconstruction after breast-conserving surgery does not promote metastasis development in case of existing residual breast cancer cells in proximity.

17.30 SEPTUM-BASED CERVICAL LYMPH NODE-ADIPO-CUTANEOUS FLAP: A NEW VASCULARIZED LYMPHNODE TRANSFER MODEL IN RAT

Liliana BARONE ADESI, Giuseppe VISCONTI, Marzia SALGARELLO
Rome, Italy

Introduction

Besides the reported clinical experiences with vascularized lymph node transfer in the treatment of lymphedema are promising, the results remain unpredictable. In this setting, experimental research on the matter is of high interest for the plastic surgery community. Nevertheless the rat is a cost-effective and widely accepted animal for experimental microsurgery, a limited number of vascularized lymph node transfer models are available in rats. In this paper, the authors report the applied anatomy and step-by-step surgical technique of a new cervical lymph node-adipo-cutaneous vascularized flap.

Materials & Methods

Between March and June 2014, 18 consecutive Wistar rats (9 female and 9 male) were used in this study. Of these, three rats were used to investigate the neck-applied anatomy both intraoperatively and with histological topographic investigations. Fifteen rats underwent cervical lymph node-adipo-cutaneous flap harvesting and, in ten of them, free flap transfer in the inguinal region was performed.

Results

Microvascular and cervical lymph node anatomy was constant in both histological and surgical samples. The flap, based on innominate septum and carrying 2 to 3 lymph nodes, can be constructed on a supermicrovascular, microvascular or on a combined pedicle. Donor-site morbidity was minimal and six out of seven flaps did survive after inguinal revascularisation.

Conclusions

The constant vascular anatomy, the possibility to include a skin monitoring paddle to tailored the number of lymph nodes to be included as well as to minimize donor-site morbidity, makes this flap a safe, reliable and versatile vascularized lymph node transfer model in rat.

FRIDAY 29 MAY 2015

08.00-10.00 SCIENTIFIC SESSION 3 - *MICROSURGERY*

Moderators

Pietro GIOVANOLI - Zurich, Switzerland

Fabrizio SCHONAUER - Naples, Italy

**08.00 COMPOSITE ORBITAL RECONSTRUCTION USING
THE VASCULARIZED SEGMENTALIZED OSTEO-
FASCIO-CUTANEOUS FIBULA FLAP**

Kalle LUNDGREN, Martin HALLE,

Ann-Charlotte DOCHERTY-SKOGH, Giorgio DE SANTIS

Stockholm, Sweden

Introduction

Reconstruction of composite orbital defects presents a surgical challenge. After tumor resection, there is often a need for skull base and/or maxillary obliteration, while the orbit should be covered and reformed but not obliterated, for later accommodation of an episthesis. We present a rationale for a near anatomical reconstruction of the orbit while obliterating dead space in the surrounding tissues using the segmentalized osteo-fascia-cutaneous fibula flap. Before transfer to the recipient site, the facial defect is measured and a cutting-template for the fibula is made corresponding to the bony orbit. The segmentalized bone was osteosynthesized to the facial skeleton using microplates and revascularized. Hence, an orbital depth is created by the fibula as the orbital rims whereas the fascio-cutaneous part of the flap may be used for lining of the orbit and obliteration of the skull base and/or the maxillary region.

Materials & Methods

Six sequential patients were treated at our units. All patients presented with advanced tumorous disease involving the orbit including Psammomatoid fibroma, Amelioblastoma, Adenocystic carcinoma (2 pts), Salivary gland carcinoma and Squamous cell carcinoma of the lacrimal duct. Surgical defects after resection were classified by Brown and Shaw as ranging from 3b to 5.

Results

Flap survival was 100%. Patients were followed clinically and by CT/MR for 6m-9years without recurrence of disease.

All orbits allowed for fitment of a standard orbital epistheses, indicating a sufficient depth and near anatomical shape of the new orbit. Minor skin defects occurred in two patients after radiotherapy, but were covered with local skin advancement.

Conclusions

We describe a successful surgical regimen for reconstructing composite orbital defects using a single segmentalized fibula osteo-fascia-cutaneous flap. This allows for a one-procedure recreation of a new orbit with a depth and shape allowing for fitment of a standard episthesis, and simultaneous obliteration and soft tissue reconstruction.

8.08 AESTHETIC AND FUNCTIONAL SUBUNIT RECONSTRUCTION OF COMPOSITE FACIAL GUNSHOT WOUND

Konstantinos APOSTOLOU, Dimitrios ANTERRIOTIS,
Dimosthenis TSOOTSOS, Andreas GRAVVANIS
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Introduction

We analyse a self-inflicted gunshot mandibular-facial defect that was early reconstructed following the aesthetic and functional subunit reconstruction principles. Case Report: A 49-year-old male sustained a close-range gunshot injury following a suicide attempt, causing total disfigured anatomy of the left half of his face. The medical rapid-prototyping model, revealed a 6-cm defect of the body of the mandible as well as significant soft tissue loss.

Materials & Methods

There was a need to reconstruct the left mandibular body, cheek mucosa, cheek skin, and the zygomaticus major muscle. A single-stage reconstruction was planned. A chimeric anterolateral-thigh flap with 3 components was used: a skin paddle to reconstruct the cheek skin, a second skin paddle to reconstruct the oral mucosa and a piece of functioning vastus-lateralis muscle to animate the face. The lateral circumflex femoral vessels were anastomosed to the ipsilateral facial whilst the muscle's motor nerve was sutured to the ipsilateral marginal mandibular. An osseous fibula flap was harvested, and a pre-bent reconstruction plate fabricated according to the rapid-prototyping mandibular model was used to shape the flap. Mini-plates were used for the fixation of the fibula in place while the peroneal was anastomosed with the contralateral facial vessels.

Results

There were no early or late complications. Two years postoperatively, the patient presents with a satisfactory functional and aesthetic result. The vascularized bone was completely incorporated in the area, producing a smooth and symmetrical jaw contour, whilst the functioning muscle resulted in a spontaneous smile. Most importantly, he is able to eat and speak normally, and has returned to his work and social life.

Conclusions

This is the first report of a chimeric functioning muscle in a gunshot facial wound. The early restoration, facilitated by rapid-prototyping model, of each subunit involved with the use of the most 'like' replacement tissues, resulted in optimal outcomes.

8.16 COMBINING COMPUTED TOMOGRAPHIC ANGIOGRAPHY (CTA) MAPPING OF THE PERONEAL ARTERY PERFORATORS WITH COMPUTER-AIDED DESIGN AND MODELING (CAD/CAM) FOR FREE FIBULA FLAP MANDIBLE RECONSTRUCTION

Patrick GARVEY, Noopur GANGOPADHYAY, Mark VILLA,
Edward CHANG, Jesse SELBER
Houston, Texas, U.S.A.

Introduction

Computer-aided design and modeling (CAD/CAM) have been applied to fibula flap reconstruction preoperatively to aid in surgical planning and execution. We have developed a protocol to combine CAD/CAM modeling with computed tomography angiography (CTA) to map perforators of the peroneal artery for optimized placement of the skin island. We hypothesized that the use of CAD/CAM+CTA decreased operative times and improved patient outcomes with respect to fewer surgical site occurrences and lesser need for revisional surgeries.

Materials & Methods

We retrospectively compared consecutive patients (N=148) at a single major US cancer center who underwent mandibulectomy reconstruction with free fibula flaps for whom CAD/CAM+CTA were (N=33) or were not (N=120) employed preoperatively over a six-year period (2008-2014). To minimize selection bias, we only included patients of surgeons who selectively employed both CAD/CAM+CTA as well as conventional fibula flap harvest in the study. We employed logistic regression analysis to identify potential associations between patient and reconstructive factors and postoperative outcomes.

Results

The patient characteristics were similar between the two groups. Flap ischemia time was significantly shorter in the CAD/CAM+CTA group (82 vs. 103 minutes; $p < 0.01$), while total operative time was similar between the two groups (612 vs. 641 minutes; $p = 0.28$). Surgical complication rates, including failure rates, were similar between groups ($p = 0.39$). There was a trend towards less need for surgical revision for contour deformity and asymmetry in the CAD/CAM+CTA group (7.1%) than in those without preoperative planning (20.8%), although this difference did not reach statistical significance ($p = 0.09$).

Conclusions

There appear to be advantages for preoperative planning combining the use of CAD/CAM and CTA for mandibular reconstruction with free fibula flaps. Specifically this strategy appears to facilitate shorter ischemia times and improved postoperative outcomes. Future studies are needed to more specifically define the patients who will most benefit from this technology.

8.28 RECONSTRUCTION MICROSURGERY IN THE ELDERLY. EXTENDING THE LIMITS

Jan PLOCK, Maurizio CALCAGNI, Nicole LINDENBLATT, Gerhard HUBER, Pietro GIOVANOLI
Zürich, Switzerland

Introduction

Reconstructive microsurgery has evolved significantly over the last four decades. However indications have changed over time and contraindications should be revisited to keep the field cutting edge surgery. The aim of this paper was to review risk factors and outcomes in patients >78 years.

Materials & Methods

We analysed personal and surgical data, including anesthesiological preoperative risk assessment (ASA), comorbidities, operation time, complications and hospital stay over the last 3 years in our institution. We collected 18 patients with a mean age of 82.8 ± 5.1 years. A majority of these patients was undergoing facial and oral cancer resection ($n=13$), while the others underwent defect reconstruction in the upper and lower limb ($n=5$). An individual approach was chosen using muscular, fascio-cutaneous, and arterialized venous flaps. We had two flap losses. Five Patients underwent a one-stage procedure including cancer resection or debridement and immediate flap coverage. In two cases secondary coverage with a split thickness skin graft of the radial forearm flap donor site was necessary, after using a dermal substitute for coverage during the initial operation. The mean operative time was not longer than in younger patients.

Results

One patient died on the third postoperative day due to a cardiac event. Although the patients had multiple co-morbidities, they represent an average population of aged persons in a superior public health care system. One patient was classified ASA I, nine ASA II, five ASA III and three ASA IV preoperatively.

Conclusions

While this may not necessarily be true for other countries, we conclude that reconstructive microsurgery under general anesthesia can be performed safely, reliably and predictably in the elderly.

There may however be a selection bias as primarily people with a better health status over their lifespan may reach the 9th decade of life. Compared to the pertinent literature this is the oldest population analysed so far.

8.36 THE TRIMMED CORTICO-PERIOSTEAL MEDIAL FEMORAL CONDYLE FREE FLAP FOR RECONSTRUCTION OF THE TRACHEA

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Jian FARHADI, Hung-Chi CHEN
Taichung, Taiwan

Introduction

The complex anatomical structure of the trachea, alongside its important functional role, makes any such reconstruction particularly challenging. A large variety of reconstruction techniques have been described, including vascularized or avascular allografts and autografts, synthetic prosthesis and scaffolds, and most recently tissue engineering. Here we present our experience with 2 cases where segmental defects of the trachea were reconstructed using a trimmed cortico-periosteal free flap from the medial femoral condyle (MFC).

Materials & Methods

In our unit we carried out trachea reconstruction in 2 male patients (58 and 62 years-old) using a MFC cortico-periosteal free flap. Both patients had previously undergone resection of hypo-pharyngeal cancer, reconstruction with ALT flap and radiotherapy. Long-term tracheostomy tube resulted in destruction, and stricture formation of a segment of tracheal cartilage (4 and 4.5 cm), causing airway obstruction and recurrent respiratory infections. Severe trachea obstruction was confirmed with flexible bronchoscopy and dynamic CT. The affected cartilaginous segment was resected, while the posterior membranous trachea was left intact. The MFC flap was harvested on the descending genicular pedicle. The cortical bone was trimmed with a bone-burr and the flap inset in an onlay fashion by fixing its lateral extensions to healthy cartilage. Recipient vessels consisted of the transverse cervical pedicle and the external jugular vein. Tensionless wound closure was achieved with a pedicled delto-pectoral flap.

Results

Both flaps survived with no peri-operative complications. Both patients were able to mobilize fully after 3-weeks and residual pain and numbness on the donor site resolved by 3-months. At 3-months follow-up flexible bronchoscopy and dynamic CT confirmed adequate bone vascularity and patency of the trachea, with the degree of obstruction improved from severe to mild.

Conclusions

Our results suggest that the cortico-periosteal MFC flap is a valuable, safe option in restoring moderate-length cartilaginous defects of the trachea and improving its patency.

8.44 NEW APPROACH FOR RECONSTRUCTION OF TRACHEAL DEFECTS USING CORTICOPERIOSTEAL MEDIAL FEMORAL CONDYLE FREE FLAP

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Introduction

Tracheal reconstruction is challenging because of its function as a conduit for air and its multilayer structure. Multiple approaches at replacing long tracheal segments are described including the use of autologous, allogeneic and synthetic tissues. The medial femoral condyle corticoperiosteal free flap seems to meet the reconstructive requirements for tracheal reconstruction.

Material & Methods

We report on three patients, 75 and 81 year old woman, and 28 year old man, suffering from a cervical tracheal fistula that had developed as a serious complication after tracheotomy in two cases and strumectomy in one case. In all patients the anterior half of the circumference of the trachea and therefore almost all of the tracheal scaffold, just below the cricoid cartilage up to the 4th tracheal cartilage, had been lost. A free corticoperiosteal flap was bent in a reverse U-shape and used to reconstruct the tracheal scaffold while the inner lining was achieved by local skin flaps. The inclusion of the skin island directly located over the corticoperiosteal(-cutaneous) flap in two patients and local transposition flaps in one patient served as outer coverage of the tracheal reconstruction.

Results

All patients were extubated immediately after surgery without complications. In one patient air leakage occurred postoperatively but healed without additional surgery. The postoperative course was otherwise uneventful. Postoperative bronchoscopy has shown an intact and stable inner lining. Until now (14, 12 and 10 months) the reconstructed trachea has retained its shape, diameter and airway function. None of the patients is restricted in the mobility of the neck. The donor site healing was uneventful in all patients.

Conclusions

The properties of the medial femoral condyle corticoperiosteal free flap meet the special reconstructive requirements of extended tracheal defects and allow a reliable one-stage reconstruction with well-vascularized tissue, being more than a simple tube.

8.54 IMPROVED HEAD AND NECK FREE FLAP OUTCOME: EFFECTS OF A TREATMENT PROTOCOL ADJUSTMENT FROM PRE- TO POSTOPERATIVE RADIOTHERAPY

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Lalle HAMMERSTEDT, Caroline GAHM, Martin HALLE
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Introduction

The impact of preoperative radiotherapy on microvascular reconstructive surgery outcome has been a subject of debate. However, data are conflicting and often dependent on local treatment protocols. We have studied the effects of radiotherapy in a unique single center setting where a treatment protocol change was undertaken from pre- to postoperative radiotherapy administration for microsurgical head and neck reconstructions.

Materials & Methods

A cohort study was conducted for 200 consecutive head and neck free flap cases where 100 were operated on before and 100 after the treatment protocol adjustment 2006. Only direct cancer reconstructions were included. Complication rates of anastomosis related (flap necrosis) and flap bed related (infection, fistula and wound dehiscence) complications were compared between irradiated and non-irradiated patients. A multivariate analysis was performed to correct for treatment period.

Results

Due to cases of cancer recurrence, a total of 126 patients had received radiotherapy before reconstruction. There were no significant differences in demographic data or risk factors between irradiated and non-irradiated cases. Irradiated cases had a higher rate of both flap loss (9.5 versus 1.4%; $p=0.034$) and flap bed related complications (29 versus 13%; $p=0.014$). However, after multivariate analysis there was only a significant relationship between preoperative irradiation and infection (O.R.=2.51; $p=0.033$) and fistula formation (O.R.=3.13; $p=0.034$).

Conclusions

The current single center study clearly indicates that preoperative radiotherapy is a risk factor for both infection and fistula formation, most likely related to impaired microcirculation of the flap bed.

The effect of radiotherapy on larger conduit vessels (i.e. the anastomosis) was related to treatment period and possibly associated with technical factors.

We suggest postoperative radiotherapy administration whenever possible for oncological reasons, otherwise liberal use of antibiotics and meticulous flap inseting in order to prevent radiation related infection and fistula formation.

9.02 MANAGEMENT STRATEGIES FOR FAILED ESOPHAGEAL RECONSTRUCTION WITH GASTRIC PULL-UP: SALVAGE WITH INTESTINAL TRANSFERS

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Introduction

Gastric pull-up (GPU) is one of the most recognised procedures for restoring the continuity of the alimentary tract. Yet, complications due to anastomotic problems are reported to be as high as 25% after this procedure. Managing the neck with anastomotic leakage or stricture following failed GPU and/or radiotherapy is formidable. We report our method and results with failed GPU procedure management.

Materials & Methods

19 cases referred to our department with failed esophageal reconstruction following GPU procedure were included in this study. Retrospective data from the patient charts was obtained and analysed. Of the 19 patients, 18 had undergone GPU procedure for reconstruction after cancer resection (n=18, mean age 49y) and one for idiopathic esophagitis (n=1, mean age 45y). Fifteen patients presented with severe stricture formation and 4 patients with leakage from the anastomotic site. Average time between the GPU and salvage procedures was 7,3 months for patients with stricture formation and 15.5 days for patients with leakage. Pedicled colon interposition (n=8) was used when the upper end of the gastric tube was located below the sternoclavicular junction. A free jejunal flap (n=11) was utilised when defects were located at the neck (above the sternoclavicular junction). The average follow-up for the patients with tumor resection was 33 months.

Results

In all patients salvage procedures with intestinal flap transfer were successful. Post-operative period was uneventful except of two patients with pedicled colon interposition who presented minor leakage post-operatively (10,5%). This was treated with conservative means, leading to spontaneous healing. All patients resumed smooth oral intake eventually; 16 patients were able to feed with solid diet with 3 patients able to tolerate only soft diet.

Conclusions

Intestinal tissues can be safely and successfully transferred as salvage procedures, with meticulous technique, careful patient selection and individual flap design. With the methods described as back-up armaments, gastric pull-up remains a good procedure for esophageal reconstruction.

9.14 TRAPEZIUS MUSCLE RECONSTRUCTION WITH A FREE INNERVATED GRACILIS FLAP

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Introduction

Very little has been written about trapezius reconstruction, although the morbidity of its resection is relevant, causing shoulder drop and several limitations in the activities of daily living. We present a case of trapezius reconstruction after tumor resection in a 31 years old lady by means of a free innervated gracilis flap.

Materials & Methods

A 31 year old woman underwent upper trapezius muscle resection for a desmoid tumor that included the muscle hilum. A free transverse musculocutaneous gracilis flap was used to replace the muscle and connected to the transverse cervical vessels and the spinal accessory nerve (as distally as possible to minimize length of the obturator nerve stump). The skin of the flap was resected for cosmetic purposes after motor recovery and skin expansion.

Results

Signs of contraction appeared after 3 months from surgery. The patient experienced no shoulder drop and resumed her normal activities like swimming, brushing her hair and picking up high objects. EMG study confirmed muscle reinnervation. Shoulder power (the isolated trapezius power could not be measured) is M5 like the contralateral. At 3 years follow-up the patient is free from disease and the control MRI shows restoration of muscular integrity by means of the gracilis.

Conclusions

This is the first report of functional trapezius reconstruction after resection for cancer. Considered the rarity of the disease and the paucity of options available, description of an effective technique can be useful. The use of a gracilis muscle guarantees an anatomical reconstruction of the upper trapezius and allows restoration of motion and avoidance of the morbidity of trapezius paralysis, which strongly affects daily living activities. A short obturator nerve stump facilitates fast recovery.

9.22 SENSATE ANTEROLATERAL THIGH PERFORATOR FLAP FOR ISCHIATIC SORES RECONSTRUCTION IN MENINGOMYELOCELE PATIENTS

Marco PAGNONI, Benedetto LONGO, Maria Rosaria MASTRANGELI, Renato MONACO, Fabio SANTANELLI DI POMPEO
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Introduction

Recurring pressure sores are a frequent complication in meningomyelocele patients, for their limitation in motility and scarce ability to monitor the pressure applied on insensate areas. In such patients conservative treatments are not resolute and an effective surgical approach is required. Different flaps have been used for ischiatic pressure sore repair, however, as all cases reported in literature were on paraplegic patients, the chance to include sensitive branches within the flap was not considered. We report the utilization of the sensate pedicled anterolateral thigh (ALT) perforator flap for ischiatic sores reconstruction in meningomyelocele patients with spinal injury below L2, in which the lateral cutaneous femoral nerve is intact.

Materials & Methods

Between May 2011 and September 2013, five patients underwent transfer of a sensate pedicled ALT flap by an intermuscular passageway through the upper thigh to reach the ischial defect. The LCFN territory of distribution was identified by ultrasound-guided block. Within this area, sensitivity was later assessed with the Pressure-Specified Sensory Device, in order to properly harvest the sensate ALT flap from the thigh. At minimum 12-months follow-up, postoperative measurement of cutaneous pressure thresholds was performed to assess the persistence of sensation on the reconstructed area.

Results

All flaps reached the ischial defect harmlessly and healing was uneventful with neither immediate nor late complications. Each patient presented cutaneous sensitivity at donor site and showed persistence of sensitivity at the reconstructed area. No recurrent ischiatic sore was observed at mean follow-up of 26.4 months.

Conclusions

The sensate pedicled ALT flap is a valuable solution for coverage of recurrent ischial sores in meningomyelocele patients, in which pressure consciousness is fundamental. The intermuscular passageway allows to reduce the distance between flap's vascular pedicle origin and ischial defect, hence to use the more reliable skin from the middle third of the anterolateral thigh.

9.30 PREDICTABILITY OF PERFORATORS IN THE VASCULAR TERRITORY OF THE POSTERIOR TIBIAL ARTERY (PTA): A FRESH CADAVERIC STUDY AND CLINICAL IMPLICATIONS

Georgios DRIMOURAS, Fotios-Filippos KARANTONIS, Epameinondas KOSTOPOULOS, Efstathios ANTONIOU, Othon PAPADOPOULOS
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Introduction

The aim of this study is to investigate if perforators of the PTA to the inner surface of the lower leg arise in predictable anatomic locations.

Materials & Methods

Thirty anatomical dissections of the inner aspect of the lower leg were performed on 25 adult fresh cadavers. The number, location and characteristics of perforators were recorded (course, length, diameter and directionality). Measurements were taken in reference to anatomical landmarks. Perforator clusters to 5cm intervals from the medial malleolus were recorded and analysed. Moreover, the clinical arm of this study consisted of 8 patients in need of lower leg reconstruction. Each perforator position was confirmed by a handheld Doppler preoperatively. Follow up ended upon complete healing.

Results

A total of 155 perforators were identified (average number 5 per leg; diameter 1.0mm). Septocutaneous perforators predominated, followed by musculocutaneous and septomusculocutaneous. The majority were concentrated in the middle and distal tertile. Two comitant veins accompanied each perforator. Length and diameter was related to perforator location. There was a significant association between perforator length and type. Cluster analysis revealed reliable perforators at 6-10cm, 11-15cm and 16-20cm intervals. Two constant perforators were found; one in the middle (± 2 cm) between the inner tibial condyle and the medial malleolus and another at a distance of 5-7cm from the medial malleolus. Specifically 8 lower leg reconstructions were performed using propeller and keystone flaps that were vascularized by these constant PTA perforators. No major complications arose and all of the flaps healed appropriately.

Conclusions

Lower leg reconstruction can be challenging. The results of the cadaveric study are applicable in clinical practice. The predictability of the anatomic position of PTA perforators is delineated by our findings. Further anatomic and clinical research may solidify our results and will certainly determine the design of perforator flaps for lower leg reconstruction.

9.38 ONE-STAGE TENDON RECONSTRUCTION OF ISOLATED AND COMBINED TENDON DEFECTS WITH THE VASCULARIZED ADDUCTOR MAGNUS TENDON GRAFT

Maximilian NEUWIRTH, Heinz BÜRGER, Wolfgang PALLE,
Matthias RAB
Klagenfurt, Austria

Introduction

Due to the constant anatomy and the reconstructive potential the medial femoral condyle region is considered to be an important source for microsurgical procedures. Regarding the various applications and the low donor site morbidity the adductor magnus tendon is suited to be an ideal donor graft for the reconstruction of isolated or combined tendon defects on the upper and lower extremity. In this series we present our experience with the vascularized adductor magnus tendon graft in the reconstruction of isolated and combined osteo-tendo-cutaneous defects.

Materials & Methods

From 2011 to 2014 tendon reconstruction with a vascularized adductor magnus graft was performed in five patients. On the upper extremity the vascularized adductor magnus tendon graft was used to reconstruct the extensor tendon system in two cases and the extensor pollicis longus tendon in one case. On the lower extremity defects of the Achilles tendon and the extensor hallucis longus tendon were reconstructed with this graft. In two cases a vascularized adductor magnus graft was performed as a single procedure, while in three cases this graft was used as part of a osteo-tendo-fasciocutaneous composit flap.

Results

The postoperative course was uneventful in all patients. Primary healing of the flaps could be observed in each case. A further surgery in the late postoperative had to be performed in one case. At the latest follow-up all of the patients showed good functional results without any complaints at the donor sites. Patient satisfaction with the procedure and the functional outcome was high.

Conclusions

With respect to a strict indication process, the harvest of the vascularized adductor magnus graft presents a reliable method and the use of this graft is approved to be versatile in the hands of a skilled microsurgeon.

9.46 DIABETIC LOWER LIMB RECONSTRUCTION: REVERSE NEURO CUTANEOUS VS PROPELLER PERFORATOR FLAPS

Efterpi DEMIRI, Dimitrios DIONYSSIOU, Leonidas PAVLIDIS,
Anastasios GOMOLIS, Antonios PAPACONSTANTINOU
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Introduction

This retrospective study aims to compare outcomes of reconstructing diabetic lower limbs using reverse neurocutaneous and propeller perforator flaps, with an emphasis on indications and complication rates.

Materials & Methods

We reviewed the files of forty diabetic patients (aged 45-83 years), who underwent reconstruction of acute or chronic wounds of the lower leg and foot, between 2005 and 2013. Twenty-five patients (Group A) had a reverse neurocutaneous flap (NCF); 10 lateral supramalleolar and 15 sural flaps. Fifteen patients (Group B) had a propeller flap (PF) based on perforators of the peroneal (n=9) or posterior tibial artery (n=6). All patients had a preoperative Doppler examination to identify the nutrient artery of the flap. In both groups, we recorded the defects' characteristics (location, size), postoperative complications and time to heal. Follow up ranged from 6 to 50 months.

Results

Location of the defect concerned the Achilles zone (n=12), foot dorsum (n=9), lateral aspect of the foot (n=8), posterior heel (n=11), with an equal distribution in both groups. Mean size of the defect was 40.5cm² in Group A (ranging from 20-64cm²) and 18cm² in Group B (12-40cm²). Uneventful healing was recorded in 13/25 neurocutaneous flaps (52%) and 8/15 propeller flaps (53.3%); complications included two complete flap losses (one NCF, one PF), fifteen distal flap necroses (10 NCFs, 5 PFs), twelve delayed wounds' healing (9 NCFs, 3 PFs). Secondary surgeries were required in 11 NCF and 6 PF patients. Mean heal time was 47.1 and 40.7days for Group A and B, respectively. All patients, except one NCF case, which resulted in leg amputation, returned to previous levels of ambulation.

Conclusions

Both reverse neurocutaneous and propeller flaps provide reliable alternative options for reconstructing diabetic lower limb defects; neurocutaneous flaps consist better indications for larger and more distal defects but might be associated to longer healing times.

9.54 TOTAL CALCANEAL RECONSTRUCTION USING A MASSIVE BONE ALLOGRAFT AND A PEDICLED OSTEOCUTANEOUS FIBULA FLAP

Christian BONDE, Werner HETTWER, Michael PETERSEN,
Lisa TOFT JENSEN
Copenhagen, Denmark

Introduction

Reconstruction of the calcaneus is a challenging procedure due to the anatomy and mechanical properties of the heel bone. In case of malignant bone tumours of the calcaneus, amputation is often the preferred surgical treatment as it is difficult to achieve wide margins and the reconstructive options after calcanectomy are limited. Capanna originally described a technique for treatment of long limp segmental bony defects using a free fibular flap placed within the intramedullary canal of an allograft. Other authors have presented the use of a pedicled fibula flap for the treatment of calcaneal malignancies. We present how the principles of the Capanna reconstruction can be adapted to reconstruct the calcaneus using a massive bone allograft and a pedicled fibula flap, thus avoiding amputation.

Materials & Methods

Two girls (aged 5 and 16) presented with Ewings sarcoma of the calcaneus. Both received pre- and post-operative chemotherapy. In both cases a limb preserving calcanectomy were performed. In one patient, a femoral head allograft was fitted to replace the removed calcaneus, and in the other, a calcaneus allograft was used. The allograft was fixed to the talus and cuboid bone. In both, a distal based, pedicled fibula flap were used for reconstruction of the soft tissue defect and the vascularised fibula bone was fitted into the allograft as a vascularized inlay and fixed using staples.

Results

The patients were allowed weight bearing in an ankle brace when CT confirmed bone healing and incorporation of the fibula into the allograft, at 3 months and 6 months respectively. Full weight bearing without brace was allowed after 8 months in both cases. There were no allograft fractures and no infections.

Conclusions

A pedicled fibula flap combined with a massive allograft is an excellent option for reconstruction of the calcaneus after total extirpation of the bone due to malignancy.

10.30-12.30 **SCIENTIFIC SESSION 4 –
FACIAL & CRANIAL RECONSTRUCTION**
Moderators
Anna ELANDER – Gothenburg, Sweden
Brigitte PITTET-CUÉNOD – Geneva, Switzerland

10.30 **Introduction of the Leonard R. Rubin -
AAPS Best Paper Award Winner**
Stephan ARIYAN, AAPS President

10.32 **EAR RECONSTRUCTION WITH A PHDPE
IMPLANT: A TWENTY-THREE YEAR EXPERIENCE
WITH 1042 EARS**

John F. REINISCH, Wai Yee LI
Beverly Hills, California, U.S.A.

Introduction

Porous high-density polyethylene (pHDPE) ear reconstruction produces a realistic-looking ear. Although popular among parents of children with microtia, it has not gained widespread acceptance among reconstructive surgeons. We present the world's largest series of ear reconstructions with a pHDPE implant.

Materials & Methods

We conducted a retrospective review of all patients who had undergone pHDPE ear reconstruction, between 1991 and 2013. We recorded the history, gender, age at surgery, hospital stay and rates of infections, exposure and fracture.

A total of 1042 pHDPE ear reconstructions were performed. There were 978 primary ear reconstructions for microtia (Figure 1). Of these cases, 301 were done with or after an ear canal reconstruction (Figure 2). An additional 59 were performed as a salvage procedure, following failed or unsatisfactory ear reconstruction (Figure 3) and 5 were performed after trauma. The median age at the time of primary surgery was 4 years and 7 months, ranging from 2.5 to 59 years.

Results

An early series (1993-1995) demonstrated high fracture and exposure rates of 25% and 44% respectively. With refinements of both the surgical technique and implant, the fracture rate has dropped to 1.5%. With implant modification, no fractures have occurred in the last 3.5 years. The current early exposure rate is 4%, with late exposure rate, (> one year post-surgery), less than 1%. Infection and hematoma rates are negligible. Since 1995, all but two surgeries have been performed as an outpatient. In the last four years, no post-operative drains have been used. Salvage of 76 unsatisfactory prior ear reconstructions has been successful in all cases.

Conclusions

The single-stage technique gives a realistic-looking ear, and can be performed as an outpatient, before kindergarten without a chest or scalp scar. The ability to perform simultaneous atresia and microtia repair is a further advantage. As a salvage procedure, it is often the only acceptable reconstructive option, particularly in bilateral patients, who have had failed or aesthetically unacceptable cartilage reconstruction.

10.40 GROWTH OF EARS RECONSTRUCTED FROM AUTOLOGOUS RIB CARTILAGE

Sven Olof WIKSTROM, Martin OBERG, Emma ROOS
Malmö, Sweden

Introduction

Microtia is a congenital abnormality characterized by a deformed or absent auricle, which can be reconstructed surgically using autologous rib cartilage. Long-term symmetry in size is an important goal. The optimal age for surgery and sizing of the framework is still under debate, as it is not clearly shown if the reconstructed ear grows. The objective of this study was to determine if the reconstructed ear changes in size and if it is comparable with the growth of the normal ear.

Materials & Methods

Twenty-two patients were selected in this retrospective study. Digital morphometry was used to measure the length of the reconstructed and normal ears. A first photo had been taken after the reconstruction at a median of 11.2 years (8.0-12.5) of age and a second photo at a median of 16.3 years (range 14.5-21.6). The median follow-up time was 5.6 years (range 2.1-10.6). The differences in length in the first and second photo were calculated and paired students' t tests and Mann Whitney U tests were used for the analysis.

Results

The mean growth of the reconstructed ears was 0.62 cm (95% CI 0.43-0.81) and that of the normal ears was 0.53 cm (95% CI 0.38-0.68). There was no significant difference between the growth of the normal and the reconstructed ears ($p=0.26$).

Conclusions

The reconstructed ears grow during the studied time interval. This is most likely due to growth of the actual cartilage. There is no significant difference of the growth on the reconstructed and normal sides.

10.48 AN ANTI-CLEFT LOOK AESTHETIC RHINOPLASTY FOR UNILATERAL CLEFT LIP NOSE USING A NEW TIP CARTILAGINOUS GRAFT

Amin BELMAHI
Rabat, Morocco

Introduction

The bulbous tip, the nostril apex overhang and the caudal displacement of the anterior part of the ala are still responsible for a characteristic cleft look in many adult patients with unilateral cleft lip nose (UCLN), even with a good initial management of the upper lip and nose. Many techniques have been described to correct such deformities but the good aesthetic results are fickle. An aesthetic rhinoplasty using a new tip cartilaginous graft and allowing regularly an excellent correction of these deformities is described below.

Materials & Methods

From 2007 to 2014, 65 adult patients presenting essentially the above deformities have benefited from an aesthetic open rhinoplasty, including this graft by the author. After skeletonization of the dorsal nasal skin, resection of the dorsal hump, lateral and medial osteotomies, the pathological lateral crura (LC) is dissected from the underlying mucosa, suspended to the ipsilateral upper lateral cartilage and onlay grafted, which makes it symmetrical to the opposite LC. This tip graft, originating from the septum, is then cut roughly like a triangle: its base, slightly above the domes, is asymmetric due to its extension by a tailored triangular arm to the new triangle of CONVERSE created by the suspension of the LC; this extension treats the nostril apex overhang by allowing, at closure, a natural moulding of the skin at this level. Its summit is located at the upper third of the columella, and its edges are sutured to the conjoined medial crura reinforced by a columellar strut.

Results

In all these patients, the cleft look has disappeared. All these noses have a good tip projection and definition with quasi-symmetrical nostrils. No complications are reported with a mean follow-up of 3 years.

Conclusions

For such deformities of the lower third of UCLN, the anti-cleft look effect of this rhinoplasty is real.

11.00 LEVATOR SHORTENING/REINSERTION IS AN EFFECTIVE METHOD FOR BLEPHAROPTOSIS CORRECTION

Ingrid SCHLENZ, Christoph GRILL
Vienna, Austria

Introduction

Blepharoptosis is defined as an abnormal drooping of the upper eyelid with partial impairment of the visual field. It may be caused by various abnormalities, both congenital and acquired with senile ptosis being the most common form of all. In the literature more than 100 different techniques are described for surgical repair with revision rates up to 72%. We report our 8-year experience with the anterior levator shortening/reinsertion technique.

Materials & Methods

Between 11/06 and 5/14 171 eyelids (90 patients) were treated with the anterior levator shortening/reinsertion technique by a single surgeon under local anaesthesia. Three PDS sutures were used for reinsertion of the shortened levator aponeurosis to the tarsal plate with intraoperative cooperation of the patient in supine position. Preoperative workup included perimetry, ophthalmologic and neurologic examination, Hering's test, measurement of levator function and photo documentation. Concomitant blepharochalasis or eyebrow ptosis was corrected if necessary. Patients were seen for follow-up examinations at week 1,3,12 and for this study.

Results

The patient group consisted of 68 women and 22 men with an average age of 62y(26-88y). Senile ptosis was usually bilateral (80 patients). Five patients presented with unilateral congenital ptosis, five patients had blepharoplasties or attempted ptosis corrections elsewhere and were secondary cases. Average levator function preoperatively was 10mm (6-14mm), average shortening of the levator aponeurosis during the operation was 10,5mm (8-22mm). Complete correction of the blepharoptosis was achieved in 92%, slight undercorrection/asymmetry was found in 6%, only two eyelids (1,67%) had to be revised because of obvious undercorrection/asymmetry. Patient satisfaction with the results was very high.

Conclusions

Anterior levator shortening and reinsertion is a reliable and effective method for ptosis correction in acquired and congenital cases. It benefits patients by yielding a very good functional and cosmetic outcome associated with low complication rates.

11.12 CHANGE OF FACIAL ASYMMETRY IN PATIENTS WITH CONGENITAL MUSCULAR TORTICOLLIS AFTER SURGICAL RELEASE

Myoong Chul PARK, Joo Hyung KIM, Seung Jo SEO, Young Hoo JOH, Kyung Buhm CHOI
Suwon, Republic of Korea

Introduction

A number of studies have shown that facial asymmetry improves in congenital muscular torticollis (CMT) patients after surgical release. This study confirmed the improvement in facial asymmetry, and analysed factors that affect the change of facial asymmetry in CMT patients after surgical release by using objective and quantitative methods.

Materials & Methods

Facial asymmetry was analysed in sixty CMT patients who underwent surgical release before ten years of age. Intercommissural angle (ICA) in the clinical photograph was used to measure facial asymmetry. Postoperative improvement in ICA was evaluated in each age group, after grouping the patients by age. Patients were divided into two groups according to the postoperative head tilt, and postoperative functional deficit. Postoperative improvement in ICA was compared between two groups. The relationships between postoperative improvement in ICA and independent variables (age, follow-up period, preoperative ICA, postoperative head tilt, and postoperative functional deficit) were analysed.

Results

The ICA was improved significantly postoperatively in groups younger than 5 years of age. No significant difference was found in the postoperative improvement in ICA between two groups according to the postoperative head tilt, and postoperative functional deficit. In the correlation analysis, postoperative improvement in ICA was proportional to the follow-up period ($r=0.256$, $p=0.048$) and preoperative ICA ($r=0.600$, $p=0.000$).

Conclusions

Facial asymmetry in CMT patients can be improved significantly if surgical release is performed before 5 years of age. After surgical release, facial asymmetry will improve over a long period of time, and patients with more severe facial asymmetry have a better remodelling potential to achieve facial symmetry.

11.20 SPRING-ASSISTED SURGERY IN THE TREATMENT OF SAGITTAL SYNOSTOSIS: A SYSTEMATIC REVIEW

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Peter TARNOW, Lars KÖLBY
Gothenburg, Sweden

Introduction

Premature sagittal synostosis (SS) can be surgically corrected using extensive cranioplasties or using less invasive methods, e.g. spring-assisted surgery (SAS). The aim of the present study was to perform a proper systematic review of springs in the treatment of SS.

Materials & Methods

A literature search was performed with the assistance of a professional librarian in the databases PubMed, EMBASE and The Cochrane Library between 1997 and September 2013. Studies that fulfilled the PICO (patients, interventions, controls, outcome) criteria were included. All studies were graded for methodological quality according to MINORS and all retrospective studies were assessed according to a scale developed for retrospective studies in paediatric surgery. The quality of evidence was rated according to GRADE.

Results

A total of 241 abstracts were extracted in the literature search. Five studies met the PICO criteria. Two of these five were considered as preliminary reports and excluded. Assessment according to MINORS showed a mean score of 21, i.e. fair quality. The clinical outcome regarding cephalic index did not differ between the surgical techniques but the quality of evidence, according to GRADE, that SAS was equally efficient, was very low. Clinical outcome regarding operation time, blood loss, ICU stay and hospital stay was in favour for SAS but the quality of evidence was low.

Conclusions

This systematic review has revealed that the level of evidence for SAS being an equally efficient surgical method as more extensive cranioplasties for SS is low or very low. The results point out the need for well-designed prospective studies within craniofacial surgery.

11.28 THE LIMITATIONS OF BIPARTITION DISTRACTION IN TREATING APERT SYNDROME

David DUNAWAY, Freida ANGUILLA, Allan PONNIAH,
Maarten KOUDSTAAL, Cliff RUFF
London, United Kingdom

Introduction

Apert syndrome is characterized by hypertelorism, with a negative canthal axis and counter-rotated orbits. Central midface hypoplasia results in a biconcave face in both midsagittal and axial planes. Bipartition distraction partially corrects these facial anomalies. This study investigates limitations of bipartition distraction using a combination of conventional and geometric morphometric analysis.

Materials & Methods

Pre and postoperative three-dimensional computed tomography (3DCT) scans of 10 patients with Apert syndrome (aged 12 to 21 years) were annotated with 98 landmarks. 13 age matched normal skulls were used as controls. Principal component analysis (PCA) was used to analyse and compare shape characteristics within and between the groups and describe the changes occurring with surgery. The statistical results were graphically displayed using thin plate spline movies and difference colour maps. Conventional point based measurements documented midfacial width, height and asymmetry.

Results

PCA confirms that midface hypoplasia and central biconcavity is corrected by bipartition distraction. Interorbital distance was reduced from a mean of 29 mm to 23mm compared to a mean of 20mm in the control group indicating mild under correction. Apert skulls were more asymmetrical than controls. Bipartition distraction improved upper midfacial symmetry and worsened lower midfacial symmetry. Overall, surgery made asymmetry more severe. Apert skulls were wider than controls and bipartition distraction partially corrected this. Mean midfacial height was 61.3 mm in controls and 60.3mm in unoperated Apert skulls, which reduced to 58mm postoperatively.

Conclusions

Bipartition distraction corrects midfacial retrusion, exorbitism, midline recession, upper midface asymmetry and hypertelorism. It does not treat midfacial height disproportion or correct orbital shape.

It leaves the face too wide at the zygomatic level and increases asymmetry in the lower midface. Although an improvement on the unmodified monobloc advancement further refinements are needed to fully correct the Apert deformity.

11.40 A RISK-BENEFIT ANALYSIS OF FRONTOFACIAL DISTRACTION

William RODGERS, Chris ABELA, Owase JEELANI, Jonathan BRITTO
London, United Kingdom

Introduction

Frontofacial distraction produces functional benefits in the treatment of syndromic craniosynostosis, but is associated with a significant complication rate. This study aims to identify the patients who benefit most from the surgery and quantify the associated risk.

Materials & Methods

A systematic review of 82 consecutive patients undergoing frontofacial distraction over an eleven-year period was undertaken. Prospectively collected information from a standardised assessment was augmented with a retrospective case note review. Assessments were undertaken preoperatively, at distractor removal, and at 6 and 12 months postoperatively. Functional outcomes were assessed with a multifactorial Craniofacial Outcome Score (GCOS). Complications were classified as major, moderate, intermediate or minor.

Results

Frontofacial advancement produced significant functional benefits. Tracheostomy decannulation was achieved in 14 of 21 patients. All 15 patients with ocular exposure achieved globe protection. Raised intracranial pressure was treated in 13 of 14 patients. Multi and univariate linear regression models showed a negative correlation of age with functional score, though sex, underlying disease, surgical complications and history of previous surgery were not significantly associated. There was one postoperative death. 65 patients suffered one or more complications (81%). There were 13 major complications (16%). Major perioperative complications included haemorrhage (9%), CSF leaks (11.9%) and infections (6.3%). Late complications included frontal bone necrosis and mucocoele formation. Factors related to complication risk included increasing age, length of surgical procedure, a history of previous craniofacial surgery and the presence of a ventriculo-peritoneal (VP) shunt.

Conclusions

Infants and young children are more likely to benefit from frontofacial surgery and less likely to suffer complications than older patients.

Frontofacial distraction can be regarded as a procedure of choice for young children with severe functional compromise. It is a risky procedure in older patients who have had previous frontal surgery and alternative strategies should be considered.

11.48 RESPIRATORY ASSESSMENT AND THREE DIMENSIONAL VOLUMETRIC CHANGES OF THE UPPER AIRWAY IN PEDIATRIC PATIENTS AFTER LE FORT III AND FRONTOFACIAL ADVANCEMENT

Francesco ARCURI, Tommaso AGOSTINI, Mirco RAFFAINI
Florence, Italy

Introduction

The purpose of this study is to investigate and correlate the changes of the upper airway volumes and respiratory outcomes in syndromic craniosynostosis patients following Le Fort III and fronto-facial advancement.

Materials & Methods

In this retrospective study, the preoperative and postoperative computed tomographic scans of 13 patients (7 males, 6 females; mean age 11.1 years, range 5 to 24 years) with syndrome craniosynostosis who underwent Le Fort III and frontofacial advancement between January, 2005 and December, 2013 were analysed. CT scans were performed with the same equipment (Philips/Brilliance CT 64; Andover, MA) at the Department of Radiology of the 'Children's Hospital Meyer'. Airway volumes of oropharynx, nasopharynx, nasal cavity and paranasal sinuses were analysed. The respiratory evaluation was assessed using polysomnography (PSG). Analysis was performed using oxygen-desaturation-index (ODI) and apnoea-hypopnoea-index (AHI) as parameters.

Results

The mean preoperative and postoperative volumes have been identified as 16.322 mm³ and 25.912 mm³, respectively. Ten patients (76.9%) showed an improvement of the severity of obstructive sleep apnoea syndrome (OSAS) according to preoperative and postoperative polysomnographic data analysis. In 4 patients (30.8%) the OSAS was completely resolved. In 10 patients the upper airway volume increased and a similar improvement of the PSG measurements was recorded. In 3 patients the respiratory outcome did not show any improvement as well as the postoperative volume change of the upper airway volume. Data were considered statistical significant ($p < 0.05$).

Conclusions

Le Fort III and monobloc advancement by distraction lead to a stable and significant improvement of the degree of OSAS which is correlated to the three dimensional volumetric changes of the upper airway.

11.56 PROMOTING OF OSSIFICATION OF CALVARIAL DEFECTS IN CRANIOSYNOSTOSIS SURGERY BY USING DEMINERALIZED BONE STRIP

Junnu LEIKOLA, Mikko SAVOLAINEN, Virve KOLJONEN
Helsinki, Finland

Introduction

Demineralized Bone Matrix (DBX), is allogenic biomaterial used in filling bone defects, inducing bone formation and accelerates healing. Craniofacial applications of DBX are limited. Aim of this current study was to assess the use of DBX in cranial defects.

Materials & Methods

Study included 13 non-syndromic and 5 syndromic craniosynostosis patients operated during 2008-2010 with bilateral, comparable defects. Their mean age was 6.7 years. Eleven had primary cranial vault reconstruction (CVR), followed by 5 re-do CVRs and 2 focal defect coverage. Mean follow-up time was 5.7 years. Each patient received both interventions; each side (right or left) was chosen to receive the DBX plate (DBX strip, Synthes USA, West Chester, Pa.) intervention on one side and the control intervention on the mirrored side. The study comprised 26 DBX covered defects and 26 control defects. 3D-CT imaging was performed one week and one year post-operatively. Defect area was measured from 3D reconstructed skull with a method utilizing OsiriX®. The degree of fusion between the defects was compared and given in percentage.

Results

The DBX covered defects were located on the right in 12. In 15, the DBX defects were larger (mean 11.08 cm²), compared with the control defects (mean 7.75 cm²). The fusion was 100% in five DBX defects while only two control defects fused 100%. The fusion degree of the DBX defects was 76% compared with 53% in the control sides, $p < 0.02$. There was no difference between the patients with syndromic or non-syndromic craniosynostosis in terms of defect fusion. The defect fusion between the DBX and control defects was statistically significant for patients aged > 2.5 years ($p < 0.02$). No DBX related complications were recorded.

Conclusions

DBX strip is safe and promotes ossification in CVR, especially for patients whose osteogenic potential is decreased due to advanced age.

12.04 MENTAL OUTCOME IN CRANIOSYNOSTOSIS SURGERY

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Dominique RENIER
Paris, France

Introduction

Surgery for craniosynostosis is performed for both functional and morphological reasons. Differences exist in the outcomes according to the type of craniosynostosis and protocol of treatments.

Materials & Methods

Out of 4500 operated craniosynostosis, a subgroup of 861 patients has been retrospectively analysed. Mental outcome defined by usual quotients (DQ-IQ) were prospectively recorded by standard tests (Brunet-Lezine scale or WISC) carried out by the same team of psychologists during 22 years. There were: Sagittal synostosis (n=396), Metopic synostosis (n=76), Unicoronal synostosis (n=220), Bicoronal synostosis (n=99) and Apert syndrome (n=70), operated with standardized techniques. The influence of age at surgery (before or after one year of age) and presence of FGFR mutations were analysed. Minimal follow-up was 1 year between evaluations.

Results

In all groups, except for unicoronal synostosis that presented with a good mental outcome whenever operated or not, surgery before one year of age was beneficial on the mental outcome. This was particularly true for the most severe syndromes (Apert) in which there was no patient obtaining a normal score if operated after one year of age ($p < 0,05$). In bicoronal synostosis the outcome was worse if in addition to a late operation ($p < 0,05$), a genetic mutation was present. For sagittal synostosis, the difference was not so obvious but the least good results were found in non-operated patients.

Conclusions

As unicoronal synostosis may clearly appear as a pure esthetic operation, the surgery is predominantly functional when two or more sutures are involved. For most single suture craniosynostosis, operating before one year of age gives a trend for better mental outcome.

Anyhow in non-operated patients, psychological disturbances may occur even if the IQ does not seem affected. Altogether, surgery was only preventive of mental impairment. The quality of the psycho-social environment remains a critical predictive factor.

12.12 SURGICAL TREATMENT OF CENTROFACIAL HEMANGIOMAS: INDICATIONS, TECHNICAL GUIDELINES AND OUTCOME

Beatriz BERENGUER, Pilar RODRÍGUEZ-URCELAY, Minia CAMPOS, Elena TOMÁS, Concepción LORCA
Madrid, Spain

Introduction

Centrofacial hemangiomas may disturb aesthetics and function and leave complex anatomic sequelae. Medical therapy is first line treatment for complicated hemangiomas, however, non-responders and patients with sequelae after involution benefit from surgery. Few studies have focused on their surgical treatment. The authors review indications for surgical treatment of centrofacial hemangiomas, propose guidelines to optimize surgical results and describe complications and outcome. Different variables are analysed for correlation with outcome. Lastly the possible benefit to children's psychosocial adjustment is assessed.

Materials & Methods

The study includes 71 consecutively operated hemangiomas followed prospectively. Clinical data, standardized photographs and imaging studies were registered. Results were rated by subjective evaluation with a standardized panel and objective measurements before and after treatment. The CBCL (Child Behaviour Checklist) questionnaire was used to assess psychosocial benefits.

Results

From 2007 to 2014, 71 individuals underwent surgical treatment: 12 (17%) male and 59 (83%) female. Mean age at surgery was 5 years (range 1-52 years). Surgical indications included: deformity 55 (77%), functional disturbance 12 (17%), and diagnostic doubts 4 (6%). Surgical technique focused on meticulous reconstruction of aesthetic subunits and antropometric measurements, not on complete tumor resection, since it has a self-limited growth. Three children (4%) suffered minor complications, 2 hematomas and 1 dehiscence. Sixty-three patients (84%) received a score of 4 or 5 on a subjective 5-point outcome scale ($\kappa=0.65$), 57 (81%) improved objective antropometric measurements. Male gender, small size and absence of hemangioma ulceration correlated with better outcome ($r_s=0.75$; $p<0.01$). CBCL evidenced positive changes between pre and post surgical intervention.

Conclusions

The main surgical indication for centropacial hemangiomas is aesthetic deformity. Meticulous 'aesthetic subunit-approach' techniques minimize scars, reduce complications and improve outcome. Male gender, small size and absence of hemangioma ulceration are positive prognostic factors. Aesthetic surgical correction of centropacial hemangiomas favours psychosocial adjustment.

12.20 SURGERY OF EXTRA-CRANIAL ARTERIO-VEINOUS MALFORMATIONS

Mckay MCKINNON, Nguyen HONG HA, Nguyen QUANG DAI
Chicago, Illinois, U.S.A.

Introduction

Extra-cranial arterio-venous malformations (AVM) have an insidious natural history, may be life threatening, and pose a difficult challenge to the surgeon and his or her colleagues treating these uncommon vascular anomalies. Surgical therapy and its timing continues to be controversial, even among major centers with vascular anomaly teams. The rarity of extra-cranial AVMs, the confusion over their accurate diagnosis and prognosis, and the overlap of different surgical and radiologic specialists involved with their care has further added to morbidity. This study examines a recent premise that radical surgery can best effect cure of AVM and still avoid mutilation.

Materials & Methods

We report a retrospective study of 10 surgical cases (3 children, 7 adults) of AVM, including 8 of the craniofacial region and 2 unprecedented lesions of the trunk. Pre and postoperative analysis included physical exam, MRA and/or CTA, Doppler and photographic data. Follow up of at least 18 months includes analysis of recurrence and other complications.

Results

There were no deaths. One patient had a small post-op recurrence which was successfully treated by embolization alone. 4 patients required multiple procedures to complete reconstruction. After a minimum 18 months post-op, no patients reveal AVM.

Conclusions

We conclude that: (1) laser, chemotherapy and sclerotherapy are inappropriate primary treatments for stage III or IV AVM; (2) embolization is a helpful adjunct but not sufficient for cure of AVM; (3) radical surgery is the definitive treatment of choice for cure of AVM, and can be performed without significant morbidity.

13.45-15.40 SCIENTIFIC SESSION 5 – LYMPH & LIMB

Moderators

Adriana CORDOVA – Palermo, Italy

Andrea FIGUS – Norwich, United Kingdom

13.45 RELIABILITY OF VARIOUS PREDICTORS FOR PREOPERATIVE DIAGNOSIS OF INFRACLAVICULAR BRACHIAL PLEXUS LESIONS WITH COMBINED SHOULDER AND ELBOW PARALYSIS

Shan Shan QIU, Johnny Chuieng-Yi LU, David Chwei-Chin CHUANG

Introduction

Brachial plexus injury (BPI) often results from motor vehicle accidents and high-velocity trauma, more frequently affecting to younger population. The differentiation between supraclavicular and infraclavicular BPI could be unclear in cases affecting both shoulder and elbow paralysis. We studied the reliability of several predictors from the clinical, physical examination and neurophysiologic studies variables to predict the infraclavicular BPI.

Materials & Methods

A retrospective study including consecutive patients suffered from brachial plexus injury from 2004 to 2013 was performed. From the total of 490 patients, 75 presented with motor weakness of the shoulder and elbow were included. The variables included to study their predictability for infraclavicular BPI were: muscles function, sensory function, associated fractures, presence of infraclavicular Tinel sign and results from nerve conduction velocity (NCV). Logistic regression analysis along with calculation of odds ratio (OR) and 95% confidence interval (CI) was performed to determine the diagnosis predictors for level IV BPI.

Results

From the total of 75 patients, 65 were males and 10 were females. The time between the injury and the surgical exploration and treatment was 5.04-1.90 months for supraclavicular BPI and 5.01-2.05 months for infraclavicular BPI, without statistical differences.

Normal function of clavicular part of pectoralis major (OR=36.562), biceps (OR=31.765), supraspinatus (OR= 14.314), serratus anterior (OR= 9.731), teres major (OR=8.204) and latissimus dorsi (OR= 4.466), scapular fracture (OR=11.738), infraclavicular Tinel sign positive (OR=9.8) and impaired motor NCV of the musculocutaneous nerve (OR= 3.562) were predictors of infraclavicular BPI with statistical significance, $p < 0.05$.

Conclusions

The present study showed that muscle function, sensory function, fractures, Tinel sign and NCV could be predictors that allow the surgeons to be more accurate in the preoperative diagnosis, avoiding extensive incision and unnecessary dissection, while shorten the operative time and decreasing the morbidity of these patients.

13.53 THE ROLE OF ELECTIVE AMPUTATION IN PATIENTS WITH TRAUMATIC BRACHIAL PLEXUS INJURY

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Introduction

Despite undergoing complex brachial plexus surgical reconstructions and rehabilitation, some patients request an elective amputation. This study evaluates the role of elective amputation after brachial plexus injury.

Materials & Methods

A retrospective chart review was performed for all the patients with brachial plexus injuries treated with elective amputation between 1999 and 2012 at a single institution. Potential predisposing factors for amputation, amputation level and post-amputation complications were analysed. Patients were evaluated using pre-amputation and post-amputation Disabilities of the Shoulder, Arm, and Hand scores in addition to visual analog pain scores.

Results

During the period of time, 2140 patients underwent brachial plexus reconstructive surgeries. Three conditions were present in all nine of the patients who requested an elective amputation: 1. Pan-plexus injury; 2. non-recovery (mid-humeral amputation) or elbow flexion recovery only (forearm amputation) one year after all other surgical options were performed; 3. at least one chronic complication (chronic infection, non-union fractures, full-thickness burns, chronic neck pain with arm weight, etc.). Pain improvement was found in five patients. Subjective patient assessments and visual analog pain scores before and after amputation did not show a statistically significant improvement in Disabilities of the Shoulder, Arm, and Hand scores. However, four patients reported that their shoulder pain felt “better” than it did prior to amputation and two patients indicated they had no more chronic pain after surgery.

Conclusions

Elective amputation after brachial plexus injury should be considered as an option in the above circumstances. When the informed and educated decision is made, patients can have satisfactory outcomes regarding amputation.

14.01 ADVANCEMENTS TOWARDS A FUNCTIONAL AMPUTATION OF THE HAND

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Henning MÜLLER, Franco BASSETTO
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Introduction

The natural control of prosthetic robotic hands via surface electromyography (sEMG) remains a challenge despite the flexor-extensor muscular system of the fingers is usually partially preserved in patients with trans-radial amputations. In this work we analyze the Ninapro database (Non Invasive Adaptive Hand Prosthetics, <http://ninapro.hevs.ch>), which is currently the largest sEMG database of hand movements. The aim of the work is to identify relationships between clinical parameters of the amputation and movement recognition accuracy, in order to foster the integration between amputation surgery and innovative robotic hand prostheses.

Materials & Methods

Eleven transradial amputated subjects and forty intact subjects participated to this study. For all subjects we recorded age, weight, height, percentage of the remaining forearm, time elapsed since the amputation, intensity of phantom limb sensation (0 to 5 subjective scale), prosthesis use and DASH (disabilities of the arm, shoulder and hand) score. During data acquisition, the subjects were asked to mimic 50 movements shown on the screen of a laptop with the missing hand. In the meanwhile, sEMG was recorded with 12 electrodes fixed on the remaining forearm. Machine learning was used to classify the sEMG signals of the movements.

Results

Several clinical parameters (e.g. phantom limb sensation and years passed since the amputation) are significantly related to the capability to distinguish different hand movements through machine learning and sEMG. Moreover, several subjects reported an increased feeling of control of the hand during the acquisition.

Conclusions

Clinical implications of these outcomes are substantial and have the potential to dramatically improve life expectations and prognosis for trans-radial hand amputated patients.

The relationships between classification accuracy and clinical parameters could help to better understand phantom limb sensation and they could lay the foundations for functional amputation“ surgery procedures, which could better integrate with robotic hand prostheses in the future.

14.09 PREDICTABLE PATTERN DIGITAL ARTERY PERFORATOR FLAP: AN ALTERNATIVE CONCEPT IN DIGITAL RECONSTRUCTION

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Petros KONOFAOS, Othon PAPADOPOULOS, Vincent CASOLI
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Introduction

The proper digital arteries as any other axial vessel give rise to multiple cutaneous perforators either volar or dorsal along their course. Their identification is performed with Doppler flowmetry. The vasculo-cutano-tendino-osseous complex (VCTOC), which was described by the senior authors, has been identified responsible for the vascularization of the extensor apparatus and other digital anatomic structures (skin, periosteum). These complexes are perforators originating from the proper digital artery. Their appearance was consistent to well measured distances from the digital joints. Subsequently, the purpose of this study was to determine the feasibility of designing and harvesting „predictable pattern“ digital artery perforator (PDAP) flaps, highlighting the anatomy in-vivo, standardizing the procedure in order to make flap dissection reproducible and safe, thus eliminating the need for preoperative Doppler imaging.

Materials & Methods

From November 2012 to March 2014, fifteen patients underwent reconstruction with a predictable pattern digital artery perforator flap (PDAP), based on the previously described detailed VCTOC mapping, for digital lesions secondary to tumor extirpation. Flaps were designed as V-Y advancement or propeller type. Postoperative control concerned flap viability and digital function.

Results

Seven males and 8 females underwent elective surgery using PDAP flaps for digital defects following tumor extirpation. The diameter of the defect ranged from 0.5 to 1.5 cm. The vast majority of the lesions were identified on the right hand, the index, the ring finger and the distal phalanx. All flaps survived without signs of venous congestion. No functional digital problems were observed during postoperative follow up (mean follow up time was 77 months). A minor wound dehiscence presented in one immunocompromised patient.

Conclusions

Authors introduced the concept of a 'predictable pattern' in the surgery of digital artery perforator flaps. These flaps based on a solid anatomic background, are reliable and could be a valuable reconstructive option.

14.17 A MODIFICATION OF LIMITED FASCIECTOMY TECHNIQUE BY USING DERMAL AUTOGRAFT FOR THE REDUCTION OF RECURRENCE RATES IN THE TREATMENT OF DUPUYTREN'S CONTRACTURE

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Murat SARICI, Gaye Taylan FILINTE
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Introduction

Following the data that healthy dermal tissue carried to the diseased area with the full thickness skin graft that shortens the life cycle of the myofibroblasts which were shown to be the main factor in the pathogenesis of Dupuytren's disease (DD), authors combined limited fasciectomy with autogenous dermal grafting to achieve lower recurrence rates with minimal morbidity.

Materials & Methods

45 fingers of 30 patients were operated using limited fasciectomy in control group while 37 fingers of 26 patients were operated using limited fasciectomy plus autogenous dermal graft technique under the skin in the study group. In both groups, limited fasciectomy was performed using the same technique. In all patients, preoperative and postoperative Tubiana scoring was performed and the degrees of MP and PIP joint contractures were measured. Total passive extension deficit (TPED) values were measured for all fingers separately in the preoperative, early postoperative and late postoperative and the values were also statistically evaluated.

Results

Mean follow-up period in the control and study groups were 3.4 years and 3.6 years, respectively. The mean preoperative degrees of MP/PIP contractures in control and study groups were 53.8/25 and 62.5/27.3, respectively. The measurements of the same contractures in the late postoperative period revealed 15/10 in the control group and 3/8 in the study group. Only of late postoperative TPED values were significantly better in the study group whereas no significant difference was found in the preoperative and early postoperative period.

Conclusions

Modifying the limited fasciectomy method with autogenous dermal graft provides lower late-term recurrence rates comparing to the traditional limited fasciectomy method with similarly low complication rates and may be considered as a useful technique in the treatment of DD.

14.25 CORRECTING HAND AND FOOT DEFORMITIES IN CHILDREN WITH APERT SYNDROME USING DISTRACTION OSTEOGENESIS: A REVIEW OF 10 YEARS OF EXPERIENCE

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Introduction

Apert Syndrome is characterized by bilaterally short, radially deviated thumbs in hands, and brachymetatarsia and hallux varus deformities in the foot. Hand deformities may lead to difficulties in daily life such as holding cutlery and buttoning up, while the foot deformities may cause severe problems such as pain and development of callus formation related to weight redistribution, problems with footwear that may limit daily activities.

Materials & Methods

This study retrospectively reviewed 7 patients (14 upper and 14 lower extremities) followed up with Apert syndrome who underwent distraction to simultaneously correct the shortness and the angulation deformities of the bilateral thumbs and first metatarsal ray.

Results

Average length of phalanges at the beginning of distraction was 19.1-3.26 mm and mean length of distracted phalanx at long term follow up visit was 26.2-5.63 mm. Average correction of radial angulation was calculated as 42.6-9.95 and the difference was considered as being statistically significant ($p < 0.001$). Length of the first metatarsal bone significantly increased from the average length 32.6-5.7 mm to the average of 46.7-6.5 mm ($p < 0.001$). Preoperative and postoperative metatarsal inclination angles were at a mean of 43.8-5.12 and 32.6-3.8 degrees respectively and correction of metatarsal inclination was considered as being statistically significant ($p < 0.001$). In 6 upper extremities of 4 patients minor complications such as pin loosening were observed, and in 5 lower extremities minor complications such as pin loosening, pin tract infection and early union that required reoperation were observed.

Conclusions

Limb features of Apert Syndrome is as noteworthy as craniofacial features thus may lead to function impairment and limitations in daily life. Distraction appears to be an effective and safe approach for correction of shortness and angulation deformities simultaneously in Apert patients.

14.33 EVALUATION OF THE UPPER LIMB LYMPHATIC SYSTEM: A PREOPERATIVE LYMPHOSCINTIGRAPHIC STUDY IN MELANOMA PATIENTS

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Introduction

Current research on the upper limb lymphatic system mainly focuses on breast cancer women with unilateral lymphedema secondary to axillary lymphadenectomy. In the absence of a preoperative lymphoscintigraphy, the contralateral limb is used as a control, assuming that it is functionally intact. Common criteria to identify lymphatic dysfunction include asymmetric and delayed (>10-30 minutes) transportation time of the radiopharmaceutical. Few lymphoscintigraphic studies have been conducted on healthy people or patients before any axillary surgical treatment. We present the first study that evaluate, through lymphoscintigraphy, the preoperative condition of the upper limb lymphatic system in melanoma patients to identify preexisting functional differences.

Materials & Methods

Sixteen right-handed patients (32 upper limbs) with histological diagnosis of trunk/upper limb melanoma were enrolled: 8 male, 8 female (mean age: 53.2 years; BMI: 21.5 -34 kg/m²). Patients had no clinical findings or history of lymphedema, venous incompetence, trauma or previous surgery besides excisional biopsy of the primary melanoma. All were candidates for sentinel lymph node biopsy (SLNB). Each patient underwent lymphoscintigraphy of the upper limbs 30 days after melanoma biopsy and before wide excision and SLNB. Lymphoscintigraphic images were classified into three patterns on the basis of the radio-labeled tracer time of appearance (TTA) in the axillary nodes from the injection site. Type I: TTA= 20 minutes; type II: TTA= 60 minutes; type III: TTA= 120 minutes.

Results

Lymphoscintigraphic patterns were symmetric only in ten patients (62.5%). Surprisingly, Type III was the most common pattern regardless of patient characteristics and melanoma site (50%), with Type I and Type II accounting for 25% each.

Conclusions

Our lymphoscintigraphic findings show wide and constitutive differences and an often 'slow' TTA in patients with theoretically healthy lymphatic system, questioning the use of contralateral limb as control and transportation time >30 minutes as criteria for identification of lymphatic alterations.

14.45 THE 'SELECTED LYMPH NODE' TECHNIQUE TO FACILITATE LYMPH NODE FLAP HARVEST IN THE TREATMENT OF UPPER LIMB LYMPHOEDEMA

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Introduction

Lymph node transfer (LNT) has been effectively used to treat lymphoedema. Traditionally, groin lymph node flap is harvested based on anatomic landmarks alone without preoperative examination of the lymphatic drainage pathways. We describe a new technique, the 'Selected Lymph Node' technique (SLN) aiming to identify the most functional lymph nodes of the inguinal area, with the use of SPECT-CT lymphoscintigraphy, for an effective and safe LNT.

Materials & Methods

Preoperative lower extremity lymphoscintigraphy including SPECT-CT imaging of the donor inguinal area was performed in all upper limb lymphoedema patients, candidate for LNT. The most functional lymph node above the inguinal crease was located in each patient and the lymphatic drainage of both lower extremities was also assessed. On the hybrid SPECT/CT images we measured the distances from the selected node to the vertical midline and also to the horizontal level of pubis tubercle. Measurements were transferred onto the patients' abdomen. Ten patients of this group underwent LNT (Group-A) and were compared with ten patients (Group-B) who had a conventional LNT. We documented the flap size, the number of nodes contained into the flap, the flap harvesting time and recorded donor site complications and functional results.

Results

Lymphoedema symptoms were improved similarly in both groups. The mean size of the flap was 5.2 cm for Group-A while 6.4cm in Group-B. A mean 2.7 lymph nodes/flap was recorded in Group-A while 3.4 in Group-B. The mean time spent on flap harvesting was significantly lower in Group-A compared to Group-B ($p < 0.01$). Donor site lymphoedema was not documented in both groups. Lymphorrhoea was recorded in Group-B two cases. Follow up time; similar for both groups, ranged between 6-18 months.

Conclusions

'SLN' is an effective and safe technique, which may significantly decrease the overall operating time and reduce the donor site morbidity in LNT.

14.53 SURGICAL TREATMENT OF SECONDARY CHRONIC LIMB LYMPHEDEMA: CRITICAL REVIEW OF 200 CASES

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Introduction

Secondary chronic limb lymphedema (SCLL) is a disabling side effect of groin and axillary lymph node (LN) surgery. Patients who do not respond to conservative therapy can benefit from microsurgical treatment. The aim of this work is to describe our surgical technique (Combined Technique-BCCT) for SCLL treatment, its indications and results.

Materials & Methods

From June 2007 to June 2014, 200 patients with irreversible SCLL underwent BCCT. The procedure combines supermicrosurgical lymphaticovenular anastomosis (LVA) with microsurgical lymph node transfer (LNT). End-to-end/side anastomosis between subdermic/subcutaneous lymphatic collectors and small veins (LVA) were performed in order to shunt the lymph within blood circulation, so reducing its build-up in soft tissue. We also transferred superficial inguinal LN to the axilla, wrist or contralateral inguinal area (LNT) using the superficial circumflex iliac artery perforator (LN-SCIP) flap. For postmastectomy patients with arm lymphedema, microvascular breast reconstruction using the deep inferior epigastric perforator (DIEP) flap was performed in combination with LNT (LN-DIEP flap).

Results

All flaps survived and 1:7 LVA were performed in each patient. No major complications were seen after surgery. The rate of preoperative versus post-operative excess circumference decreased in range 12-86,7% (average 39,72%). The clinical improvement was more dramatic at a 6 months follow up, while an 18-month follow-up showed stable results.

Conclusions

Despite various surgical techniques for SCLL treatment have been described, there is no consensus about the ideal one between the experts. Our experience shows that BCCT can be considered as a safe and effective procedure to treat SCLL I selected cases.

15.05 LYMPHATICOVENOUS ANASTOMOSES OR MICROVASCULAR LYMPHONODE TRANSFER?

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Introduction

Surgical treatment of lymphoedema is challenging, and although we have many operative options

Materials & Methods

A retrospective comparative study comparing the results of microvascular lymphonode transfer and lymphaticovenous anastomoses (LVA) in postoperative lymphedema was designed. The files of 40 patients were evaluated and groups of 20 consecutive patients with LVA and 20 with free lymphonode transfer, either alone or together with a breast reconstruction, were involved. All patients had at least two years follow up (2-6 yr, mean 3,5) All LVAs were performed in local anaesthesia, using near infrared spectroscopy with indosyanine green preoperatively to assess lymphvessels. All lymphonodes were harvested along the SIEA or SCIA vessels and anastomosed to thoracodorsal vessels after thorough scar release of the axilla. All patients were preoperatively wearing a garment and undergoing regular lymphotherapy, conservative methods were at maximal use.

Results

In the lymphaticovenous group, if less than 3 anastomoses could be performed, the results were judged poor and all patients were rescheduled for a new operation. If >4 anastomoses could be achieved, 60% of the patients had some circumference and/or softness benefit distally but only one could live without a garment. In the lymphonode transfer group all patients had some benefit, reduction in circumference or softness. All but 2 who reached three years follow up had been able to leave out the garment and lymphotherapy, but only 4 reached the circumference of the healthy arm. Postoperative lymphoscintigraphy revealed no donor site problems.

Conclusions

In this study free lymphonode transfer seems to produce superior results to LVA:s. However, it is a major procedure when LVA:s can be performed in local anaesthesia. A smaller operation produces smaller results and the patients should be well informed preoperatively.

15.17 PLANTAR FLAPS BASED ON PERFORATORS OF THE PLANTAR METATARSAL/COMMON DIGITAL ARTERIES

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Introduction

Due to the unique characteristics of its integument, the affirmation 'replacing like with like' becomes more than evident in the reconstruction of defects of the ultra specialized plantar skin. But the paucity of local resources, especially in the forefoot, transforms this attempt in a very challenging problem. Many techniques, including skin grafts and various types of flaps were used in the management of defects in the forefoot.

Materials & Methods

We present a new useful flap in the reconstruction of skin defects in the forefoot, based on small perforator vessels originating either from the plantar metatarsal arteries or plantar common digital arteries. Starting in June 2011, this flap was performed in 17 patients with ulcers over the metatarsal heads. The flap was used as a transposition island perforator (rotated less than 90 degrees) flap in 3 cases, as a propeller perforator flap in 10 cases, as a triangular V-Y advancement flap in 2 cases, and as a propeller perforator plus flap in 4 cases.

Results

During a follow-up of 5 to 17 months (mean 9.6 months), the local evolution regarding flap integration, pain, relapse, sensitive recovery, donor site, and footwear quality was analysed. We registered a 100% survival rate of the flaps, with delayed healing in only one case. The gait resumption was possible after 6 weeks in all cases.

Conclusions

This new flap, based on small perforator vessels of the plantar metatarsal or common digital arteries, and which provides a good, stable and sensory recovery, seems to be a promising method in the reconstruction of skin defects over the metatarsal heads.

15.25 TREATMENT OF MASSIVE TIBIAL BONE DEFECT WITH BONE MARROW STEM CELLS AND GROWTH FACTOR AFTER EARLY MICROSURGERY RECONSTRUCTION

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Federico TAMBORINI, Mario CHERUBINO
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Introduction

Lower leg reconstruction is still a challenge in case of a severe bone defect. Bone Marrow Stem cells (BMSC) and growth factors as Bone Morphogenetic Protein (BMP-7) represent new tools for inducing bone formation, but the real efficiency in severe trauma is unclear. A two-step surgical procedure allows the synergy of microsurgical reconstruction for the soft tissue defect and the regenerative surgery for the bone defect. The main advantages are that in case of primary infection allows repeated debridement if necessary, an internal fixation with early weight bearing with decreased misalignment risk and short learning curve. This technique allows the principle of the regenerative surgery of the combination of cells, growth factors and scaffolds in a bio-environment. The aim of this study is to present an efficient, easy method for management a severe tibial bone defect after trauma with the use of biotechnologies tools.

Materials & Methods

The authors report on 4 cases of Gustilo IIIB meta-epiphyseal fracture of the leg with a severe in length bone loss (6-8cm) and soft tissue defects treated in acute with the microsurgery reconstruction and a antibiotic spacer. 4 free flaps were muscular flaps to induce the membrane formation. The second surgical procedures, for bone defect management, were after 4-6 weeks from the initial trauma. The bone was reconstructed with BMSC with BMP-7 and allograft bone chips.

Results

The patients started early rehabilitation with the provisory external fixation after 2-3 weeks from the trauma. All flaps survived without any complication. After 30-60 days from the initial trauma they were outpatients with the definitive internal fixation. The follow up was from 33 months to 52 with a complete new bone formation.

Conclusions

The technique and the early microsurgery reconstruction can represent an efficient tool for treatment of severe tibial fracture.

15.33 MANAGEMENT OF NON-HEALING COMPLEX WOUNDS SEEN IN AUTOIMMUNE DISORDERS VIA BONE MARROW ASPIRATE CONCENTRATE

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Introduction

Development in immunology has marked an era in medicine over the last five decades. While mechanisms of autoimmune diseases interest the immunologists, systemic symptoms enter to occupational areas of other disciplines such as plastic and reconstructive surgery. Behcet's Disease (BD), Antiphospholipid Antibody Syndrome (APPLAS) and non-specific vasculitis (NSV) are some of the best examples to autoimmune disorders that have skin manifestations. The aim of the present study was to assess the efficiency of bone marrow aspirate concentrate (BMAC) on non-healing complex wounds in autoimmune disorders where conventional therapies have failed.

Materials & Methods

A total of three patients having non-healing complex wounds located in lower extremities due to different etiologies were enrolled in the study. The patients were consulted as follows; a 25-years-old man with BD which has been grafted for 22 times and has received colchicine(1mg/day) and methylprednisolone(80 mg/day) therapy, a 10-years-old girl with APPLAS which has been grafted for 5 times and has received azathioprine therapy(0.5-1 mg/day), a 60-years-old woman with NSV. 60 cc of bone marrow was harvested from the anterior iliac crest and processed using the SmartPReP BMAC® system (Harvest Technologies Corp.) to obtain BMAC. BMACs were applied to surgical areas after effective debridements. Split thickness skin grafts were performed on wounds and V.A.C. VeraFlo Therapy (KCI Corp.) was used for closure.

Results

Average follow-up period was two years. Average operation number per patient was 3. Length of stay in hospital was 6 days per patient. Ocular manifestations occurred in patients with BD, and a unilateral enucleation operation was performed by ophthalmologists. The wounds healed totally and no recurrence occurred during the two-year follow-up.

Conclusions

BMAC therapy has an active role on non-healing complex wounds by a mechanism that cannot be fully explained. If this mechanism is solved, there will be more effective methods for wound therapy.

16.10-17.30 **SCIENTIFIC SESSION 6 – BREAST MICROSURGERY**

Moderators

Jian FARHADI – London, United Kingdom

Christoph HEITMANN – Munich, Germany

16.10 **ANTITHROMBOTIC AGENTS IN PERFORATOR FREE FLAP BREAST RECONSTRUCTION - A DOUBLE-EDGED SWORD**

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Åsa EDSANDER-NORD
Stockholm, Sweden

Introduction

Perforator free flap reconstruction is today an integral part of breast cancer treatment. However, local protocols for microsurgery mostly still predict the use of antithrombotic agents. The introduction of perforator flaps has led to reduced donor site morbidity and faster patient mobilization. This, together with reduced operation times and low complication rates calls for less comprehensive antithrombotic regimens. We hypothesized that the antithrombotic regimen according to our treatment protocol was a risk factor for free flap complications.

Materials and Methods

A retrospective cohort study was conducted for 150 consecutive perforator free flap breast reconstructions. Low molecular weight heparin, heparin and dextran were used as antithrombotic prophylaxis. Flap related congestion, thrombosis and haematoma necessitating reoperation were analysed. A subanalysis was performed to evaluate the effect of dextran (n=76), which was withdrawn from the protocol 2010. A nationwide survey was undertaken to analyze the use of different antithrombotic regimens for microsurgery.

Results

Reoperation due to haematoma occurred in 21 (15%) of the patients and flaps were venously congested in twelve (8.6 %) of which thrombosis occurred in four (2.9%) patients. An association was noted between reoperation for breast haematoma and venous congestion ($p < 0.001$), but also thrombosis ($p = 0.007$), highlighting haematoma as a risk factor for flap related complications. Only one case with thrombophlebitis was registered among non-flap related thromboembolic events.

The withdrawal of dextran from the treatment protocol did not increase complication rates significantly, but rather decreased the rate of hematomas. Eight different treatment protocols for microsurgery were identified nationwide.

Conclusions

The current study highlights extensive use of antithrombotic agents as a risk factor for haematomas associated with both venous flap congestion and thrombosis. A review of the literature and national treatment protocols call for evidence based medicine regarding the use of antithrombotic agents in standard free flap breast reconstruction.

16.18 PERFORASOMES OF THE FASCIOCUTANEOUS INFRAGLUTEAL FLAP (FCI): AN ANATOMICAL STUDY

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Introduction

The Fasciocutaneous Infragluteal Flap (FCI) can be used as a local flap for perineal reconstruction or as free flap for various reconstructive indications. Its vascular pedicle originates from a constant cutaneous branch of the descending branch of the inferior gluteal artery (IGA). We sought to further investigate and describe the vascular supply of the FCI flap and to analyze its corresponding perforasomes.

Materials & Methods

Using ten fresh anatomical specimens (7 male/ 3 female), the cutaneous branch of the descending branch of the IGA was selectively dissected and injected with either Methylene blue solution or Eosin. The size and the position of the colored skin areas were documented and analysed using ImageJ planimetric software. Subsequently, the corresponding perforators were dissected and their diameter, length and position were described.

Results

The perforasome of the FCI flap could be identified in all specimens. The mean size of the colored skin area was 97.4 cm² (± 30.2 cm²). The mean dimensions of the skin paddle were 15.4 cm x 11.1 cm. A mean number of 1.9 (range: 1-3) perforators per specimen were identified. The external diameter of the dissected perforators was 0.73 mm (± 0.14 mm) and the mean length until branching was 7.0 cm (± 1.9 cm). All observed vessels were direct cutaneous perforators that reached the fascia distal to the caudal edge of the gluteus maximus muscle.

Conclusions

A constant and reliable vascular supply of the FCI flap could be demonstrated in this anatomical study. The possible size of the FCI, its long pedicle and the favorable donor site morbidity make this flap a valuable alternative for reconstructive indications.

16.26 BREAST RECONSTRUCTION WITH THE PROFUNDA ARTERY PERFORATOR (PAP) FLAP: PROSPECTIVE STUDY OF 30 FLAPS

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Pieter HUPKENS
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Introduction

Occasionally, the Deep Inferior Epigastric Perforator (DIEP) flap is unavailable or undesirable for breast reconstruction. Alternative options such as gluteal artery perforator flaps and the transverse upper gracilis (TUG) flap have well-known disadvantages. The novel profunda artery perforator (PAP) flap is a promising new technique.

Materials & Methods

Thirty PAP flaps were planned in twenty-two patients. The flaps were harvested from the posteromedial thigh region of patients lying supine. Patient characteristics, anatomical variables and clinical outcome were prospectively evaluated.

Results

Mean patient age was 42 years, mean body mass index (BMI) 23 kg/m². Mean flap size was 32x12.5 cm, mean weight 395 g. Mean number of suitable perforators in the adductor magnus area (diameter ≥ 0.5 mm) was 2.3 per thigh. In 4 of our flaps, suitable perforators of the profunda artery system could not be detected and operation changed to a TUG-flap (n=2) and IGAP-flap (n=2). All flaps survived completely. Despite low BMI, pre-existent bra size was unchanged or larger in 26 flaps. Wound dehiscence at the donor site occurred after 6 PAP flap reconstructions, transient lymphedema of the leg after two PAP flaps. Other wound morbidity or systemic complications did not occur. Secondary breast surgery using ipsilateral lipofilling was indicated for four unilateral reconstructions and two bilateral reconstructions. In nine unilateral reconstructions, symmetry was further restored by simultaneous contralateral reduction mammoplasty. Sensibility changes in the posterior thigh region were not reported.

Conclusions

Based on these results, the PAP flap from the posteromedial thigh region has become our first choice when the DIEP flap is unavailable or undesirable.

Occasionally, temporary donor site morbidity and the need for secondary breast surgery must be anticipated. In cases without suitable perforators, TUG- or IGAP-flap reconstruction can be performed from the same incision.

16.38 LUMBAR ARTERY PERFORATOR FREE FLAP: ANATOMICAL STUDY AND CLINICAL EXPERIENCE IN BREAST RECONSTRUCTION

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Introduction

Breast reconstruction with lumbar artery perforator (LAP), which was described only in one case report, is indicated in patients with unfavorable abdominal donor site. In addition to our clinical experience with LAP free flap breast reconstruction, we present an anatomical study of the origin and course of the perforators.

Materials & Methods

Images of multi-detector computerized tomography MDCT scan were used to visualize the location of the dominant lumbar artery perforator in 20 patients. X- (horizontal line connecting the highest points on both iliac crests) and Y-axes (the midline along the spinal process) were used as landmarks to localize the lumbar perforators. The medical files of our patients who underwent LAP breast reconstruction were also analysed.

Results

MDCT imaging in 20 female patients with mean age 47-year old revealed an equal number of dominant perforators (10 left, 10 right); 60% were at the level L3-4, 30% at the level L4-5 and the remaining at the level L2-3. The dominant perforators were mainly located 42.6mm from the Y axis at their origin at the transverse process, and 69.5mm (4 fingers breadth) when emerging in the subcutaneous tissue. Six patients had 8 successful LAP flaps for breast reconstruction. Average operative time was 270 min. Due to shortness of pedicle and mismatching between diameter of lumbar artery and internal mammary artery (IMA), vascular bypass (harvested from the deep inferior epigastric vessels) was required in 50% of the cases. The major complication at the donor site was seroma (80%).

Conclusions

The lumbar artery perforator has a constant anatomical location. The free LAP flap provides ample amount of tissue for breast reconstruction, however, its major disadvantages are small artery diameter, shortness of the pedicle, and high seroma formation rate at the donor site.

**16.50 PREOPERATIVE CT ANGIOGRAPHY VERSUS
DOPPLER ULTRASOUND MAPPING
OF ABDOMINAL PERFORATOR IN DIEP
BREAST RECONSTRUCTIONS:
A RANDOMIZED PROSPECTIVE STUDY**

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Introduction

Computer Tomography Angiography (CTA) is the gold standard for pre-operative mapping of abdominal perforators in breast reconstruction with DIEP flap. By predicting the patient's vascular anatomy, the 'best' perforator can be chosen and thereby reducing surgery time and complication rates. In our unit, CTA mapping replaced doppler ultrasound (US) mapping in 2007. Our surgery time has decreased from 7-8 hours in 1998 to 4-5 hours in 2012. We hypothesized that this reduction in surgery time was due to pre-operative perforator mapping with CTA and not due to a learning curve. A randomised prospective study was set up to compare the difference between CTA and doppler ultrasound (US) mapping of perforators. Surgery time and complication rates were analysed.

Materials & Methods

64 consecutive patients were included in our study from February 2012 onwards. They were randomized to either pre-operative CTA or Doppler US mapping of abdominal perforators. Surgery time and complications were recorded.

Results

In the CTA group, surgery time was 249 - 62 minutes (mean - SD). In the US group, surgery time was 255 minutes - 74. The difference of 6 minutes was not statistically significant (T-test). There was no difference in complication rates between the two groups. We found no association between surgery time and occurrence of complications. There was no flap loss and all patients came through with a favourable reconstruction

Conclusions

Pre-operative mapping of perforators with US is satisfactory enough provided the microsurgery team has proper experience in breast reconstruction with DIEP flaps. In our unit, we have stopped routine pre-operative perforator mapping with CTA in unilateral breast reconstruction cases.

16.58 DUAL PLANE DIEP FLAP INSET: OPTIMIZING AESTHETIC OUTCOME IN DELAYED AUTOLOGOUS BREAST RECONSTRUCTION

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Introduction

In an effort to improve our results in Delayed Autologous Breast Reconstruction we introduce a new abdominal flap inset, with the flap lying simultaneously behind and in front of the pectoralis major, in the upper and lower pole of the reconstructed breast respectively. We define this flap inset as «dual plane», and we attempt to delineate the advantages and disadvantages of the method.

Materials & Methods

Fifty irradiated patients that underwent delayed unilateral breast reconstruction were included in the study. All patients received a DIEP flap that was inset following the Single aesthetic unit principle, with a flap extending from the mastectomy scar down to the inframammary fold. Twenty-five patients had their reconstruction using the traditional Single Plane in front of pectoral muscle (group-A) and were compared with 25 patients that their breast was reconstructed using the Dual Plane flap inset (group-B). Photographic images were formulated to a PowerPoint presentation and cosmetic outcomes were assessed from 30 physicians, by means of a Questionnaire (consisted from 7 questions) and a visual analog scale. The final assessment involved patient self-evaluation of aesthetic outcome and quality of life, based on 6 variables with 4 Likert subscales.

Results

Our data showed that the dual plane flap inset presents significant advantages over the traditional single plane, due to optimal healing with irradiated chest skin, more natural transition from native and reconstructed tissues, improved fullness of the upper pole, and significant less ptosis of the reconstructed breast with time. Moreover, patient self-evaluation of esthetic outcome and quality of life showed that dual plane reconstruction is associated with higher patient satisfaction.

Conclusions

The dual plane DIEP flap inset ensures the vascularity of irradiated chest wall skin but also improves breast shape, therefore should be considered the method of choice in any delayed autologous breast reconstruction.

17.06 CONTRALATERAL IMAP FLAP FOR BREAST RECONSTRUCTION: BREAST-SHARING TECHNIQUE

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Barcelona, Spain

Introduction

Perforator flaps offer natural breast reconstruction with minimal morbidity. Seeking to optimize physiological breast reconstruction methods, we started using the breast-sharing technique. We present our technique and preliminary results.

Materials & Methods

Retrospective study conducted between April 2010 and August 2014 of 22 women (mean age 57) with mastectomy who underwent breast reconstruction with an IMAP flap. All women had gigantomastia. The flap was raised from the lower quadrants of the healthy breast and rotated as a propeller flap to reconstruct the contralateral breast. The tissue removed is vascularized by perforators of the internal mammary vessels located between the 4th and 6th intercostal space. Pre-operative MRI or CT angiography was performed to evaluate perforators and plan the surgery.

Results

After a minimum follow-up of 6 months, 19 of 22 flaps had survived. The 3 losses were due to failure of a perforator, irreversible venous congestion, and pedicle avulsion. Two flaps required venous anastomosis with a vein from the thoraco-dorsal system to solve venous congestion. Three cases presented complications at the donor site: nipple-areola complex congestion and wound dehiscence. We performed stage-2 refinement surgery in all cases.

Conclusions

The breast-sharing technique based on IMAP flap is a valid option for post-mastectomy reconstruction in patients requiring breast reduction for gigantomastia and simultaneous breast reconstruction. As breast tissue is transferred for the new breast, patients should be counseled about the theoretical risk of breast cancer in the reconstructed breast. No other technique permits such a physiological breast reconstruction with such minimal morbidity. To achieve good results and meet patients' realistic expectations, careful selection of patients and a precise microsurgical technique are essential.

17.14 BREAST RECONSTRUCTION WITH FAT GRAFT AUGMENTED DIEP FLAP IN PATIENTS WITH INSUFFICIENT DONOR SITE VOLUME

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Michail SOROTOS, Fabio SANTANELLI DI POMPEO
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Introduction

Microvascular reconstruction provides natural, lasting breast that can be integrated with ease into body image, but thin patients are often not ideal candidates because of the inadequate donor-site volume. Purpose of this study was to present our experience in delayed fat-graft augmented DIEP flap by the use of standardized protocol.

Materials & Methods

From 2010-2014, 20 consecutive patients were prospectively enrolled to perform fat-graft augmented DIEP flap (active-group, AG) and matched with a control-group (CG) submitted to the same procedure without fat-injection. Fat-tissue was harvested using dry technique with a 2/3 mm cannula, centrifuged at 3000 r.p.m. for 3-minute and injected with a blunt cannula and 1-ml syringes. The amount of fat to be injected was calculated as the difference between mastectomy and flap weight, taking into account 20-30% physiological re-absorption that occurs within 3-6 months. Age, mastectomy and flap weight, number of take-backs to the theater for secondary procedures, total treatment period (TTP) and complications were collected and analyzed. Patient and surgeon-surveys rated aesthetics outcomes. Continuous and categorical variables were analyzed using student t-test and Kruskal-Wallis test, respectively. A value of $p \leq 0.05$ was considered statistically significant.

Results

The groups did not differ in age and mastectomy weight ($p > 0.05$), while AG had smaller BMI and flap weight ($p < 0.05$). Mean number of take-backs (1.5 in AG vs. 1.4 in CG) and mean TTP (8.6-month in AG vs. 8.9-month in CG) did not show significant difference ($p > 0.05$) between groups. Volume, upper/lower pole shape, projection, breast mound placement, IMF, symmetry, overall appearance and general satisfaction sub-items obtained high-score evaluation without significant difference between groups ($p > 0.05$). Moderate-substantial correlation was found between surgeon and patient-surveys.

Conclusions

Delayed fat-graft augmented DIEP flap is a reliable option for patients with insufficient donor-site volume and medium/large breasts without additional take-backs and prolonged TTP achieving pleasant aesthetic results.

17.22 AUTOLOGOUS FAT GRAFTING FOR ENHANCEMENT OF BREAST RECONSTRUCTION WITH A TRANSVERSE MYOCUTANEOUS GRACILIS FLAP

Heike TREINTINGER, Elisabeth RUSSE, Laurenz WEITGASSER, Thomas SCHOELLER, Gottfried WECHSELBERGER
Salzburg, Austria

Introduction

The transverse myocutaneous gracilis (TMG) flap is a viable option for reconstruction of small to moderate breasts. Donor-site morbidity is considered minimal, but the TMG-flap has been repeatedly criticized due to its small volume, possibly requiring later corrections. Aim of this study was to evaluate the improvement of breast reconstruction with a TMG-flap followed by autologous fat grafting.

Materials & Methods

Patients who underwent breast reconstruction with a TMG-flap and consecutive autologous fat grafting from 1/2009 to 10/2013 were included and patient files including body mass index, age and medical history as well as surgical reports were retrospectively reviewed.

Results

A total of 129 fat graftings were performed in 71 patients for improvement of shape and symmetry of breasts (98%) and/or donor site (8%) following TMG breast reconstruction. The mean age was 48 years (min. 16, max. 77) and main indication was reconstruction after breast cancer surgery (92%). On average 1.8 fat grafting sessions (min. 1, max. 7) were performed with an average of 81ml fat (min. 5, max. 450) engrafted per breast. In 72% fat grafting was combined with additional corrections such as reconstruction of the nipple-areola complex. In most cases fat was harvested under general anesthesia in tumescent technique, using a filter syringe system (Tissue-TransTM/Shippert Medical or LipivageTM/Polytech) and injected without any further processing in multiple layers.

Conclusions

Autologous fat grafting represents an important tool to improve shape and symmetry after breast reconstruction with a TMG-flap. Especially in combination with autologous fat grafting adequate autologous tissue can be provided. As in most cases fat grafting can be combined with other corrections, like reconstruction of the nipple areola complex, it is a simple, safe and effective treatment option.

SATURDAY 30 MAY 2015

8.30-10.20 SCIENTIFIC SESSION 7 – FACE & GENERAL

Moderators

Paul GUELINCKX – Hasselt, Belgium

Gennaro SELVAGGI – Gothenburg, Sweden

**8.30 ORIBASIOUS AND PAUL OF AEGINA:
THE UNKNOWN BIZANTINE FACIAL
RECONSTRUCTIVE SURGEON**

Antonios TSIMPONIS, Dimitrios DIONYSSIOU, Leonidas PAVLIDIS,
Alexandros DIONYSSOPOULOS, Efterpi DEMIRI
Thessaloniki, Greece

Introduction

Little is known about the pre-existing knowledge in what has now become the plastic surgery field during the Byzantine era. The school of Alexandria gave birth to dozens of pioneers in medicine. Oribasius and Paul of Aegina were both gifted Byzantine physicians that contributed significantly to the first steps of plastic surgery.

Methods

Information about the life of these two eminent physicians and their valuable work in surgery were thoroughly studied and we present essential information concerning the rather innovative techniques they used to treat facial ‘colobomata’, the Greek word for defects.

Results

Oribasius and Paul of Aegina were both prolific writers. Oribasius lived and acted in the 4th century AD and the work ‘Synagoge Medicae’ is considered one of the first integrated medical encyclopedias ever published. Chapters 25 and 26 of the 45th book are of great importance for plastic surgery; Oribasius described the need for preoperative flap designing according to the anatomical units of the face that need to be reconstructed. He made important suggestions concerning undermining of the wound edges, bone debridement and orientation of the flaps and in his work the reader can find a detailed description of rectangular advancement flaps. Paul of Aegina lived in the 7th century AD and was considered a very skilled surgeon. ‘Medical Compendium in Seven Books’ was his greatest medical work and it contains significant information for reconstructive procedures, used to treat defects of the ears and lips.

Conclusions

Although many consider the Byzantine Era, one of the darkest periods in the history of surgery, there is evidence that many enlightened personalities acted during this time and contributed to various fields of Medicine. Talented surgeons like Oribasius and Paul of Aegina through their work laid the foundations of reconstructive facial surgery.

8.38 FREE STYLE LOCAL PERFORATOR FLAPS FOR FACIAL RECONSTRUCTION: CLINICAL EXPERIENCE AND INDICATIONS

Mariagrazia MOIO, Fabrizio SCHONAUER
Naples, Italy

Introduction

Reconstruction of facial defects always presents a surgical challenge as functional and cosmetic outcomes must be taken into account more than in any other region of the body. The concept of free style perforator flaps has been developed to gain more freedom for reconstruction and a complete range of freedom in their movement to reach the defect. We present our clinical experience with perforator flaps of the face, focusing on indications, surgical technique and complications.

Materials & Methods

Thirty-one facial defects were reconstructed with free style local perforator flaps between January 2007 and November 2014. Doppler identification of perforator vessels preceded preoperative planning and the flap harvesting followed the dissection of perforator vessel/s. Adequate attention was given to identification of the vein/s to ensure an adequate outflow. Skeletonization was complete in some flaps while others were harvested as perforator based.

Results

Twenty-two clinical cases had no complications. Four had venous congestion that resolved spontaneously; three had a distal 1/3 superficial necrosis; one suffered hematoma and loosed the distal 2/3 in a patient taking anticoagulant drugs; one had a superficial congestion that evolved in a small area of full thickness necrosis. Difficult venous outflow was the critical characteristic of these flaps. Where a cuff of subcutaneous fatty tissue was left around the artery to help drainage, on the other hand the risk of kinking affected the propeller procedures.

Conclusions

The concept of free style perforator flaps was applied to gain more freedom for reconstruction of the face allowing one-stage procedures and low donor site morbidity. Good anatomical understanding, precise planning and meticulous technique can affect clinical results of perforator flaps in the face. A critical approach is essential to get better results.

**8.46 FUNCTIONAL IMPROVEMENT IN PERI-ORAL
SCLERODERMA BY FAT GRAFTING**

Franco BASSETTO, Luca LANCEROTTO, Michela RIZZO,
Enrico TOGNAZZO, Vincenzo VINDIGNI
Padua, Italy

Introduction

Perioral modifications are significant stigmata of scleroderma, with functional implications that negatively impact daily life. Lips stiffening results in microstoma, dryness, easy ulceration, difficult performance of speech, food biting, oral hygiene and dental care, besides alteration in psychosocial interactions. As fat grafting has emerged as a 'regenerating' treatment for scarred and fibrotic tissues, scleroderma patients may receive significant benefits from the procedure.

Materials & Methods

Fat grafting was proposed to patients with perioral sclerosis in systemically stable scleroderma. 8 patients in 2 years met inclusion criteria and accepted grafting. Patients were stratified for functional impairments with a specifically designed questionnaire. Follow up at 3, 6 and 12 months included a post-operative questionnaire for subjective functional performance of the perioral region (-5/+5 scale), and serial echographic assessments of fat grafts, performed by a same-blinded radiologist.

Results

Patients reported pre-operative impairment concentrated in three daily activities (speech, eating, oral hygiene) and three psychosocial items (uneasiness with others, tension in interactions, embarrassment in interactions). After fat grafting, all patients reported significant benefit in lips softness, mouth opening and appearance at 1 and 3 months. One patient reported total regression of achieved benefits by the third month. All other patients reported a partial regression of functional benefits between the 3 and 6 months, with results then stable at 1 year, with subjective perception of improvements >+3 (in -5/+5 scale) in lips sensibility, lips/mouth dryness, movement, opening, softness, as well as aesthetics and easiness in social interactions. All patients would repeat the operation. No complications occurred. Serial echography confirmed a significant increase in thickness at the grafted points.

Conclusions

Fat grafting seems an option to improve the functional performance of the perioral region in scleroderma patients. Even if not all patients may respond, most seem to receive long-term functional benefits.

8.54 COMPARISON OF HEMIHYPGLOSSAL NERVE VERSUS MASSETERIC NERVE TRANSPOSITIONS IN THE REHABILITATION OF SHORT-TERM FACIAL PARALYSIS USING THE FACIAL CLIMA EVALUATING SYSTEM

Alvaro CABELLO, Diego MARRÉ, Cristina AUBÁ,
Bernardo HONTANILLA
Pamplona, Spain

Introduction

Masseteric and hypoglossal nerve transfers are reliable alternatives for reanimating short-term facial paralysis. To date, few studies exist in the literature comparing these techniques. This work presents a quantitative comparison of masseter-facial transposition versus hemihypoglossal facial transposition with a nerve graft using the Facial Clima system.

Materials & Methods

Forty-six patients with complete unilateral facial paralysis underwent reanimation with either hemihypoglossal transposition with a nerve graft (group I, n = 25) or direct masseteric-facial coaptation (group II, n = 21). Commissural displacement and commissural contraction velocity were measured using the Facial Clima system. Postoperative intragroup commissural displacement and commissural contraction velocity means of the reanimated versus the normal side were first compared using a paired sample t test. Then, mean percentages of recovery of both parameters were compared between the groups using an independent sample t test. Onset of movement was also compared between the groups.

Results

Significant differences of mean commissural displacement and commissural contraction velocity between the reanimated side and the normal side were observed in group I but not in group II. Mean percentage of recovery of both parameters did not differ between the groups. Patients in group II showed a significantly faster onset of movement compared with those in group I (62 ± 4.6 days versus 136 ± 7.4 days, $p = 0.013$).

Conclusions

Reanimation of short-term facial paralysis can be satisfactorily addressed by means of either hemihypoglossal transposition with a nerve graft or direct masseteric-facial coaptation. However, with the latter, better symmetry and a faster onset of movement are observed. In addition, masseteric nerve transfer avoids morbidity from nerve graft harvesting.

9.06 MINIMALLY INVASIVE ENDOSCOPIC AIDED FACIAL REANIMATION

Juan BARRET
Barcelona, Spain

Introduction

Surgical correction of facial paralysis requires excellent exposure of nerves and vessels and direct vision for good muscle vector positioning. Classical approaches utilize extended parotidectomy incisions with medial incision to expose the whole middle and lower face and neck leaving visible scars and stigmata. Herein we present a novel minimally invasive approach for microsurgical facial paralysis correction.

Materials & Methods

A minimally invasive-endoscopic aided surgical correction was performed in 20 consecutive patients. The operation consists in two short scar incisions located in the pre-auricular area, and in the intraoral area few mm anterior to the nasolabial fold. All vessels and nerves are identified by means of magnification with the microscope and endoscope. Any necessary tunnelization for nerve grafting is performed under direct endoscopic vision. In all cases a gracilis free muscle flap was utilised, which was anastomosed either to the facial or temporal vessels. Nerve coaptation was used either with the masseteric nerve, cross-face nerve graft, or both.

Results

None of the patients required a conversion to a classical open technique. Mean follow up for all patients is 18 months. Vascular anastomosis included 8 patients with facial vessels and 12 patients with temporal vessels. Donor nerves included: 6 masseteric nerve, 7 cross face nerve grafts, and double nerve anastomosis in 7 patients. Complications were present in three patients: 1 postoperative infection, 1 hematoma, and 1 venous thrombosis. All flaps survived. Long term follow-up showed excellent functional recovery of smile with similar outcomes when compared to the traditional technique, with the exception of less swelling and quicker recovery and the absence of visible scars in the minimally access patient group.

Conclusions

Microsurgical facial reanimation with a minimal invasive approach is feasible. It renders the same good outcomes of classical open techniques with invisible scars and quicker recovery.

9.18 PATIENT SATISFACTION WITH BOTULINUM TOXIN TYPE A IN THE MANAGEMENT OF LONG TERM FACIAL PALSY

Daniel BUTLER, Jonathan LECKENBY, Adriaan GROBBELAAR
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Introduction

Paralysis of the muscles of facial expression can result in significant disfigurement. Botulinum toxin type A (BT) has become a well-recognised treatment modality in the management of patients with facial palsy and the resulting facial asymmetry, synkinesis and hyperkinesis. The objective of this study was to evaluate the patient satisfaction with BT treatment in the management of their facial palsy. In addition, the study aims to delineate if any particular patient groups benefit more from BT therapy than others in order to guide future treatment protocols for facial palsy patients.

Materials & Methods

Patients >16 years old with facial palsy more than one year in duration were eligible for inclusion. Data was collected prospectively. Patient satisfaction was quantified using a validated facial palsy-specific questionnaire. Patients scored their outcome using a five-point Likert scale. Statistical analysis for one population proportion comparisons were performed using a Chi-square goodness of fit test and a Fisher's exact test was used for two population proportion comparisons.

Results

Forty-six patients were eligible for inclusion in the study (33 female, 13 male; average age = 42 years old). All patients had unilateral facial paralysis. Forty-three were undergoing treatment for facial asymmetry, eight for ipsilateral synkinesis and three for ipsilateral hyperkinesis. Amongst the whole study population there was a significant trend towards patients rating their overall outcome as "better" or "much better" ($p < 0.0001$). There was no significant difference in patient satisfaction amongst those undergoing treatment for facial asymmetry, synkinesis reduction or hyperkinesis reduction. Female and male patients had an equivalent level of patient satisfaction.

Conclusions

Patient satisfaction amongst those with long-standing facial paralysis treated with BT is high. This is applicable to those being treated to improve facial asymmetry, synkinesis and hyperkinesis.

9.26 THE VASCULARIZED VASTUS LATERALIS NERVE GRAFT BASED ON THE DESCENDING BRANCH OF THE LFCA FOR IMMEDIATE FACIAL NERVE RECONSTRUCTION

Sora LINDER, Nikolaos AGROGIANNIS, Shai ROZEN, Gangadasu REDDY, Andrés RODRIGUEZ-LORENZO
Stockholm, Sweden

Introduction

In the setting of ablative head and neck surgery the resulting defect often requires a combined reconstruction of a volume and nerve defect. Therefore the vascular anatomy of the vastus lateralis nerve has been studied in cadavers showing adequate features to use it as vascularized nerve graft in combination with the ALT-flap.

Materials & Methods

In five cadavers the vastus lateralis motoric nerve and its vascular pedicle were dissected and measured. In two vascularized VLMN a radiopaque contrast was injected, CT-angiography with three-dimensional reconstructions was performed and scanned for visualization of the nerve's vascular supply. The vascularized VLMN graft has then been applied in a clinical case for immediate facial nerve reconstruction.

Results

The VLMN showed a division into an oblique proximal and a descending distal branch in 70% of the dissections. Mean maximal length of 8.4 ± 4.5 cm for the oblique division and 15.03 ± 3.87 cm for the descending division. The mean pedicle length was 2.93 ± 1.69 cm until crossing the oblique and 3.27 ± 1.49 cm until the descending division respectively. Three-dimensional CT-angiography documented that the entire VLMN perfusion is provided by branches from the descending branch of the lateral femoral circumflex artery. Resection of a squamous cell cancer in the external auditory canal required resection of sternocleidomastoid muscle, mastoid bone, external ear, parotid gland, 7 cm of facial nerve and neck dissection. The vascularized VLMN along with an ALT-flap were applied. Nerve coaptation was performed between facial nerve stump and distal marginal, buccal and zygomatic nerve branches. Vascular anastomoses were performed to the facial artery, facial and external jugular vein. Follow-ups at 1, 3, 6 and 12 months.

Conclusions

The vascularized vastus lateralis nerve in combination with the ALT-flap is a useful and reliable tool in immediate reconstruction after extensive ablative head and neck surgery.

9.38 DYNAMIC REPAIR OF HERNIAS WITH CONCOMITANT DENERVATION OF THE ANTEROLATERAL ABDOMINAL WALL

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Introduction

Flank, subcostal or paramedian incisions as used in general surgery and urology may sever the intercostal motor nerves and thereby denervate the ipsilateral abdominal wall muscles. A hernia that occurs after this type of incisions is difficult to treat, because the hernia repair site lacks functioning muscular support. Since 2001, we have developed and applied a surgical technique that reinforces the repair site with an innervated external oblique muscle flap to reliably close the hernia and to provide synergistic functional support of the abdominal wall. This paper describes the surgical technique and evaluates the clinical outcome.

Materials & Methods

The surgical technique involves direct closure of the hernia and, if required, reinforcement with a synthetic mesh. An innervated external oblique muscle flap is then harvested from an area that has not been denervated by the primary incision and transposed to dynamically support the denervated muscles. A nerve stimulator is used to help in identifying the innervated muscle parts. From 2001-2013, sixteen patients (9 males, 7 females, age 23-68 years) underwent hernia repair using the above-mentioned technique. All sixteen patients had a clinical follow-up examination (median 41 months, range 12-146). Thirteen patients (81.25%) underwent additional ultrasound examination and a questionnaire procedure to assess their satisfaction and postoperative quality of life.

Results

All patients had a stable abdominal wall. There was one partial hernia recurrence (6.25%). Bulging of the lateral abdominal wall was considerably reduced in all patients. Hernia induced pain and quality of life were improved in all but one patient. None of the patients still required compression garments at follow-up.

Conclusions

The transposition of an innervated external oblique muscle flap using the above-described technique provides a practicable surgical solution for the problem of hernias associated with denervation of the anterolateral abdominal wall.

9.46 A NEW MODIFICATION FOR PROTECTING NEOURETHRA IN DISTAL HYPOSPADIAS REPAIR WITH TIP (TUBULARISED INCISED PLATE) URETHROPLASTY TECHNIQUE: PREPUTIAL TRANSPOSITION FLAP

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Introduction

TIP urethroplasty is a commonly used and universal method in distal hypospadias repair. Complication rates of this technique are very low; it is easy to learn and perform. The most common complication we have faced in our clinical practice is urethracutaneous fistula. In this study, we have used preputial fasciocutaneous transpositional flap to envelop the proximal neourethra, which is left uncovered after the glanular flaps are rotated.

Materials & Methods

Technique was used in 11 patients operated for distal hypospadias in our clinic. After the tubularisation of the neourethra with the TIP urethroplasty technique, the glanular flaps were elevated. They were rotated distally and sutured to each other to cover the distal neourethra. The proximal neourethra was covered with a transpositional preputial flap, which included both the skin and the fascia underneath. The transpositional flap was planned at least 2 times longer and 1½ wider than the defect. After the operation, patients were evaluated for early and late complications and cosmetic and functional results.

Results

Urine catheter was retained for 7 days after the operation. Complications like stricture, fistulas, and wound dehiscence were not observed in patients for the postoperative 1st year. Also early complications like detachment in suture lines, flap loss, urinary infection, and hematoma were not seen.

Conclusions

With this technique, it is possible to perform two-layered repair (skin and dartos fascia) only with one flap that reduces the operation time and bleeding. In addition to this, as the suture line of the flap, and underlining neourethra are in different planes and direction, it reduces the risk of a vertical contracture.

The most important advantages of the transpositional flap when used with the conventional TIPU technique are the decreased operative time and fistula rate.

9.54 MEATUS RECONSTRUCTION FOR VULVECTOMIES REQUIRING RESECTION OF THE DISTAL PART OF THE URETHRA

Francesca DE LORENZI, Pietro LOSCHI, Fabio LANDONI,
Mario RIETJENS
Milan, Italy

Introduction

Vulvar cancer is a relatively rare tumour accounting for just 5% of all gynaecological malignancies. Radical excision can sometimes involve the distal one-third to one-half of the urethra, and it is related to postoperative problems such as micturition, vulvar asymmetries and psychosexual distress. Although vulvectomies with simultaneous resection of the distal urethra have been previously reported, no specific technique for distal urethra reconstruction has been described. The aim of this paper is to assess the safety and reliability of our technique of neourethral meatus reconstruction.

Materials & Methods

We conducted a retrospective study of 47 consecutive patients who underwent vaginal mucosa flap reconstruction of the neourethral meatus between March 2000 and February 2013. The surgical technique is described step-by-step. We reviewed the patients' demographics, operative characteristics, as well as immediate complications and long-term outcomes.

Results

Neo-meatal reconstruction was combined to direct vulvar closure in 2 patients, rhomboid flaps in 3 cases, 1 bilateral lotus flap, 36 V-Y fasciocutaneous advancement flaps, 4 rectus abdominis and 1 gracilis flap. Wound dehiscence at the site of the neourethral reconstruction occurred in only 4,3%, partial necrosis of the vaginal mucosa flap happened in 2.1%. Totally post-operative early complication rate including the whole procedures was 29,8% with a re-operation rate of 4,3%. Long-term outcomes were evaluated in 68,1% of the patients, including 18,7% of urinary incontinence, no urethral stenosis, 3,4% of misdirection of the urinary stream and 25% of narrowed vaginal introitus.

Conclusions

Even though this is a retrospective study and 1/3 of the patients were missing for long-term follow-up, we can state that neourethral meatus reconstruction using the vaginal mucosa flap is a simple, safe and reliable technique with a very low complication rate. We suggest that this flap could be a good option to preserve and restore urinary function in case of distal urethrectomy.

10.02 QUALITY OF LIFE AFTER MALE-TO-FEMALE SEX REASSIGNMENT SURGERY: A PROSPECTIVE STUDY

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Introduction

Transsexualism is an ICD-10 recognized personality disorder where affected patients suffer from their constant urge to live as members of the opposite sex. The aim of this study was to analyse how the quality of life (QoL) changes in male-to-female (MTF) transsexuals after sex reassignment surgery (SRS).

Materials & Methods

49 Patients who decided to undergo their first SRS were asked to fill out a package of questionnaires prospectively. 47 agreed to answer them, which included a self-developed and indication-specific questionnaire, a German standardized QoL-questionnaire (FLZM), the Freiburg Personality Inventory (FPI), the Rosenberg Self-Esteem-Scale (RSES), and the Personal Health Questionnaire (PHQ-4).

Results

The total subjective satisfaction with the surgical results was high, both aesthetically (Ø 8.4 of 10) and functionally (Ø 8.3 of 10). The patients agreed post-operatively that SRS strongly improved their QoL (Ø 9.1 of 10) and felt significantly more feminine ($p=0.000$). 25 women (54.1%) reported about regular intercourse after surgery whereas pre-operatively, only six did so ($p = 0.002$). The FLZM showed in its parts “general” and “health” the highest significant improvements for the items partner/sexuality ($p=0.000$), ability to relax ($p=0.000$), energy ($p=0.001$), and in its part of “body image”, for the items hair ($p=0.001$), breasts ($p=0.000$), and genitals ($p=0.000$). The FPI revealed a significant score improvement ($p=0.003$), being even better than the German norm population’s ($p=0.020$). While the RES questionnaire demonstrated a significantly higher score post-operatively ($p=0.004$), both values were within the range of the norm population. In addition, significantly improved scores resulted from the PHQ-4 ($p=0.000$).

Conclusions

To our knowledge there are no prospective studies with standardized questionnaires on SRS. Thus, herein we cannot compare our data to those of other papers, but we can conclude that SRS improves most physical, mental, and social aspects of male-to-female transsexuals significantly.

10.10 SURGICAL OUTCOME OF MALE TO FEMALE GENDER REASSIGNMENT SURGERY: A 14-YEAR COHORT STUDY

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Kalle LUNDGREN
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Introduction

Gender dysphoria is a state where the individual shows a strong and persistent identification with the opposite gender and a belief of being born in the wrong sex. Gender reassignment surgery (GRS) has been shown to be an effective and medically necessary treatment for patients with gender dysphoria. In our country male-to-female GRS has been done at two regional centers for the past decades. Here we present demographics and surgical outcomes: mortality and short-term post-operative complications over a period of 14 years for GRS surgery at our hospital.

Materials & Methods

This is a retrospective study on consecutive patients who underwent primary GRS at our reconstructive plastic surgery clinic in a university hospital during the years 2000-2013. Demographics along with surgical complications were registered and analyzed.

Results

A total of 205 primary male-to-female GRS were performed in the period. Median age of patients was 33 years (range 18-76). Operation time was on average 197 minutes (range 87-402), which steadily decreased during the study period. Length of stay was on average 7 days (range 5-33 days). The most common complications were bleeding (11%) and infection (10%). Major complications such as rectovaginal fistula (2%) and pulmonary embolism (1%) were rare.

Conclusions

Male-to-Female GRS can be performed with a low rate of major complications. Complication rate in our material was comparable to other centers. Operation time was shortened during the study period and re-operation rates reduced. This suggests that GSR surgery should be performed at few centers so that surgical experience and volume may be optimized.

10.50-12.30 SCIENTIFIC SESSION 8 – BREAST

Moderators

Rafic KUZBARI – Vienna, Austria

Nathalie ROCHE – Gent, Belgium

10.50 TRENDS IN IMMEDIATE ONCOPLASTIC BREAST RECONSTRUCTION: AN 11-YEAR POPULATION-BASED COHORT STUDY OF ENGLISH NHS CANCER NETWORKS

Joanna MENNIE, Pari-Naz MOHANNA, Joe O'DONOGHUE,
Richard RAINSBURY, David CROMWELL
London, United Kingdom

Introduction

In 2002, the National Institute for Health and Clinical Excellence recommended that reconstruction should be available at initial surgery to all women diagnosed with breast cancer. Following national audit reports of inequalities in services, further guidelines were published by NICE that re-emphasised the importance of offering reconstruction, regardless of whether the service is available locally. With the steady increase in incidence of breast cancer and the improving outcomes and techniques in reconstruction, the effect of such guidelines also need quantified and considered in terms of service provision. The aim of our study was to evaluate specifically the trends in immediate reconstruction rates across time. We also aimed to investigate proportional rates of immediate reconstruction across the 28 English cancer networks.

Materials & Methods

We identified women diagnosed with breast cancer who underwent mastectomy between April 2000 and March 2012 using the Hospital Episode Statistics database. Criteria for immediate reconstruction were implant, pedicled flap or free flap procedures on the same date and laterality as mastectomy. The proportional rates of immediate reconstruction were calculated and plotted against volume of mastectomies for each cancer network and across time.

Results

A total of 145,371 mastectomies for breast cancer were identified. The overall rate of immediate reconstruction was 13.7%. Proportional rates of immediate reconstruction varied significantly across cancer networks, from 7.1%- 29.4% (Mean 14.1, SD 5.8, $p < 0.01$).

Proportional rates increased consistently across time from 10.6% in 2000 to 21.7% in 2011, $p < 0.05$. Age was an independent variable that influenced rates of immediate reconstruction, $p < 0.001$.

Conclusions

Proportional rates of immediate breast reconstruction have increased over time, with an accelerated increase following the publication of national audit. However significant variance across cancer networks still remains. Consideration of the growing demand on reconstructive services in the UK requires careful consideration by clinicians and policy makers alike.

11.02 IS THERE A ROLE OF POST-MASTECTOMY ACELLULAR MATRIX (AM)-ASSISTED IMPLANT RECONSTRUCTIONS IN THE IRRADIATED SETTING? A EUROPEAN EXPERIENCE

Marco IERA, Luis CAMPOS MARTINEZ, Pietro LOSCHI,
Mario RIETJENS
Milan, Italy

Introduction

Over the past decade AMs have been largely used in post mastectomy reconstructions as an alternative to total muscular or musculofascial pocket, expanding their original indication in pure cosmetic surgery. Data from the literature demonstrated that a low capsular contracture rate is associated to AM-assisted reconstructions, even in irradiated breasts. Experimental studies support these findings. However, most of the patient series are including AlloDerm mesh not available in Europe, they have limited follow-up and number of patients, with a low level of evidence (III to V). The purpose of this study is to assess the safety and reliability of AM-no AlloDerm-assisted implant reconstructions in irradiated patients.

Materials & Methods

Between November 2010 and May 2014, 94 patients underwent AM-assisted implant reconstructions for 96 irradiated breasts, including 2 bilateral procedures. Two matrices have been used in the same irradiated breast for 3 times. Bovine pericardium was used in 86 breasts, porcine dermis in 2 breasts and fetal/neonatal bovine derma in 11. We reviewed the patients' demographics, operative characteristics, immediate complications, failure and long-term outcomes.

Results

Early complications occurred in 27,7 % of the patients, including local erythema/red breast syndrome (4,3%), infection (3,2%), wound dehiscence (8,5%), mastectomy flap necrosis (2,1%), seromas (13,8%). Total implant removal was 11,46 % (14,8% between years 2010-2012 and 6,7% between 2013-2014). At long term evaluation, with a mean follow-up of 12,5 months (range 1-41), capsular contracture rate was scored as baker I-II in 86,7% of cases.

Conclusions

Autologous reconstruction currently represents the gold standard in irradiated breasts. AM-assisted implant reconstruction can represent an alternative to flap with a reasonable low complication rate and satisfactory long-term results. Patient selection is a crucial step as well as surgeon experience and skills. In case of AM failure, autologous reconstruction can be advocated as a salvage procedure.

11.14 **ONE STEP BREAST RECONSTRUCTION WITH MUSCLE SPARING TECHNIQUE: REVIEW OF TWO YEARS MULTICENTER EXPERIENCE USING FULL COVERED IMPLANTS WITH A NEW ACELLULAR DERMAL MATRIX**

Giorgio BERNA, Francesco DELL'ANTONIA, Simon CAWTHORN, Glenda CAPUTO, Maurizio GOVERNA
Treviso, Italy

Introduction

Implant-based breast reconstruction is becoming increasingly popular because of the widespread adoption of acellular dermal matrix (ADM), which allows surgeons to obtain good aesthetic results with fewer operations. To develop more conservative surgical techniques, a retrospective, three-center, proof-of-concept study was performed, from November 2012 to January 2014, to study the effectiveness of a new, immediate, muscle-sparing breast reconstruction technique using the patented Braxon® ADM, which enables subcutaneous positioning of the breast implant without detaching the pectoralis major. A European multicenter study is currently ongoing. We report preliminary results of three-center experience from November 2012 to date.

Materials & Methods

The muscle-sparing surgical technique involves the use of a dry pre-shaped 0.6 mm porcine ADM which allows the complete wrapping of the breast implant and its positioning in a subcutaneous plane, saving the pectoral muscle. This method, in selected patients, increases the aesthetic results by reducing post-operative pain, functional disease, hospitalization and operatory times.

Results

During the preliminary scientific study on 25 cases the choice of material and surgical technique were improved, with a significant reduction in early complications. The second multicenter analysis on 44 Braxon® implants (32 patients) reported a reduction of complications also in medium and long term. Symmetrical and natural breasts with good shape, ptosis and softness were obtained. No cases of capsular contracture were detected in patients with follow-up longer than one year.

Conclusions

The preliminary results are encouraging from aesthetic and clinical viewpoints. In our opinion such natural outcomes are difficult to obtain with the traditional submuscular breast reconstruction technique.

11.22 **BILATERAL BREAST RECONSTRUCTION WITH TAPIA, THORACODORSAL ARTERY PERFORATOR FLAP, IMPLANT AND ACELLULAR DERMAL MATRIX**

Gudjon GUNNARSSON, Jorn Bo THOMSEN
Skien, Norway

Introduction

Local perforator flaps are widely used for partial breast reconstruction but only a few papers describe their use in total breast reconstruction. In this paper we present the first case series of bilateral breast reconstruction using the propeller Thoracodorsal Artery Perforator (TAP) flap with an implant and acellular dermal matrix (ADM) as an alternative to the existing armamentarium of available methods.

Materials & Methods

A retrospective case series of 9 women undergoing bilateral breast reconstruction with TAPIA method. We have previously reported our experience using the TAPIA for a unilateral one-stage breast reconstruction (1).

Results

Over a period of 34 months we performed 9 bilateral breast reconstructions using the described method. The average age was of 47 years (45-70), BMI 25 (19-30), three patients were smokers (33%) and 5 were hypertonic (56%). Four patients had adjuvant radiation therapy prior to their reconstruction (44%). Mean follow-up time from the reconstruction was 17 months (9-34). All procedures were one-stage using permanent silicone implants. The median implant size was 375 (225-650) and operative time was 260 minutes (200-330). Reconstruction was successfully completed in all cases. Two patients experienced complications that were successfully salvaged: one transient venous congestion that was relieved, and one distal flap necrosis that was debrided and the implant exchanged with an expander. No patients presented with infection, hematoma, seroma or total flap necrosis. All patients reported to be very satisfied with the result of their reconstruction at the time of follow up and denied any shoulder disabilities, experience of pain or discomfort at either breast or donor site.

Conclusions

The TAPIA-technique allows for a swift and reliable one-stage reconstruction in a simple setting. The double-sided TAPIA is a valuable adjunct to our armamentarium of single stage bilateral breast reconstruction.

11.30 TOTAL BREAST RECONSTRUCTION USING AUTOLOGOUS FAT GRAFTING FOLLOWING NIPPLE-SPARING MASTECTOMY IN IRRADIATED AND NON-IRRADIATED PATIENTS

Benedetto LONGO, Rosaria LAPORTA, Michail SOROTOS, Marco PAGNONI, Fabio SANTANELLI DI POMPEO
Rome, Italy

Introduction

Although autologous microvascular reconstruction following nipple-sparing mastectomy (NSM) is one of the best reconstructive choice, it cannot be offered to all patients. Aim of this study was to define a fat-grafting protocol for successful reconstruction following NSM and to assess its reliability in irradiated and non-irradiated patients.

Materials & Methods

Twenty-one patients were prospectively enrolled and stratified in Group-A, 11 non-irradiated, and Group-B, 10 irradiated NSMs comparing clinical and aesthetic outcomes. Fat-tissue was harvested using dry technique with a 2/3 mm cannula and a 10-ml syringe. It was centrifuged at 3000 r.p.m. for 3 minutes and injected with a blunt Coleman cannula and 1-ml syringes (i.e., subcutaneous and submuscular layers). To achieve overall injected volume approximately equal to the mastectomy weight, fat-transfer for each session was 1/3 of the latter. The rule of 30% more fat was applied from second to last session because of the physiological resorption. Continuous and categorical variables were analysed using the student t-test and the Kruskal-Wallis test, respectively. A value of $p \leq 0.05$ was considered statistically significant.

Results

The groups were homogeneous regarding demographics ($p > 0.05$), while number of sessions, mean volume of the first two treatments, overall injected volume showed significant difference ($p < 0.001$; $p < 0.001$; $p = 0.002$). Volume, shape, breast mound position, inframammary-fold and scar location subscales obtained high score evaluation without significant difference between the groups ($p > 0.05$), while skin texture subscale showed less score evaluation in Group-B than in Group-A ($p = 0.001$). Although significant difference for total subscale was in favour of Group-A ($p = 0.001$), global score had high rate evaluation in both groups ($p = 0.132$). Interrater reliability showed substantial agreement among all categories.

Conclusions

This is the first prospective series of fat transfer reconstruction following NSM using a systematic approach. Although further studies are required, it may be considered an effective option whenever flap reconstruction cannot be performed.

11.42 TOTAL BREAST RECONSTRUCTION WITH FAT AUGMENTED LATISSIMUS DORSI FLAP

Fabio SANTANELLI DI POMPEO, Benedetto LONGO,
Rosaria LAPORTA, Michail SOROTOS, Marco PAGNONI
Rome, Italy

Introduction

Fat grafting has recognized as useful adjunct to other methods of post-mastectomy reconstruction because of its low morbidity and easy application. Latissimus dorsi (LD) flap provides suitable recipient tissue for fat transfer, with a good blood supply and a reasonable volume of host tissue to inject into. We present our experience on the use of pedicled LD flap coupled with fat grafting for total autologous immediate breast reconstruction without implant.

Materials & Methods

From 2010-2014, 32 patients underwent breast reconstruction with primary fat augmented LD flap, in 21 cases for unilateral and 11 cases for bilateral procedures. Mean patients' age was 44.4 years (range, 37-71 yrs), while the body mass index was 25 kg/m² (range, 21.5-28.7 kg/m²). Fat was harvested using a Coleman-technique with 10-mL syringes and injected in the adipose-layer and muscle fascia of LD flap skin paddle with 1-mL syringes.

Results

Mean size of harvested skin paddle was 19.7x11.08 cm (range, 18x10 cm to 21x12 cm). Mean operative-time was 2.40 hrs (range, 2.10-3.20 hrs) and 5 hrs (range, 4.20-6.10 hrs) respectively for unilateral and bilateral reconstructions. Mean harvested fat volume was 120mL (range, 70-180mL), while mean injected fat volume was 90 mL (range, 60-150mL). All flaps healed uneventfully, no seroma occurred in flap donor-site and no fat grafting-related complications were observed.

Conclusions

To the best of our knowledge, this is the first report where fat transfer is used to achieve immediate LD flap volume augmentation that results as an alternative option for total autologous reconstruction avoiding implant-related complications.

11.54 MASSIVE SUPERFICIAL FAT TISSUE HARVESTING (MAXT) FOR MACROVOLUME BREAST FAT GRAFTING: SURGICAL TECHNIQUES, COMPLICATIONS AND COSMETIC OUTCOMES

Marzia SALGARELLO, Giuseppe VISCONTI, Giuseppe DI TARANTO, Wanda LATTANZI
Rome, Italy

Introduction

Fat donor sites have been previously investigated using a 'bi-dimensional' approach to the subcutaneous tissue anatomy (i.e. tissue comprised between skin and muscular fascia). Our recent findings that superficial fat carries more stemness features than deep fat demand a shifting in fat donor-site analysis to 'three-dimensional' approach. In this paper we describe the Massive Superficial fat tissue harvesting (MAXT) surgical technique for breast fat grafting and analyze its complications and cosmetic outcomes.

Materials & Methods

From July 2012 to August 2013, 62 consecutive patients underwent MAXT breast fat graft harvested from superficial fat with 1.8mm cannula for both cosmetic (25 patients, 7 with BRAVA®) and reconstructive (37 patients, 3 with BRAVA®) indications. Breast volume assessment was performed with preoperative and postoperative MRI breast scans as well as three-dimensional volumetric conversion of standard two-dimensional pictures. Recipient- and donor-site complications, surgeons' and patients' satisfactions were reported.

Results

Average follow-up was 14.2 months (reconstructive group) and 14.4 months (cosmetic group). Mean volume maintenance ranged from 55.1% \pm 9.2 (radiated patients without BRAVA) to 81.6% \pm 2.6 (not radiated, cosmetic patients with BRAVA). Volume maintenance spread of data ranged from 2.6% to 9.2%. Recipient and donor-site complications were minimal. Patients' and surgeons' satisfaction was good to very high.

Conclusions

MAXT is a safe and effective technique that allows to harvest large amount of superficial microfragmented fat for breast fat grafting. The preliminary results show a high graft take with acceptable narrow spread of data for rate of volume maintenance (less unpredictability), very low donor and recipient-site complications and high surgeons' and patients' satisfaction.

12.06 LIPOFILLING MAY CAUSE RADIOLOGICAL CHANGES BUT DOES NOT IMPAIR CANCER DETECTION

Inkeri SCHULTZ, Marie WICKMAN-CHANTEREAU,
Anna LINDGREN
Stockholm, Sweden

Introduction

Autologous fat transplantation to the breast, lipofilling, is commonly used for improving results after breast conserving surgery for breast cancer and after breast reconstructions. The aim of the present study was to prospectively evaluate changes in mammograms and ultrasonography after lipofilling.

Materials & Methods

Forty-four breasts in 37 patients were evaluated. Nineteen patients had previously had breast-conserving surgery, 13 mastectomies and immediate reconstructions, one mastectomy and delayed reconstruction, seven prophylactic mastectomy and immediate reconstruction and four mastectomy and LD flap-reconstruction. Median time from last breast surgery to lipofilling was 34.5 months. The median amount of fat injected was 149ml. Pre- and postoperative mammogram and/or ultrasonography was performed. Follow-up time from the last lipofilling-session to ultrasound and or mammogram was median 13 months.

Results

Calcifications were seen in 11 breasts preoperatively and 15 breasts postoperatively. Four out of the 11 with preoperative calcifications had an increased amount of calcifications postoperatively. Oil-cysts were detected with ultrasound postoperatively in 15 breasts. Patients with cysts had had more fat injected than those who did not. No liponecroses were found. Twenty-two of the patients had visible scarring, six improved after lipofilling. Six patients had a palpable lump that lead to fine-needle aspiration. Three patients had fine-needle aspiration because of findings during ultrasound. One of the aspirations showed only oil and was discarded. A pathologist analysed eight aspirations and found fat necrosis in four cases, benign breast tissue and oil in two cases, one ordinary cyst and one case with normal fat tissue.

Conclusion

The present study shows that autologous fat transplantation to the breast may result in increased number of calcifications and small oil-cysts. These findings may necessitate fine-needle aspiration for cytology but detection of cancer is not impaired.

12.14 BREAST IMPLANT ASSOCIATED ANAPLASTIC LARGE CELL LYMPHOMA: REPORT OF 4 CASES AND PROPOSAL FOR A MONITORING PROTOCOL

Michail SOROTOS, Benedetto LONGO, Rosaria LAPORTA, Marco PAGNONI, Fabio SANTANELLI DI POMPEO
Rome, Italy

Introduction

The aim of the study was to report four cases of ALCL from a single institution and to propose a monitoring protocol.

Materials & Methods

From 2011 to 2014, four BIA-ALCL were diagnosed; case 1 was a CD4+/CD30+/ALK-ALCL in a woman with previous expander/silicone-implant reconstruction. Case 2 was a CD4+/CD30+/ALK-ALCL in a woman with previous Latissimus Dorsi and silicone-implant reconstruction. Case 3 was a CD8+/CD30+/ALK-ALCL in a woman with previous augmentation mammoplasty (polyurethane implants). Case 4 was a CD4+/CD30+/ALK-ALCL in a woman with previous breast reconstruction with silicone implant. A retrospective study of all patients who underwent breast implant positioning was performed to identify any misdiagnosed cases.

Results

Of 458 patients, 226 cases underwent reconstruction while 25 underwent breast augmentation for congenital anomalies. Fifty-eight (12.7%) presented capsular contracture (Grade III-IV). Late-onset seroma occurred in 15 (3.27%) patients. A combination of capsular contracture and seroma was diagnosed in 4 (0.87%) cases. All those 77 (16.81%) symptomatic patients received surgical revision and/or seroma evacuation combined with capsulectomy/capsulotomy. Histology specimens received a second look by the pathology department and although extensive samplings of the periprosthetic capsules were not done at the time no misdiagnosed cases were identified. Due to this retrospective study that revealed different treatment approaches among those patients a multidisciplinary protocol for suspected BIA-ALCL patients was established. Immediate ultrasound exam with FNAC is done to all patients with periprosthetic effusion and sent for cytologic examination. If BIA-ALCL is diagnosed, staging is done with a PET/TC total body scan and immediate implant removal and complete capsulectomy is performed. The patient receives postoperative follow-up at regular intervals.

Conclusions

Surveillance of all patients with implants is needed together with increased awareness in order to identify suspected symptoms and direct patients to specialized centers where a multidisciplinary team can offer the appropriate treatment.

12.22 PHYSICAL EFFECTS OF UNILATERAL MASTECTOMY ON SPINE DEFORMITY

Savar SEREL, Zeynep YASAVUR, Zehra AKKAYA, Caglar UZUN, Sancar BAYAR
Ankara, Turkey

Introduction

Breast cancer is the most frequent malignant neoplasm in women which primary treatment modality is mastectomy. Long-term postural changes are seen after mastectomy. Although there are several studies on effects of mastectomy on the body posture, there has been no study investigating the direct effects of mastectomy on spine. The aim of this study was to evaluate physical effects of mastectomy on spine deformity.

Materials & Methods

The study enrolled 60 women who underwent unilateral mastectomy. Initially in order to determine the presence or absence of any thoracic spine rotational abnormality, pre- and postoperative 12th month posteroanterior (PA) chest x-rays were evaluated. In addition to this, two radiologists measured Cobb's angles. All statistical calculations were performed using SPSS 11.5 statistical software (SPSS, Chicago, IL, USA). Pre- and postoperative measurements in Cobb's angles were evaluated by using Wilcoxon signed-ranks test, Mann-Whitney U test and Chi-square test.

Results

The Cobb's angle was decreased in 14, and increased in 38, of 60 patients independent on mastectomy side ($p < 0.001$). Postoperative films showed increased Cobb's angles in 23 (74.2%) of 31 right mastectomy patients, and in 20 (69%) of 29 left mastectomy patients ($p > 0.05$). Increased Cobb's angle to the leftward was found in 21 of 28 right mastectomy patients (75%, $p < 0.01$), and to the rightward was found in 12 of 25 left mastectomy patients (48%, $p < 0.001$). Shifting of Cobb's angle to opposite side of mastectomy was seen in 33 (62,2 %) of 53 patients ($p < 0.001$).

Conclusions

The patients who had unilateral mastectomy have developed acquired scoliotic posture that could have a direct effect on the lateral curving of vertebral column in a long term. As a conclusion breast reconstruction and physical therapy should be kept in mind as a preventive method in patients undergoing unilateral mastectomy.

**13.45-15.15 SCIENTIFIC SESSION 9 -
*PRESIDENTIAL PANEL***

COMPLICATIONS IN RHINOPLASTY

Chair

Moshe KON – Utrecht, The Netherlands

Participants

Nuri CELIK – Istanbul, Turkey

Sebastian HAACK – Stuttgart, Germany

Roni MOSCONA – Haifa, Israel

Riccardo MAZZOLA – Milan, Italy

Awf QUABA – Edinburgh, UK

15.45-17.45 SCIENTIFIC SESSION 10 – AESTHETICS

Moderators

Berend VAN DER LEI – Groningen, The Netherlands

Gregory EVANS – Irvine, California, U.S.A.

15.45 THIRTEEN YEARS OF EXPERIENCE WITH LATERAL PILLAR SUSPENSION TECHNIQUE IN VERTICAL-SCAR MAMMAPLASTY

Erdem TEZEL, Burak ERSOY

Istanbul, Turkey

Introduction

The vertical scar mammaplasty is an elegant technique that successfully combines the two concepts of minimal scar formation and a satisfactory breast shape. In the last decades many authors developed various modifications of this technique, mainly to overcome the effect of the gravitational forces on the breast and the bottoming out phenomenon. The remaining lateral fullness, the descent of the breast tissue and the loss of upper pole fullness are pointed out to be the most important and annoying complications encountered during the late follow-up period. The purpose of this study is to introduce a modification of the vertical scar mammaplasty designed to overcome these drawbacks and to present its long term results.

Materials & Methods

Since 2001 the lateral pillar suspension technique has been utilized in 143 patients. Intraoperatively, in concordance with the planning for superior pedicled vertical scar mammaplasty lateral and medial pillars were prepared following de-epithelization. The most inferior end of the lateral pillar triangle is tightly plicated to the periosteum of the rib next to the inferomedial border of the sternum using 0 PDS suture. Resections were performed mainly from the medial pillar, and thickness of the lateral pillar was adjusted accordingly.

Results

Of the 143 cases 112 (78.3%) were mastopexy and 31 (21.7%) reduction mammaplasty procedures, which have been followed up for 1 to 12 years. Overall the application of the lateral pillar suspension technique has yielded pleasant and satisfactory long-term results.

Conclusions

Lateral pillar suspension in vertical mammaplasty is a versatile and efficient technique that can be used for mastopexy as well as for reduction mammaplasty purposes. This method facilitates the redistribution of the lateral fullness of the breast to the upper pole and promises to provide cosmetically pleasing and long-lasting outcomes in aesthetic breast surgery.

15.53 LOCAL HEAT PRECONDITIONING TO PREVENT WOUND BREAKDOWN AND SKIN NECROSIS: A PILOT STUDY IN BILATERAL REDUCTION MAMMAPLASTY

Daniel SCHMAUSS, Tom FINCK, Tomàs EGAÑA,
Hans-Günther MACHENS, Yves HARDER
Munich, Germany

Introduction

Wide dissections or transfer of flaps depend on sufficient perfusion of the tissues, particularly within the randomly perfused areas distant to the vascular inflow. As a function of the procedure, inadequate perfusion is associated with a rate of wound breakdown of up to 68% respectively skin necrosis of up to 45%. Tissue preconditioning (PC) has shown to effectively replace 'surgical delay', an effective but invasive and long lasting approach to reduce ischemia-induced flap-morbidity. Tissue PC increases ischaemic tolerance and/or maintains microvascular perfusion within the tissue at risk. This translational study aims at analysing the efficacy of local heat PC in reduction mammaplasty (RMP).

Materials & Methods

Prospective randomised trial including 20 patients (mean age: 42years; mean BMI: 26kg/m²) undergoing bilateral RMP. Local heat PC was initiated ~17 hours prior to surgery, using a pliable water-cuff heated up to 43°C and moulded to the breast for three 30-min cycles, interrupted by 30-min cooling-cycles at room temperature. The contralateral breast was kept un-heated, serving as control. Tissue perfusion (laser-Doppler), rate of wound breakdown, total healing time and expression of Heat-Shock Protein (HSP)-70 (ELISA) were assessed. 'Wound break down' was defined as incomplete re-epithelialization of the wound at day 14 postoperatively.

Results

No burns were induced. Mean resection weight of both breasts was comparable. Local heat PC resulted in reduction of wound breakdown from 35% to 10% ($p < 0.05$). Tissue PC was associated with an up-regulation of HSP-70 ($p < 0.05$). Tissue perfusion was only increased directly after heat application when compared to the un-heated contralateral breast and not before surgery the next day.

Conclusions

Local heat PC of the skin is a simple, non-invasive and effective method to thwart ischaemia-induced complications, including prolonged healing and wound breakdown. The tissue protective effects are associated with an induction of HSP-70 increasing ischaemic tolerance rather than maintaining tissue perfusion.

16.05 BREAST REDUCTION WITH TRIPLE BLOOD NOURISHING OF THE NIPPLE-AREOLA COMPLEX: A NOVEL CONCEPT OF THE TRANSVERSE BI-PEDICLE REDUCTION MAMMAPLASTY BASED ON WÜRINGER'S SEPTUM

Eugenia Jenny KYRIOPOULOS, Dimosthenis TSOUTSOS
Athens, Greece

Introduction

Numerous breast reduction techniques have developed over the years. The choice of pedicle depends on the degree of hypertrophy, position of nipple-areola complex (NAC), quality of skin, patient's age, surgeon's experience and long term breast shape. A modification of the transverse bi-pedicle reduction mammoplasty is presented for optimization of NAC sensation and blood supply, with satisfactory and durable aesthetic results.

Materials and Methods

Ninety patients underwent bilateral breast reduction over a 2-year period with this technique. The lateral/central pedicle carries an identifiable neurovascular supply to the NAC from the lateral thoracic and 4-5th intercostal vessels and nerves from Würinger's septum. A thin medial pedicle provides additional nourishing from the sub-dermal plexus of internal thoracic perforators and anterior intercostal arteries and nerves. Reduction is achieved from the inferior and superior parts of the breast in a customized fashion. Thinning of the pedicle, under direct vision and preservation of Würinger's septum, is carried out as desired in order to ease pedicle mobilization. Skin closure without tension is achieved with inverted-T scar incision. Patient demographics, size of reduction, complications, NAC sensitivity measured with Von Frey filaments and aesthetic assessment at 1 year are presented.

Results

Mean weight of reduced tissue was 760g per breast (range: 480-1200g) and distance of NAC transposition (range 8 to 23cm). All breasts had good projection and NAC sensitivity (87 percent similar to preoperative values) at 1 year. Cleavage fullness and inframammary fold definition persisted over time. Complications: 3 cases of small leaks of fat from the vertical scar.

Conclusions

The combination of bi-pedicle dermoparenchymal and Würinger's septum breast reduction is a technique that can be used for a wide range of macromastia with optimal NAC sensation and breast remodeling. It is safe and versatile and therefore has become our favored technique in a teaching hospital.

16.13 A RANDOMISED PROSPECTIVE STUDY OF PROPHYLACTIC CLOXACILLIN IN BREAST REDUCTION SURGERY

Richard LEWIN, Anna ELANDER, Mattias LIDÉN

Introduction

Postoperative infection after breast reduction surgery is a common complication, with the most commonly involved pathogen being *Staphylococcus aureus*. Previous studies of antibiotic prophylaxis in breast reduction surgery have been inconclusive. The aim of the present study was to clarify the role of prophylactic antibiotics in breast reduction surgery.

Materials & Methods

In total, 325 women were randomized to antibiotic prophylaxis (with 2g of Cloxacillin iv. or 600mg of Clindamycin iv.) (intervention group) or no antibiotic prophylaxis (control group). Follow-up was conducted at one and two weeks postoperatively. Patients with signs of infections or other complications were followed until resolution. Patients who received antibiotic treatment within 30 days from surgery (Cloxacillin 750mg or Clindamycin 300mg orally) were considered having an infection and this was the main outcome variable. All postoperative infections were also judged according to a graded scale.

Results

In the intervention group 26 (16.0%) patients were treated with antibiotic and in the control group 32 (19.6%) patients were treated with antibiotics. No difference was found between the groups (RR 0.82, 95% CI (0.51;1.31) $p=0.49$) Twenty-two patients (14%) in the intervention group were classified to have a possible infection according to the scale compared to twenty-seven (17%) in the control group. No statistical difference was found (RR 0.81, 95% CI(0.48;1.37) $p=0.54$)

Conclusions

Prophylactic Cloxacillin as a single dose iv. in breast reduction surgery does not reduce the incidence of postoperative infections.

**16.25 BIPLANAR LIPOABDOMINOPLASTY –
INTRODUCING THE S.L.A.S.**

Yoram WOLF

Introduction

Abdominoplasty is one of the most commonly performed aesthetic procedures, first introduced by Kelly in 1899 as a dermolipectomy of the lower abdomen. In the late 60's and early 70's, the second generation abdominoplasty commenced with the introduction of rectus sheath suture plication. The third generation came about in the late 80's and early 90's with the addition of suction assisted liposuction to the procedure. Lately new concepts have been advocated including reduced undermining, lateral subcostal perforator preservation, progressive tension sutures and lymph vessels preservation. The need for vacuum drains in abdominoplasty has also been contemplated. Numerous authors have tried to evaluate the risk for complications in these new techniques, namely of seroma formation and of vascular compromise. Being a student of Dr. Vladimir Mitz of Paris, the pathfinder of biplanar facelift, it was only natural to seek for the same concept in lipoabdominoplasties. In search for a better support to the lower abdominal wall and better utilization of the abdominal wall tissues, the author has contemplated on the concept of Biplanar Abdominoplasty.

Materials & Methods

The biplanar abdominoplasty concept will be presented, based on the evolution of 310 consecutive cases of abdominoplasties, Matarasso types III and IV. A vector analysis and physiologically based discussion of „how it works“ will be offered. Emphasis will be given to the fascial anatomy of the abdominal wall and the layers of dissection and tension in this technique.

Results

The histologic characteristics of the Subscarpal Lipo Aponeurotic System (SLAS) will be presented. Statistical data will be presented for the whole series, with a focus on the outcome and risks when the biplanar technique was used.

Conclusions

The author believes that biplanar abdominoplasty is another step forward in abdominal wall esthetic surgery. The use of this novel approach enhances better results and patients' satisfaction.

16.37 LIVER TRAUMA DURING COMBINED LIPOSUCTION AND ABDOMINOPLASTY: A RARE BUT POTENTIALLY LETHAL COMPLICATION

Ali MODARRESSI, Eleftherios GIALAMAS,
Brigitte PITTET-CUÉNOD, Philippe MOREL, Christian TOSO
Geneva, Switzerland

Introduction

Major complications after liposuction such as perforations of intra-abdominal organs are uncommon, but possibly lethal, especially in case of delay diagnosis and treatment.

Materials & Methods

A 38-year-old woman with a body mass index of 15.6 kg/m² was admitted to the emergency department with hypovolemic shock. The same morning she had undergone combined 'mini-abdominoplasty' with rectus muscle plication and 300ml liposuction in a private clinic. She presented post-operatively hypotension (70/50mmHg), which initially responded well to fluid administration. Four hours later, she developed a severe hypovolemic shock requiring an emergency transfer to a tertiary care center without precise diagnosis. At entrance, hemoglobin was 5.5g/dl and abdominal ultrasound revealed the presence of free intra-abdominal fluid. After resuscitation with crystalloids, blood and catecholamines, she underwent a computed tomography (CT), which showed a large subcapsular hematoma of the right liver and multiple active bleeding sources. The patient underwent a selective embolization of the bleeding hepatic arteries that allows hemodynamic stability. Five hours later, she showed signs of active bleeding, and underwent a second embolization. After three hours, the hemoglobin level fell again and the patient presented signs of abdominal compartment syndrome, with an intra-abdominal pressure of 36 mmHg. Sub-costal laparotomy was performed, with the removal of 3.5 liters of blood. A large subcapsular hematoma associated with a deep liver fracture in segment VI was located at the level of a 5 mm peritoneal hole.

Results

Effective hemostasis was achieved. In total, she received 13 red blood cell units, 13 fresh frozen plasma units, 6 platelets units, and 2 gr of fibrinogen. After 2-week hospital stay, she was discharged and five months later, she was back to work.

Conclusions

Although rare, liver trauma can happen during liposuction, and such a complication should be kept in mind and identified early for efficient management.

16.45 GLUTEAL SCULPTING AUGMENTATION: A SYNERGISTIC EFFECT OF THE COMBINATION BETWEEN LIPOSUCTION AND LIPOFILLING

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Introduction

The purpose is to share the authors' five years experience with gluteal augmentation by simultaneous liposuction and lipofilling.

Material & Methods

The Power Assisted Liposuction (PAL) machine is used for liposuction of the zones surrounding the buttock, harvesting and injection of fat as well as preparation of the recipient site. Fat is harvested using a 3 mm 12 holes cannula by liposuction along a triangle joining the mid axilla superiorly down to the superior intergluteal fold posteriorly and the inguinal crease anteriorly enabling sculpting of these zones at the same time. The lipoaspirate is allowed to decant and is then filled into 60 ml syringes. Following that, preparation of the recipient site is achieved through multidirectional and multilayered tunneling through multiple access points, in a way to fashion a matrix for fat grafting. Lipofilling is carried out in multiple planes with a custom-made V-shaped 3 mm multi-hole-cannula, enabling simultaneous vibration and tunnelization of the buttock during fat injection.

Results

The P.A.L.L. technique was applied for 90 bilateral buttock augmentations. Liposuction volumes ranged between 1400 and 5000 ml and the injected volumes per side and per session ranged from 300 to 800 ml. The operative time ranged between 60 to 90 min. An average of 1.2 sessions were required to achieve the final desired outcome. The follow up period ranged between 12 and 48 months.

Conclusions

Ideal gluteal sculpting should combine large volume fat grafting to the buttock with liposuction of the surrounding zones to achieve a cosmetically pleasing outcome. Combining tunnelization and vibration with fat grafting improves the dispersion of fat in the recipient site and increases the recipient site grafting capacity while maintaining a reduced operative time.

16.53 THE LATERAL SUPERCILIARY COMPARTMENT AND ITS IMPLICATIONS FOR VOLUME AUGMENTATION OF THE EYEBROW

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Introduction

Volume augmentation either with fillers or autologous fat is an established method for rejuvenation of the eyebrow. Although the anatomy of the soft tissue attachments of the eyebrow has been described in great detail to guide surgeons during lifting operations, the relevant anatomy for volume augmentation remains somewhat obscure. This study is the first description of a lateral superciliary compartment that may provide the anatomical basis for the practice of volume augmentation of the eyebrow.

Materials & Methods

35 hemifaces of 22 fresh cadaver heads were examined. A watery dye was injected above the superolateral orbital rim. The forehead and temple were then dissected and measurements were made to bony landmarks.

Results

A distinct Lateral Superciliary Compartment (LSC) located along the lateral two-thirds of the eyebrow was found in all specimens. The injected dye remained confined within the compartment. The LSC contains a fat pad that corresponds to the ROOF medially and to the superficial temporal fat pad laterally. The borders of the LSC are the tight orbicularis retaining ligament inferiorly, the less rigid inferior temporal septum cranially, the supraorbital ligamentous adhesion medially and a fine septum laterally. The superficial temporal artery courses close to the superior border or within the LSC. The temporal branches of the facial nerve course within the fat pad of the LSC. The mean medial extent of the LSC was 37 mm from the midline; the mean lateral extent was 24.7 mm from the most lateral orbital rim.

Conclusions

The lateral aspect of the eyebrow, which is most prone to age-related atrophy and ptosis, corresponds to the location of the LSC. Atrophy of the fat pad within the LSC and the relative laxity of its superior border may explain the descent of the eyebrow with ageing and the elevation achieved with volume augmentation.

**17.05 EVALUATION OF A MODIFIED MONOBLOC
SUSPENSION BY WIDE DOUBLE LOOP SUTURES
IN FACELIFT**

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Introduction

The Monobloc Suspension Procedure (MSP) for face rejuvenation, was popularised by Daniel Marchac. The aim of this study was to describe a modification of the double loop and evaluate the efficacy of this technique.

Materials & Methods

This study reports on all consecutive patients who underwent face rejuvenation surgery with the MSP between 2011 and 2013 and were followed prospectively. Exclusion criteria included: follow-up shorter than 1 year and absence of standardized photos. All procedures were performed by a single surgeon in a day care setting under local anesthesia with sedation. The core principle of this technique is the strong pull of 2 concentric purse string sutures on the SMAS going around the ear and tightly anchored above the auricula in the temporal fascia. In this manner the vertical and horizontal lift vectors adapt naturally to the facial anatomy. The skin undermining can be limited or extended depending on the skin redundancy. Photographs were assessed by 5 independent members of the clinic asked to rate apparent age reduction, as described by Swanson. Furthermore patients were asked to rate their result on a scale from 1 to 4.

Results

Fifty-three patients were included in the study, 47 female and 6 male. Age ranged from 43 to 76 years (mean 60 years). The mean reduction in apparent years was 5,1 years, (range 3-10 years). Cosmetic outcome was rated as 3 or 4 by 85 % of the patients. Only minor complications were observed: small hematomas that did not require reintervention (5%) and minimal wound dehiscence that healed without sequel (11%). No major complications were encountered.

Conclusions

We have found the Monobloc Suspension by wide double loop sutures to give reproducible results with high patient satisfaction. It has proofed a safe and relatively simple way to provide a more youthful facial appearance.

17.13 VOLUMETRIC REJUVENATION AND FACELIFT

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Introduction

The concept of the facelift has evolved considerably over the years. The various techniques currently in use seek to obtain the most natural result possible without creating the stigmata associated with conventional facelifting techniques. In addition, a deeper knowledge of the loss and atrophy of volumes in the selective fat compartments of the central regions of the face has established lipofilling as a powerful complement to improve clinical results.

Materials & Methods

A review of 187 face-lifts using an inferiorly pedicled tongue-shaped SMAS flap transposed to the mastoid and volumetric rejuvenation of the central regions of the face was conducted. Volume restoration was performed with Coleman's lipofilling or microfat grafting to correct the negative vector (malar and lower eyelid) in all patients. The tear trough was also corrected when necessary with microfat and nanofat graft. In the lower third of the face Sharp-Needle intradermal fat (SNIF) and complementary nanofat-graft was used to correct folds and wrinkles.

Results

After at least 12 months of follow-up, the facial negative vector was corrected in 92% of patients measured with computer-assisted photographic analysis. Nasolabial folds using Barton's scale revealed improvement of at least one point in 89% of the patients.

Conclusions

This facial rejuvenation protocol allows correction of peripheral cutaneous sagging of the skin in the middle third of the face and neck, together with filling of the volumes of the central areas of the face.

17.25 PREVENTING SUTURE EXTRUSION AND RECURRENCE IN OTOPLASTY BY USING LATERALY BASED POSTAURICULAR DERMAL FLAP AS A NEW TECHNIQUE

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Introduction

Prominent ear is the most common deformity of the external ear. The major causes can be underdeveloped antithetical fold, concha hypertrophy and prominence of the ear lobule. Over two hundred different techniques have been described but the choice of the procedure still remains at the surgeon's preference. We present laterally based posterior auricular dermal flap technique as an adjunct to the conventional cartilage sparing otoplasty.

Materials & Methods

From 2009 to 2014, 47 patients (27 female and 20 male) have undergone this combination procedure. Under general anesthesia, a small ellipse was marked in the posterior auricular skin. The marked elliptical skin area was then de-epithelized. Depending on the characteristics of the deformity, the concha-scaphal, concha-mastoid, or a combination of both, were used as the two suture techniques. After reshaping the auricular cartilage, the elevated posterior auricular dermal flap was sutured to the mastoid bone in a tensed position.

Results

The patients were evaluated at post-operatively 1, 3, 6, and 12 months. All patients were evaluated for suture extrusion, formation of granulomas as well as relapse of the deformity. There was no any early post-operative complication. Neither suture extrusion nor granuloma formation was observed during the follow up period. No recurrence of deformity was reported at the end of the follow up period. The patients were asked whether there was any pain, discomfort, or sensitivity of the affected ear when laying the head toward this side. No patient voiced any such concerns.

Conclusions

The laterally based post-auricular dermal flap is relatively simple, controllable and a reversible method in the treatment of prominent ears. The addition of this flap to cartilage sparing Otoplasty techniques can prevent both suture extrusion and deformity recurrence rates.

17.33 SIZE AND JEWELLERY MATTER

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Introduction

Tears and elongated splits in the ear lobe are conventionally viewed to be caused by a tugging injury or the wearing of heavy earrings. Patients with large ears often dislike them without being able to articulate why, describing them as ugly or clumsy, particularly if the ears are more than 7cms long.

Materials and Methods

One hundred patients who underwent surgery for ear lobe splits, and 304 patients who underwent surgery to reduce the size of the ears were reviewed.

Results

The majority (95%) of the patients who had ear lobe splits or tears described an insidious history of crustiness or a rash over years of prolonged wearing of certain earrings. Allergy to the metal of the earring post seems mostly responsible, and nickel a particular problem. Ten patients, 9 female and 1 male, presented with keloids at lobe piercing sites, and two of these reported that the lobe became stiff and warm within 2 hours of wearing earrings. A possible link between keloid development and metal allergy is postulated.

Of the patients who underwent ear reduction, the lobe was reduced 116 cases, the upper pole was reduced in 145 cases and in 39 cases the upper pole and lobe were tackled simultaneously. Four cases in which the main problem was an over large conchal bowl were dealt with by removing a central wedge. On average, the size of the crescent removed from the scaphal hollow was 8mm wide and a reduction in ear size of 10% was achieved. Lobe reduction produced a less major change, reducing the ear height by 3mm-4mm on average, but up to 15mm.

Conclusions

For a good cosmetic result, an ear lobe split deformity is best repaired by incorporating a Z-plasty to disguise the scar, but advice on the choice of future jewellery is essential to prevent recurrence. Ear reduction is a useful operation not widely practiced. Tips and tricks are presented.