OP1: THE EDUCATIVE ROLE OF VIDEO-ENDOSCOPY FOR ENDONASAL RESHAPING OF BONY NASAL VAULT WITH POWERED MICRO SAW OSTEOTOMY
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INTRODUCTION: Powered micro saw osteotomy for hump reduction and mobilisation of lateral nasal walls has not been discussed in aesthetic surgery literature. The author describes powered micro saw osteotomy as a novel technique for hump reduction, radix remodeling and lateral wall mobilisation. Otherwise this technique carries educational importance that can be realised by using the video-endoscopy.

MATERIALS AND METHODS: Between April 2005 and November 2008, the author performed powered micro saw osteotomy on 621 primary and secondary rhinoplasty and septorhinoplasty cases with endonasal approach. A surgical micro motor system of Bien Air Company (Bienne, Switzerland) and video-endoscopic system of the Storz Company (Tuttlingen, Germany) was used in all of the manipulations. Powered micro saw osteotomy was performed to reduce the bony hump and the edges of the open roof were softened with a powered reciprocating rasp. The dense bony areas along the lines of medial, intermediate and lateral osteotomies were cut with especially designed micro saws to mobilise the lateral nasal walls. Bone thickness measurements were discussed using CT-based 3D models by mimics software of Materialize Company (Leuven, Belgium) on 13 cases at the lines of osteotomies.

RESULTS: Satisfactory results were obtained in all of the cases. The rate of revision for focal bony prominences was 2.8% in this study. There were no immediate complications such as rocker effect, step deformity, collapse, verticalisation of lateral walls or other skin-soft tissue complications. On average follow-up of 28 months (range, 6 to 37 months), there was were? no cases of bone regrowth or widening of bony vault. The mean nasal bone thickness was found 3.3 ± 0.72 mm at the medial osteotomy line, 2.5 ± 0.56 mm at the intermediate osteotomy line, 1.2 ± 0.33 mm at the medial caunthus area, and 3.1 ± 0.67 mm at the lateral osteotomy line.

DISCUSSION: Powered micro saw osteotomy provides a precise approach to hump reduction and mobilisation of lateral walls. This is a professional technique in rhinoplasty that should be educated to aesthetic plastic surgeons, and video-endoscopy takes a major role in this training process.

OP2: THE “GLUTEAL SMAS” IN THE LOWER BODY LIFT
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INTRODUCTION: Bariatric Surgery offers the greatest degree of sustained weight loss to morbidity obese patients.

Surgical correction of post-bariatric contour deformities of the trunk, buttocks and thighs after excessive weight loss requires skin lifting operations, combined in the lower body lift procedure. Extensive subcutaneous undermining and preservation of the superficial fascial system (SFS), originally described by Ted Lockwood, are essential to produce an aesthetically acceptable outcome. Lifting and augmentation procedures of the buttock region utilise the SFS similar to the SMAS in the face to obtain gluteal fullness. Whereas Scarpa’s and Colles’ fascia as part of the SFS are well-described structures, very little attention has been paid to the SFS of the gluteal region. In this anatomical study we aim to demonstrate the existence of the SFS in the gluteal region and its applicability as a SMAS-like suspension structure.

MATERIALS AND METHODS: Anatomical dissection of the gluteal region was performed on 10 fresh cadavers (5 male, 5 female). The SFS and its connections to Scarpa and Colles’ fascia were dissected and visualised. The thickness of the superficial and deep subcutaneous fat layers was measured on a cross section of the fresh and formalin fixed cadavers.

The SFS was shown as a barrier between the superficial and deep fat layer by methylene blue staining and by histological sections from different areas of the gluteal region.

RESULTS: A constant fascial layer can be found at the gluteal region, in continuation with scarpia fascia, and can be identified as part of the SFS. It is of lesser and unsteady thickness compared to Scarpa’s fascia. The superficial and deep subcutaneous fat layers show differences related to sex and region. As in the abdominal region, lobular fatty tissue can be found superficial, lamellar fatty tissue deep to the SFS. The relation of thickness of the superficial fat layer compared to the deep is 1:3 in male, 1:2 in female for the cranial gluteal regions, and 1:1 for the caudal regions in both sexes. In the caudal regions the SFS faded to a more reticular collagen network.

DISCUSSION: A fascial layer analogous to the SFS could be identified in the gluteal region. It is less distinct than Scarpa’s or Colles’ fascia. Still, it is a clearly defined structure that can be prepared in lower body lift procedures and can be used as a suspension structure similar to the SMAS in the face.

OP3: AESTHETIC LEG LENGTHENING: SIMUL-TANEOUS IN BOTH THIGHS AND LEGS WITH TELESCOPIC DISTRACTION NAILS
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INTRODUCTION: Internal systems for callus distraction are superior to the external procedures in many aspects. Nevertheless, for the optimum application in the clinical life they must be universally applicable, like the Ilizarov system, in femur, tibia and humerus. The distraction nails. Albizia and FITBONE fulfill for the first time these conditions of the universal application. The nails are trained as real telescopes with either mechanical or electronic systems. The miniaturised transporting system provides a long length with short construction length. The straightforward operation technology allows wide applicability in clinical scenarios. For the first time, it is possible, in addition to nailing from antegrade, to nail from retrograde, and simultaneously implant in both femur and both tibia.
The small access roads improve comfort for patients. The system permits the maximum consideration of aesthetic points of view.

**MATERIALS AND METHODS:** This principle has been performed since 1986 for medical indications and since 1996 for aesthetic reasons.

**RESULTS:** A case which was the first simultaneous use of the telescope distraction nail system took effect in thigh and lower leg (carried out 09/2000) is shown. For the first time in 2002, to make the duration of the treatment for a patient more comfortable, both thighs and both legs were simultaneously implanted with distraction nails in a single operation. The lengthening occurred at each distraction nail was 1 mm per day (i.e. 2 mm per lower limb). Aesthetic lengthening was carried out up to 10 cm.

**DISCUSSION:** Today, most cases of bilateral leg lengthening are at the request of patients exclusively in either both femur or both tibia simultaneously. The restoration of the weight-bearing osseous pipe occurs, just as with the external Ilizarov procedures, appropriate for form and appropriate for function. According to lengthening distance the patients were mobile 4-6 months after the final lengthening and were walking without assistance. All returned to full activities of daily life and sports. A total of 350 aesthetic leg lengthening procedures have been performed at our unit.

**OP4: CHARACTERISATION OF MESENCHYMAL PROGENITOR CELLS FROM PROCESSED LIPO-ASPIRATES**

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**INTRODUCTION:** As an alternative to bone-marrow-derived SC, processed liposapirates (PLA) are a source of adipose-derived SC, which are able to differentiate into mesenchymal cell lineages. Previously we checked the differentiation potential of our tissue sources and relevant cell surface molecules. Now different isolation and centrifugation protocols were investigated to obtain a viable, highly proliferative PLA cell population.

**MATERIALS AND METHODS:** PLA populations were retrieved by 7 different liposuction aspiration procedures and 1 abdominal fat resection technique and cultivated at 37°C under 5% CO₂. MTT proliferation and viability assays were conducted. Pro-angiogenic cell surface markers, matrigel and cell differentiation capacity studies were set-up.

**RESULTS:** PLA show a characteristic fibroblastic spindle-shaped morphology and are capable of in vitro proliferation except for the PLA isolation from abdominal resection. PLA isolation, with mild centrifugation of the liposapirated fat depots, showed highest viability. However, long centrifugation resulted in the most proliferative PLA cell type. Specific endothelial progenitor stem cell surface markers were retrieved (CD31, KDR) as well as functional tubular formation in matrigel assays.

**DISCUSSION:** PLA have specific (pro-angiogenic and adipogenic) characteristics with great potential for biological and clinical research in translational tissue engineering cell-based experiments. Clinical application in breast reconstruction protocols is likely to succeed.

**OPS: MEDIUM TERM UPPER LIMB FUNCTION AFTER USE OF THE EXTENDED LATISSSIMUS DORSI FLAP FOR BREAST RECONSTRUCTION**

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**INTRODUCTION:** The extended latissimus dorsi myocutaneous flap (ELD) is becoming increasingly popular in breast reconstruction. Standard latissimus dorsi donor sites are generally accepted to offer minimal impact on upper limb function. After informal patient feedback functional limitations following use of the ELD flaps we embarked upon a study to formally assess the nature and extent to which patients perceived their upper limb function to be affected.

**MATERIALS AND METHODS:** 25 consecutive patients undergoing ELD flap breast reconstructions by a single surgeon were included. An independent, comprehensive, standardised, telephone questionnaire was carried out including details on specific personal, household, work, sport and leisure activities, comparing pre- to post-operatively. Patients were asked to comment on limitations, score their satisfaction (donor site) and if, with hindsight, they would undergo or recommend the procedure. Case-notes were reviewed retrospectively.

Independently, the team physiotherapist recorded pre- and interval post-operatively Disability of the Arm Shoulder and Hand (DASH) scores. This previously validated assessment tool provided an objective numerical indicator of degree of disturbance of upper limb function.

**RESULTS:** Questionnaire return was 100%, 9 of 25 had DASH evaluation. Mean post-operative period was 22 months. 40% of patients perceived no limitation in post-operative function. 60% of the group experienced some functional limitation, specifically in activities involving overhead extension and an increased rate of fatigue in repetitive movements. Details of restrictions in the 60% and how they impinge upon specific daily activities are presented. Patients considered impact acceptable, with all, at least, 'very satisfied'. Those who wished to return to work did so (mean time 4.5 months). DASH score analysis detected a 'minimally important change in function' in these patients.

**DISCUSSION:** Specific medium term upper limb sequelae are present following ELD breast reconstruction in 60% of patients in this study. These include restriction in overhead extension, tightness and increased fatigueability in the ipsilateral limb. These deficits are acceptable to patients, having minimal interference with everyday tasks.
OP6: BREAST RECONSTRUCTION WITH THE SEPTOCUTANEOUS PERFORATOR FLAP: THE NEXT FRONTIER
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INTRODUCTION: Breast reconstruction has advanced substantially since the rediscovery of the latissimus dorsi muscle flap in the 1970s. The development of TRAM flaps was the first improvement in autologous tissue breast reconstruction in the 1980s. Musculocutaneous (mc) perforator flaps represented the next stage in microvascular breast reconstruction in the 1990s. As the next logical step in the evolution of microsurgical breast reconstruction, we describe septocutaneous (sc) perforator flaps. Advantages of this new technique for microvascular breast reconstruction include larger vessels, easier and quicker flap elevation, and less potential donor site morbidity.

MATERIALS AND METHODS: A retrospective review was done of 16 consecutive septocutaneous perforator flaps performed since January 2008. Four donor sites were used: lower abdomen, upper buttock, lower buttock, and medial thigh. Preoperative imaging with CT angiography and MR angiography allowed visualization of microvascular anatomy. When present, sc perforators were clearly identified and intra-flap vascular course could be seen.

RESULTS: Sixteen sc breast reconstructions were reported: sc-DIEP (n=10), sc-SGAP (n=4), sc-IGAP (n=1), and sc-TUG (n=1). Preoperative CT and MRI imaging demonstrated sc perforators in 22.2% of DIEP flaps, 38.4% of GAP flaps, and 16.7% of TUG flaps; intraoperative findings confirmed preoperative imaging in every case. All flaps (n=16) were based on one sc perforator. Sc perforators were more common in superior gluteal vessels than in deep inferior epigastric vessels. The sc-SGAP territory was more supralateral than the typical SGAP, preserving buttock shape better. The sc-IGAP flap allowed a more lateral flap design by using the thicker trochanteric fat. The sc-TUG flap allowed the gracilis muscle to be preserved with its motor nerve. In this series, 16 out of 16 sc perforator flaps survived (100%). Complications were limited to one donor site seroma (6.25%) and one flap with fat necrosis (6.25%). As sc perforators were usually larger than mc perforators, one sc perforator was usually adequate for flap reconstruction. In addition, since the pedicle ran through an intermuscular septum, dissection was easier and faster than with mc perforators. Motor nerves were not at risk, making it possible to avoid muscle injury.

DISCUSSION: Septocutaneous perforator flaps offer advantages over other forms of microvascular breast reconstruction, including a larger perforating vessel, easier and quicker flap elevation, and less potential donor site morbidity. CT and MRI angiography are valuable tools that make it possible to identify the presence and location of sc perforators. In our view, septocutaneous perforator flaps are a simple, safe and reliable technique that represents the next advance in autologous tissue breast reconstruction.

OP7: IS THE SENTINEL NODE BIOPSY A RELIABLE PROGNOSTIC FACTOR IN MELANOMA?
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INTRODUCTION: Sentinel node biopsy (SNB) has become a standard procedure in malignant melanoma staging. In this retrospective study, we assess the prognostic value of SNB and its contribution to conventional histological prognostic factors in melanoma staging.

MATERIALS AND METHODS: Between January 1998 and December 2006, 243 SNB were performed among 301 melanoma patients. Forty-eight patients were excluded from SNB protocols for age and poor health reasons and used as control group. Ten more were excluded after lymphoscintigraphy failure. All patients had a primary melanoma with a Breslow thickness > 1 mm and/or a Clark level 4. Signs of tumour regression or ulceration also were inclusion criteria. The absence of regional or systemic disease had been radiologically assessed before SNB. Patients with a positive SNB were offered a completion lymphadenectomy.

RESULTS: In the SNB group, 51/243 patients (21%) experienced metastatic recurrence. The sentinel node status, Breslow and age revealed to be significant prognostic factors of recurrence in multivariate analysis. The mean Breslow thickness of positive and negative sentinel node groups were 3.2 and 1.9 mm, respectively and the relapse rate increased with Breslow thickness, reaching 50% for > 4 mm tumours. According to the sentinel node status, the relapse rate was 24/54 (44.4%) for positive and 27/189 (14.3%) for negative SNB. The estimated disease-free survival rates at 5 years were 46.8% and 80.4% respectively. At 5 years, the estimated disease-free survival according to AJCC Breslow ranking and to positive or negative sentinel node status were respectively: 80 and 93.2% in the 1 mm group, 74.9 and 81.5% in the > 1 " 2 mm group, 35.4 and 75.8% in the > 2 " 4 mm group, 22.2 and 51.4% in the > 4 mm group. The mean melanoma-specific mortality rate was 10.3% in the SNB group. In the control group, 19/48 patients (39.6%) relapsed. Mean Breslow thickness was 2.4 mm and the estimated disease-free survival rate at 5 years was 49.7%. The melanoma-specific mortality rate was 12.5% in the control group.

DISCUSSION: Out of 51 relapsing patients, only 24 (47.1%) had a positive SNB and 27 (52.9%) experienced recurrence in spite of a negative SNB. Therefore, we consider that a negative SNB has a limited prognostic value and despite the important prognostic information provided by a positive SNB, histological tumour features should always be taken into account.
OP8: RESULTS OF THE PRECISE ABDOMINOPLASTY STUDY: CLINICAL OUTCOMES WITH THE PEAK PLASMA BLADE COMPARED TO SCALPEL AND TRADITIONAL ELECTROSURGERY
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INTRODUCTION: Traditional electrosurgery (ES) is associated with significant thermal injury to surrounding tissue during cutting and coagulation. This thermal necrosis has been shown previously to affect healing and post-operative course in large tissue-reduction surgeries. We present results of a prospective, randomised, patient-blinded study comparing clinical outcomes following abdominoplasty with the PEAK PlasmaBlade (PB) to scalpel (SC) and ES.

MATERIALS AND METHODS: Twenty patients were randomised to either the Standard of Care (SOC: SC & ES) or PB for abdominoplasty. At 6 and 3 weeks prior to surgery, comparision full-thickness skin incisions with SC (#10 Blade), ES (Cut mode, 30W), and PB (Cut 3) were made in the patient’s abdomen and closed in a running fashion. Following abdominoplasty, healed incisions were submitted for strength testing and histological analysis. Serous drainage, narcotic consumption, activity level, diet volume, and blood loss were assessed for 10 days post-operatively.

RESULTS: PB incisions demonstrated equivalent burst strength to scalpel at 3 (43.4±3.34 lbf/in vs. 43.2±1.32 lbf/in; p=0.95) and 6 weeks (59.3±4.93 lbf/in vs. 51.9±3.99 lbf/in; p=0.25) with 65% and 42% greater strength than ES incisions, respectively (26.2±1.91 lbf/in and 41.7±2.85 lbf/in; p<0.005). Histological analysis demonstrated PB incisions reduced thermal injury depth by 75% compared to ES (185±15/#m vs. 731±26/#m; p<0.005).

Intra-operatively, PB patients demonstrated 37% less narcotic consumption compared to SOC (32.0±4.0mg vs. 50.7±4.3mg Morphine Sulfate IV equivalent; p=0.002) with equivalent operative time (98±4 min vs.95±3 min; p=0.47). Post-operatively, PB patients demonstrated 49% less narcotic consumption through a 10 day monitoring period compared to SOC (Mean AUC 34.3±3.6 vs. 67.4±12.2; p=0.024). Serous drain output was 31% less in the PB group (Mean AUC 553.4±50.5; SOC 805.3±81.6; p=0.02). PB patients reached 80% of normal diet volume by post-operative day (POD) 6 (SOC>10 days; p=0.01), and averaged 10% of normal activity on POD 0 (SOC=1%; p = 0.001) with greater than 50% of their normal activity level by POD 6 (SOC>10 days; p=0.03). Postoperative hemoglobin drop was 57% less for PB at POD 10 (0.4±0.2g vs. 2.0±0.7g; p=0.07). Skin scar width and quality were equivalent for SC and PB at 2 months following surgery (p<0.05).

DISCUSSION: Results indicate that abdominoplasty with the PlasmaBlade offers several significant clinical advantages over the standard of care and that this device has great potential in plastic and reconstructive surgery.

OP9: A 31 YEAR REVIEW OF THE QUALITY OF EVIDENCE PUBLISHED IN 5 PLASTIC, RECONSTRUCTIVE AND AESTHETIC SURGERY JOURNALS
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INTRODUCTION: Much of the information for “evidence based” clinical practice originates from publications in clinical journals. Assessing the quality of this evidence, however can be challenging. In the hierarchy of research study designs, prospective randomised controlled trials (RCT) are considered to provide the highest quality of evidence. Other clinical trial designs such as controlled trials (CT) and comparative studies (CS) are more prone to bias and confounding factors. Weaker study designs include case reports/series (CR). The aim of this study was to evaluate the quality of articles published in prominent peer reviewed plastic, reconstructive and aesthetic surgical journals.

MATERIALS AND METHODS: The quality of clinical studies published in plastic, reconstructive and aesthetic surgery, over three decades was evaluated. Computerised search of the Medline database was undertaken to evaluate the articles published in 5 clinical journals (Plastic and Reconstructive Surgery (PRS), Journal of Plastic, Reconstructive and Aesthetic Surgery/ British Journal of Plastic Surgery (JPRAS), Annals of Plastic Surgery (AnPS), Aesthetic Plastic Surgery (AePS) and Clinics in Plastic Surgery (CPS)) from 1978 until 2008. The number of randomised controlled trials (RCTs), controlled trials (CT), comparative studies (CS) and case reports were noted.

RESULTS: From the 35,816 articles evaluated (17,102 PRS; 7223 AnPS; 5652 JPRAS; 2046 AePS; 1860 CPS), there were 301 (0.8%) randomised controlled trials, 79 (0.6%) controlled trials, 1594 comparative studies (4.4%) and 9197 (25.7%) case reports. For the proportion of randomised controlled trials, the rank order of the journals was JPRAS (65; 1.15%), PRS (159; 0.930%), CPS (1; 0.928%), AnPS (57; 0.79%) and AePS (19; 0.21%). For the proportion of controlled trials, the rank order of the journals was AePS (12; 0.59%) JPRAS (29; 0.51%), PRS (28; 0.16%), AnPS (10; 0.14%), and CPS (0; 0%). For the proportion of comparative studies, the rank order of the journals was AnPS (389; 5.40%), PRS (924; 5.39%), AePS (79; 3.86%), JPRAS (186; 3.29%) and CPS (16; 0.86%). For the proportion of case reports/series, the rank order of the journals was JPRAS (2101; 37.17%); AnPS (2513; 34.79%), PRS (3916; 22.90%), AePS (438; 21.41%) and CPS (229; 12.31%). Overall, from 1978 to 2008, there were significant increases in the proportion of randomised controlled trials (1; 0.55% to 34, 5.37%; p<0.001) and comparative studies (6; 0.03% to 181; 3.31%; p<0.001), there was no significant change in the proportion of controlled trials (2; 1.1% to 2; 0.31%; p=0.331) and there was a significant reduction in the proportion of case reports (179; 98.90% to 500; 78.99%; p<0.001).

DISCUSSION: Over the 31 years evaluated, clinical trials, notably randomised controlled trials form only a small proportion of articles.
published in prominent journals from plastic, reconstructive and aesthetic surgery. This is notwithstanding the modest increases in the proportions of randomised controlled trials and comparative studies over the same period. Increasing proportions of randomised controlled trials would improve the evidence base for the clinical management of disease in plastic, reconstructive and aesthetic surgery.

OP10: OUTCOMES OF EARLY V-Y PUSH-BACK PALATOPLASTY
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INTRODUCTION: The objective of cleft palate repair is velopharyngeal competence without fistula. The general frequency of velopharyngeal insufficiency (VPI) remains at 10 to 20%. Our purpose is to assess two surgeons' 15 years single institution experience with early V-Y push-back palatoplasty as judged by need for pharyngeal flap and fistula repair.

MATERIALS AND METHODS: We retrospectively reviewed 288 children with cleft palate operated by the same two surgeons between 1989 and 2005. Syndromic patients were excluded. The type of cleft palate was categorised according to the Veau classification: I (soft palate): 80, II (hard and soft palate): 20, III (unilateral complete cleft lip/palate): 132, and IV (bilateral complete cleft lip/palate): 56. The V-Y push-back technique (Veau-Wardill-Kilner) was used for palatal closure at the age of three months. The superiorly-based tailored pharyngeal flap was used to correct VPI and ideally scheduled before the age of six years in children who made no speech progress despite intensive speech therapy. We calculated fistula rate and VPI rate based on speech evaluation.

RESULTS: The fistula rate was 6.25 %(18/288): Veau I= 6.25%, II= 15%, III= 2.27%, IV= 12.5%. Overall a pharyngeal flap was necessary in 26.3%(76/288): Veau I= 25%, Veau II= 20%, Veau III= 28% and Veau IV= 26.7%.

DISCUSSION: There was a relatively low incidence of fistula but a high frequency of VPI after palatoplasty for this large series of patients with non-syndromic cleft palate in our practice with two experienced surgeons These results are critically analysed to reduce the incidence of VPI. The criteria leading to VPI must be compared to criteria used in series with very low rate of VPI and where palatoplasty is performed with different timing.

OP11: VASCULARISED OSSEOUS TISSUE ENGI-NEERING USING NOVEL MULTICELLULAR FLOW-PERFUSION CO-CULTURE FOR REPAIR OF CRANO-FACIAL DEFECTS
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INTRODUCTION: We hypothesise that vascularised osseous tissue can be constructed by co-culturing multiple cell types on 3D scaffolds in flow perfusion, avoiding the limitations of traditional autografts or allogeneic transplantation.

MATERIALS AND METHODS: Mesenchymal stem cells (MSCs), human umbilical vein endothelial cells (HUVECs) and normal human osteoblasts (NHOsts) were co-cultured in 2D in various combinations and assessed for viability, proliferation and function (bone nodules, alkaline phosphatase, etc). Optimal culture conditions were tested with cell-seeded thick (>6mm) 3D HA-TCP scaffolds in a novel flow-perfusion bioreactor.

RESULTS: In 2D, proliferation and function were greatest when more-differentiated vasculosgenic cells were cultured with less-differentiated osteogenic cells; co-cultured HUVEC/MSC formed more bone nodules (263,945±m²) than HUVEC/NHOst (179,840±m²) or NHOst alone (89,608±m²). In 3D, cellular function was enhanced in flow perfusion; flow-perfused MSCs had more alkaline phosphatase activity (3.8±0.320nmM/g) than static 3D cultured cells (0.909±0.460nmM/g)(p<0.002)

DISCUSSION: This is the first demonstration of optimal co-culture combination for engineering vascularised osseous tissue. By expanding chemotransportation boundaries using 3D flow-perfusion, we can develop composite tissue constructs for replacement and repair.
restore the palatal vault, the thoracodorsal artery perforator (TDAP) flap was used to reconstruct the sinus-nasal wall. This study presents a retrospective case series of all patients who had a maxillary reconstruction procedure in the Plastic Surgery-Head and Neck Surgery Department Institut Gustave Roussy (Villejuif, France) between 1st January 2004 and 31st December 2008. RESULTS: The were 11 midface reconstructions: 1 flap was composed of a single component, 8 flaps were composed of two components and 2 flaps of three components. The angle of the scapula vascularised by the angular branch of the TD vessels was mainly used to restore the palatal vault. In particular cases the scapula restored the vertical branch of mandibula. The TDAP skin flap closed the sinus-nasal communication and filled the sinus defect. These skin flaps were vascularised in two cases only by direct cutaneous vessels type A of Nakajima’s classification and in all others cases also by musculocutaneous perforators (type D of Nakajima’s classification). In the case of the three component flap, the TDAP skin paddle was used to restore the mucosal lining of the upper vestibule.

DISCUSSION: TDAP chimaera flap is a reliable and useful technique in midface reconstruction that reduces the drawbacks of classic LD flaps and decreases the donor site morbidity by preserving the motor nerve functions.

The thoracodorsal perforator flap is now an ideal procedure in the reconstruction of the maxilla defects, both in cases of small loss of substance, like subtotalexcision, both in cases of muscular or obese patients in which the musculocutaneous component would be too bulky.

In conclusion, the TDAP-SA free flap is useful as a multifunctional flap able to ensure different types of complex midface reconstruction.

Hypercholesteremic mice showing established microangiopathy (B6.129P2-ApoE/J) were treated with EPO 1000 IU/kg BW i.p (n=5) or saline (n=5) given at day 1, 5 and 9, and compared to wild type mice (n=5). We used a histological score to assess wound healing and performed immunohistochemical analysis of EPO receptor and eNOS expression on day 3, 7 and 13.

RESULTS: On day 9 the hypercholesteremic microangiopathic wounds were characterised by a reduced FVD of 83 ± 5 cm² compared to wild type 155 ± 16 cm² (P < 0.01). EPO treatment increased FVD in microangiopathic wounds to values comparable to that of wild type 163 ± 4 cm² (P < 0.01 vs. saline treatment). Hypercholesteremic wounds showed 48% less red blood cell perfusion compared to wild type mice on day 9. EPO treatment increased red blood cell perfusion in hypercholesteremic wounds to values similar to that of wild type. The improved wound revascularisation was accompanied by a significantly increased amount of EPO receptor (33%) and INOS protein (55%) at day 7 (both, P < 0.05), when compared to saline treated animals. Histological wound score revealed an increased wound healing of 22 ± 1 % at day 7 and 18 ± 3 % at day 13 in treated hypercholesteremic mice (both timepoints P < 0.01 vs. saline treated animals).

DISCUSSION: Our data suggests that repetitive systemic EPO treatment improves wound healing in microangiopathic tissue not only by increasing the number of vessels but most importantly by preserving the wound with more red blood cell perfusion.

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**OP13: SYSTEMIC ERYTHROPOIETIN TREATMENT IMPROVES WOUND HEALING IN MICROANGIOPATHIC MICE DEPLETED OF APOLIPROTEIN E**

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INTRODUCTION: Inadequate blood supply is the most common cause of altered wound healing representing a considerable source of morbidity in daily plastic surgery practice. Erythropoietin (EPO) is intensively investigated for its nonhematopoietic vasculoprotective effects. The present study demonstrates the potential of repetitive systemical EPO treatment to accelerate angiogenesis in hypercholesteremic and microangiopathic murine ischemic wounds.

MATERIALS AND METHODS: Incisional wounds were created in the mouse dorsal skinfold chamber to monitor revascularisation by intravital microscopy on day 1, 3, 5, 7, 9 and 11. We assessed the angiogenic revascularisation of the wound in vivo by measuring the functional (neo) vessel density (FVD) after contrast enhancement with 5 % FITC-dextran. The product of red blood cell velocity (RBC) of the newly formed vessels and FVD was taken as an index reflecting the perfusion of the wound with RBCs (RBC perfusion).

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**OP14: VISUALISATION OF SKIN GRAFT REVASULARISATION IN THE MODIFIED DORSAL SKINFOLD CHAMBER – NEW INSIGHTS INTO THE PROCESSES AT THE VASCULAR INTERFACE**

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INTRODUCTION: The exact process of skin graft revascularisation still remains unclear until today. Therefore it was the aim of this study to visualise the process of engraftment and its microvascular architecture in a new in vivo model.

MATERIALS AND METHODS: Preparation of the modified dorsal skinfold chamber including autologous skin grafting was performed in male C57BL/6J mice (n=8). This allowed to simultaneously study the microcirculation of both the wound bed and the skin graft by intravital microscopy in vivo over a time period of 10 days.

RESULTS: Revascularisation of graft capillaries occurred at 72 hours resulting in almost complete restoration of the original pattern of skin microcirculation after 120 hours. After 96 hours a formation of spherical protrusions was seen within the graft capillaries most likely representing a temporary angiogenic response. Immunohistochemistry indicated hypoxia-mediated angiogenesis. Corrosion casting showed the formation of capillaries in the wound bed connecting to the pre-existing capillaries the graft.
DISCUSSION: These data indicate an early onset of angiogenesis, resulting in revascularisation of the skin graft at day 5. The temporary angiogenic response of the graft capillaries is a completely novel finding enabled by use of the new model. This knowledge will aid significantly in the manufacturing on skin substitutes in the future.

OP15: HUMAN BLOOD OUTGROWTH ENDOTHELIAL CELLS (HBOEC) IMPROVE DERMAL AND EPIDERMAL WOUND HEALING BOTH THROUGH REOXYGENATION AND GROWTH FACTOR RELEASE

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INTRODUCTION: HBOEC were shown to increase vascularisation, dermal matrix organisation and re-epithelialisation of full-thickness wounds in mice. HBOEC may achieve this in several ways.

MATERIALS AND METHODS: To find out the underlying mechanisms, we studied the effect of O2 supply, which correlates with the degree of vascularisation, on collagen organisation in a human dermal fibroblast sheet (hDFS) and on keratinocyte (hKC) migration and proliferation in vitro. In addition we probed for trophic interactions between HBOEC and hDFS or hKC by analyzing their in vitro growth factor expression profile by qRT-PCR and ELISA.

RESULTS: Culture of hDFS for 10 days in low (1%) O2 significantly reduced collagen organisation compared to culture in 20%O2. KC, preconditioned for 7 days in 1% O2 migrated much slower in a scratch wound assay than those incubated at 20% O2. hKC proliferation was also significantly lower in reduced O2 conditions. Analysis of growth factor profiles in HBOEC and hDFS revealed similar levels of angiogenic factors VEGF and FGF. However, for many other angiogenic, inflammatory and KC-responsive factors, the expression pattern of HBOEC and hDFS was complementary, suggesting a potential synergistic effect on (epi-) dermal recovery.

DISCUSSION: Stimulatory effects of HBOEC on (epi-) dermal wound healing are both due to increased tissue oxygenation and secretion of trophic factors.

OP16: WHY ARE SOME SCARS HYPER-PIGMENTED?

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INTRODUCTION: Scar colour changes especially following burn injuries are common and can cause significant patient distress. In some communities, this may also lead to social isolation. In addition to the burn scars per se, patients who have undergone skin grafting may also experience dyspigmentation at either the donor or recipient sites. To date, scar re-pigmentation potential is difficult to predict and management of dyspigmented scars remains challenging. This is largely due to the paucity of knowledge of mechanisms underlying re-pigmentation following injury to the skin. At a cellular level, we hypothesised that scars could be darker secondary to an increased number of melanin-producing melanocytes, changes in the packing density of the melanocytes along the basement membrane, or both.

MATERIALS AND METHODS: We investigated the process of re-pigmentation following the creation of 6 standardised partial-thickness excisional wounds on the backs of pigs (n=23). After removal of dressings (day 14), the healed donor site wounds were photographed and reflectance spectroscopy measurements performed every 4 days. At various times, post-wounding, one animal was killed and all the wounded areas excised, freshly frozen and stored at -80°C.

RESULTS: Samples were serially sectioned at 7µm and various histological levels in the healed donor site were accurately referenced to the macroscopic pigmentation pattern on the photograph. Histochemical techniques (DOPA reaction) were performed to localise staining for tyrosinase activity within activated melanocytes. An image analysis programme was used to count the number of DOPA positively stained cells in the basal epidermis of the entire length of the donor site scar histological section. The length of the donor site scar histological section and the actual length of the basement membrane (including undulations caused by the rete ridges/dermal papillae) were measured and used as denominators to calculate the density and packing density of the DOPA positive melanocytes, respectively.

RESULTS: At early post-wounding time points (up to 35 days), areas of the scar, which demonstrated re-pigmentation had a higher density of tyrosinase-positive melanocytes compared to the surrounding non/less-pigmented areas, correlating with the macroscopic appearance of the scar. As the re-pigmentation progressed with time, the density of tyrosinase-positive melanocytes reduced to the basal level seen in normal skin when the scar was mature at day 70 and had returned to normal pigmentation. However, melanocyte tyrosinase synthetic activity remained elevated in hyper-pigmented scars. Although the undulations of the basement membrane changed with maturation of the scar, the macroscopic pigmentation pattern did not correlate with these changes i.e. with the packing density of the tyrosinase-positive melanocytes.

DISCUSSION: Re-pigmentation of scars macroscopically correlates initially with the numbers and location of melanocytes staining positive with the DOPA reaction for tyrosinase activity. As the scar matures, reduction of tyrosinase activity to levels seen in normal unwounded skin correlates with the restoration of a normal macroscopic pigmentation. In hyper-pigmented scars elevated, prolonged tyrosinase activity is seen. Possible mechanisms underlying these changes in melanocyte activity are being investigated. Changes in the packing density of melanocytes due to changing basement membrane undulations, do not correlate with the macroscopic pigmentation pattern of scars.

OP17: LOCAL P53 SILENCING CHANGES CYTOKINE PROFILES TO IMPROVE DIABETIC WOUND HEALING

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INTRODUCTION: p53 is upregulated in diabetic wounds and has recently been shown to play regulatory roles in the vasculogenic pathway. We hypothesised that silencing p53 results in improved diabetic wound healing by promoting vasculogenesis.

MATERIALS AND METHODS: Paired 4mm stented wounds were created on diabetic db/db mice. Topically applied p53 siRNA or nonsense siRNA, distributed in an agarose matrix, was applied to wounds at post-wound day 1 and 7. Wound time to closure was photometrically assessed, and wounds were harvested for histology, immunohistochemistry, and immunofluorescence. Vasculogenic cytokine expression was evaluated via RT-PCR, and ELISA. T-test was used to determine significance (p<0.05).

RESULTS: Local p53 silencing resulted in decreased time to closure compared to controls (18 ±1.3 days vs. 28 ± 1d). The treated group showed a 7.63 fold increase in CD31 endothelial cell staining over controls. At day 10, VEGF ELISA was significantly increased in treated wounds (109.3 ± 13.9 pg/ml) versus controls (33.0 ± 3.8 pg/ml) while RT-PCR demonstrated a 1.86 fold increase in SDF-1 expression in treated wounds versus controls. This profile was reversed after treated wounds healed and prior to closure of controls (day 24).

DISCUSSION: Topical gene therapy with p53 siRNA improves diabetic wound healing and is associated with an augmented vasculogenic cytokine profile and increased endothelial cell markers.

OP18: SIGNAL TRANSDUCTION OF THE INNATE AND ADAPTIVE IMMUNE SYSTEM AFTER TRANSIENT CUTANEOUS ADENOVIRAL GENE DELIVERY
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INTRODUCTION: Adenoviral vectors are effective vehicles for gene therapy. The 'Achilles heel' of adenoviral gene therapy is their immunogenicity. Many aspects of adenoviral-induced immune reaction still remain unclear. The aim of this study was the identification of signal molecules involved in DNA-detection.

MATERIALS AND METHODS: Human keratinocytes were transfected with adenoviral DNA in presence and absence of inhibitors for specific signal molecules. 18 immunocompetent or athymic mice were transduced twice using a GFP encoding adenoviral vector. Expression of type-I-IFN, cytokines and TLR-dependent signal molecules was measured via qRT-PCR.

RESULTS: In vitro transfection resulted in an induction of IFN and MyD88. No induction of TLR-2, -7, -9 and TRIF was detected. Inhibition of PI3K, p38 MAPK, JNK and NFkB resulted in a decreased IFN expression. In vivo, the transgene was detected up to 12 days in immunocompetent mice. Athymic mice showed a diminished expression of IFN and an increase of duration in transgene detection.

DISCUSSION: Our results suggest a TLR-2, -7 and -9 independent immune reaction. A PI3K induced activation of p38 MAPK, JNK and NFkB led to an acute IFN expression. A manipulation of these molecules seems to be an approach improvement of adenoviral gene delivery. The diminished expression of IFN provides potential for effective adenoviral gene delivery into immunosuppressed skin.

OP19: CLINICAL-EXPERIMENTAL STUDY ON THE CRITICAL ZONE OF THE PERFORATOR FLAP
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INTRODUCTION: In any reconstruction using perforator flaps, the viability of the distal part is often the key to surgical success. The aims of this study are to define the factors that improve flap survival and to determine the maximum flap length.

OBJECTIVES: The aim of this study was to develop a new model of a unique perforator flap in the pig based on the deep circumflex iliac artery perforator and to define the relationship between perfusion limits of this flap, its blood flow and size of the perforator.

MATERIALS AND METHODS: Experimental study: 10 pigs each weighing 3.5 kg. Deep circumflex iliac artery perforator flap dissection with 5 days post-operative observation. Determination of optimal length/width flap ratio, which is correlated with perforator artery diameter and flow rate. Pathological evaluation of the zone of necrosis.

Clinical study: 85 clinical cases of a perforator flap (the propeller flap) used in reconstruction of the upper and lower limb and trunk were retrospectively studied. The indications, size, complications and flap survival were analysed and correlated with flap length.

RESULTS
When the dimension was 4:1, usually 100% of the flaps survived. Survival of a flap dimension up to 6:1 was possible when it had an axial vessel and the perforator artery diameter was greater than 1 mm with a flow rate of more than 1.5 ml/min but there was a higher risk of dermo-epidermal necrosis in the distal part of the flap but usually the deep fascia s survived allowing successful coverage of the defect.

DISCUSSION: The survival of the distal portion depends on perforator artery size, flow rate and vascular pattern within the flap tissue. The propeller perforator flap is a good option for reconstruction using local tissues.

OP20: PHARMACOLOGIC PRECONDITIONING:
HYDROGEN SULFIDE - PROTECTS AGAINST ISCHEMIA - REPERFUSION INJURY IN VITRO
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INTRODUCTION: Free tissue transfer (FTT) results in oxidative and inflammatory processes that can lead to ischemia-reperfusion
injury (IRI). Hydrogen sulfide (H$_2$S) is capable of decreasing cellular metabolism in a reversible, non-toxic manner. This study evaluated whether pre-ischemic treatment with H$_2$S ameliorates IRI in an in vitro model of FTT.

**MATERIALS AND METHODS:** Human umbilical vein endothelial cells (HUVECs) and myotubes together constitute an in vitro model of muscle flaps. The cell lines were plated in separate chamber slides and treated with media containing NaHS (0, 1μM, 10μM, 100μM, or 1mM), then exposed to anoxia (9%) for 5h, followed by normoxia for 3h. Control slides were treated with NaHS and kept in normoxia throughout. A TUNEL assay was performed on all cells and the apoptotic index (AI) was determined.

**RESULTS:** In the absence of H$_2$S, 5h ischemia and 3h reperfusion resulted in AI of 32% and 38% in HUVECs and myotubes, respectively. Treatment with increasing doses of H$_2$S resulted in a dose-dependent decrease in apoptosis in both cell lines, with maximal protection at 10μM (3.8% and 0.3% apoptosis, respectively; p<0.05 for both). No apoptosis was observed in normoxic cells treated with any dose of H$_2$S.

**DISCUSSION:** H$_2$S significantly decreased IRI-induced apoptosis in vitro. The results of this study suggest that H$_2$S has potential as a therapy for improving tissue survival in FTT.

**OP21: NETWORK OF THE CUTANEOUS PERFORATORS ISSUED OF RADIAL ARTERY – ANATOMICAL STUDY ABOUT 20 CASES**

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**INTRODUCTION:** Serious complications have been reported with the forearm radial flap, such as ischemic necrosis, distal digital necrosis, decreased power grip, and pain and chronic oedema of the hand. This flap is essentially vascularised by septo-cutaneous perforators originated from the radial artery. The goal of this study was to explore the cutaneous territories vascularised by these perforators, with the idea that such radial perforators flaps could be applied in clinics, with no sacrifice of the radial artery.

**MATERIALS AND METHODS:** 20 arms of fresh cadavers were dissected after coloured latex injection of the radial artery. Characteristics of the cutaneous paddles injected were studied and their vascular networks dissected.

**RESULTS:** The septo-cutaneous perforators of the radial artery can be considered in 2 networks: one proximal and the other distal. Some direct cutaneous branches participate to the proximal vascular network. The sub-dermal and supra-fascial anastomotic network must be considered as a shunt between these 2 perforators networks, permitting the perfusion of an intermediary angiosome.

**DISCUSSION:** The cutaneous paddle of the septal forearm radial flap can be raised only with the proximal and distal perforators of the radial artery. Our study obviously found a constant intermediary anastomotic vascular network, in a subdermal and intra-dermal situation. This intermediary network is the support of perforators flaps authorised by a sub-dermal shunt.

It does not seem to be necessary to cut off the radial artery for the forearm radial flaps because its septo-cutaneous perforators and direct branches are sufficient to supply the vascularisation of the cutaneous paddle. This improvement of perforator flaps in clinical practice will probably lead to reduced complications connected with the sacrifice of a main artery.

**OP22: REPAIR OF TENDON DEFECT WITH ADIPOSE DERIVED STEM CELLS ENGINEERED TENDON IN A RABBIT MODEL**

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**INTRODUCTION:** Tendon tissue engineering research has achieved significant progress recently but still faces the challenge of limited cell source. For example, harvesting autologous tenocytes for tendon engineering may cause secondary tendon defect at the donor site, bone marrow stem cells (BMSC) still can not be differentiated into tenocytes with high efficiency, dermal fibroblasts (DFb) are limited to allogenic application. Adipose derived stem cells (ASCs) are an easily accessible cell source, which do not cause major donor site defect. No investigation of using ASCs for tendon engineering and defect has been reported. This study aimed to explore the possibility of using ASC as cell source for tendon engineering and repair.

**MATERIALS AND METHODS:** Autologous ASCs were acquired from rabbit nuchal subcutaneous adipose with collagenase digestion, cultured and expanded to second passage, then seeded on longitudinally arranged polyglycolic acids (PGA) fibers, which were rolled by PLGA network. Cell-scaffold constructs were cultivated in a special stretching bioreactor for 5 weeks to avoid parts of acids produced by PGA fibers (n=12 for each group) before in vivo implantation to repair the defect of Achilles tendon. Scaffolds only were used as control. Specimens were harvested at 12, 21, and 45 weeks, respectively post-operation for gross, histological, and mechanical analyses.

**RESULTS:** The cells attached well to PGA fibers post-seeding and produce abundant extracellular matrices when observed by both optic and electronic microscopy. After 5 weeks of dynamic cultivation, cell-scaffold constructs with good biomechanical properties (tensile stress ~50MPa, about 50% of normal tendon) were generated in experimental group, and parts of PGA fibers were degraded. At 12 weeks post-operation, most of PLGA networks remained visible grossly, but mechanically became much weaker (one thirds of original stress) probably due to scaffold degradation. Long term in vivo observation showed that engineered tendons were quite similar to normal tendon in their gross view, histology, and tensile strength. At 21 weeks, parallel collagen alignment was observed at both ends, but not in the middle in histology, with more cellular components.
than natural tendons, with tensile stress reaching 55% of normal tendon again. At 45 weeks, engineered tendons exhibited histology similar to that of natural tendon. Collagens became parallel throughout the tendon structure, and PGA/PLGA fibers were completely degraded. Furthermore, engineered tendons showed stronger mechanical properties with tensile strength about 80MPa, relatively mature collagen with fibril diameter around 100nm at 45 weeks. In addition, collagen fibers were longitudinally aligned, becoming more closed to native tendon structure with longer remodeling time. At 12 weeks in control group, neo-tissue was formed only at the peripheral area by host cells, and the formed tissue was histologically disorganised and mechanically weaker than cell-engineered tendons (p > 0.05).

DISCUSSION: These results suggested that ASC could be considered as a practical cell source to replace tenocytes for in vitro tendon tissue engineering and possibly in vivo tendon repair.

OP23: THE USE OF NEAR-INFRARED SPECTROSCOPY (NIRS) TO CONTINUOUSLY MONITOR MYOCUTANEOUS RECONSTRUCTIONS
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INTRODUCTION: In the UK, following mastectomy patients are offered a choice of reconstruction, up to and including myocutaneous flaps. Approximately 3% of these flaps fail due to vascular embarrassment, and require re-exploration or leech therapy. Early recognition of impending flap failure using a repeatable, non-invasive system that differentiates between arterial and venous occlusion is invaluable.

MATERIALS AND METHODS: 19 patients having myocutaneous flap reconstruction, either as an immediate or delayed reconstruction were enrolled into the study. Measurements were made using the InSpectra™ StO2 monitor, measurements of tissue oxygen saturation (StO2) and total haemoglobin index (THI) were recorded. Measurements were taken prior to, during, and after the surgery; with post-operative monitoring occurring continuously for 72 hours. Data were correlated with clinical outcome measures.

RESULTS: Out of the nineteen patients, there were two complete flap failures and two complications requiring intervention. In these cases problems were identified by either a significant rise in the THI or drop in the StO2. One of these patient's data were unrecordable in recovery, and the patient was therefore returned to theatre immediately for a salvage procedure, which was ultimately unsuccessful.

DISCUSSION: InSpectra™ StO2 monitor has proved to be a successful aid in the clinical setting. While not replacing the need for experienced and rigorous nursing care, we believe it can be a valuable and objective means of assessing flap viability.

OP24: RECONSTRUCTION OF MASSIVE ONCOLOGIC DEFECTS BY FREE FILLET-OF-EXTREMITY FLAP COVERAGE. THE MD ANDERSON EXPERIENCE, 1990-2008.
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BACKGROUND: Forequarter and hind limb amputations are used for curative and palliative intents in oncologic settings. Concerns regarding wound healing, especially in irradiated fields, have occasionally limited the extent of ablation. The distal portions of these limbs can be harvested as fillet flaps.

MATERIALS AND METHODS: A retrospective review was performed of 27 patients undergoing immediate reconstruction with free fillet extremity flaps between 1991 and 2008. Twenty-two men and five women were reconstructed with free fillet flaps, with an average age of 51.4 years. Seventeen patients received preoperative radiotherapy, and 21 received preoperative chemotherapy. Resections included six hemipelvectomy, 16 forequarter amputations, and four hindquarter amputations.

RESULTS: A wide variety of donor vessels were used, with a trend towards avoiding vessels with previous thrombosis. Flaps included composite tissues for complex reconstruction. Immediate reconstruction was successful in all cases. All wounds healed despite irradiation, inclusive of defects up to 50 cm x 70 cm (3500 cm²). Complication rate was 15%. The average follow-up time was 14 months with a mean survival of 7 months.

DISCUSSION: This procedure is oncologically sound, has no associated donor sites and allows for a healed wound with an improvement in the quality of life.

OP25: A COMPUTATIONAL MODEL TO PROFILE CYTOKINE NETWORKS MEDIATING ACUTE REJECTION AFTER COMPOSITE TISSUE ALLOTRANSPLANTATION
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BACKGROUND: Composite tissue allotransplantation (CTA) is a nascent field within the realm of reconstructive surgery. When autologous tissue is neither available nor sufficient to reconstruct complex defects of the human form, CTA may provide an alternative. However, skin rejection in composite tissue allotransplantation (CTA) is the pace-limiting obstacle for wider adoption in clinical practice. This study aims to identify a computational model of cytokine network dynamics that mediate acute rejection within the skin following CTA.

METHODS: Using a Brown-Norway to Lewis rat hind-limb allotransplant model, syngeneic [n=10], allogeneic transplants without immunosuppression [n=10] and allogeneic grafts [n=10] treated with Tacrolimus were examined. 180 skin and muscle biopsies were taken at defined time points between day 0 and 11.
Protein levels of 14 cytokines known to be relevant in cellular inflammatory responses were assessed by Luminex™. Differences in the cytokine network profiles of the three groups were observed and confirmed at POD 5 with a 14-dimensional unconstrained linear classifier (KNN).

**RESULTS:** In all transplants, IL-1α and IL-18 were expressed in skin throughout the observation period with average IL-1α >3x % from native controls (NC) (standard deviation (SD)=6.5%) and average IL-18 also >3x %NC (SD=18.5%). Allogeneic transplants also expressed IL-1b at 6029 pg/ml (>65.5x %NC, SD=21.96%), IL-6 at 3145 pg/ml (>19.41x %NC, SD=10.58%) and GRO/KC at 813 pg/ml (>15.8x %NC, SD=15.59%). Tacrolimus treated transplants exhibited a cytokine profile very similar to that of syngeneic and native controls. The most notable difference was an average expression of MCP-1 at 500 pg/ml.

**DISCUSSION:** Using a 14 dimensional unconstrained linear classifier (KNN) calibrated to the data set we were able to successfully distinguish between all three categories of transplant at POD 5 with > 90% accuracy. This analysis helps to differentiate between unspecific (surgery related) inflammatory responses and rejection and provides a basis for early detection of skin rejection in CTA.

**OP26:** OLFATORY ENSHEATHING CELL-LIKE DIFFERENTIATION OF ADIPOSE-DERIVED MESENCHYMAL STEM CELLS

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**INTRODUCTION:** Recent attention has focused on the potential use of bone marrow cells which contain mesenchymal stem cells to repair the CNS because it contains populations of precursors that are multipotent and can differentiate into a number of cell types including bone, cartilage and muscle cells. Mesenchymal stem cells can be isolated from adipose tissue of the adult rat. These cells have been shown to differentiate after appropriate induction into various cell lines, e.g. fat cells, muscle, cartilage and bone as mesenchymal stem cells from bone marrow. In addition, mesenchymal stem cells s derived from bone marrow were able to transdifferentiate into glia-like cells. The question we asked was if adipose derived stem cells can also be differentiated and transdifferentiate into glia-like cells.

**MATERIALS AND METHODS:** Adipose-derived mesenchymal stem cells were isolated from adult rats, cultured and differentiation was induced by basis fibroblast growth factor and epidermal growth factor in vitro. Morphology and further immunocytochemical markers of differentiated cells and undifferentiated cells were compared.

**RESULTS:** Here, we demonstrate that adipose-derived mesenchymal stem cells form nestin-positive neurolipocyte-like structures after induction. Further differentiation leads to significant morphological changes and to expression of the characteristic Schwann cell marker S100 and p75 nerve growth factor receptor and the characteristic marker GFAP for astrocytes. The simultaneous expression of characteristic glia marker of the central nervous system and the peripheral nervous system is an exceptional feature of olfactory ensheathing cells with unique properties regarding remyelination and enhancement of axonal regeneration.

**DISCUSSION:** These results indicate that adipose-derived mesenchymal stem cells can differentiate morphological and functional into an olfactory ensheathing cell-like glia population.

**OP27:** PROTECTIVE ROLE OF I-NOS INHIBITION IN ISCHEMIA-REPERFUSION INJURY

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**AIM:** To investigate the role of apoptosis as a cell death mechanism following ischemia-reperfusion in a rat latissimus dorsi muscle flap model. To study the effects of i-NOS inhibition on apoptosis.

**MATERIALS AND METHODS:** 40 Wistar rats were divided into three groups. 10-Controls: latissimus dorsi muscle flap based only on its vascular pedicle, no ischemia-reperfusion. 15-Ischemia Reperfusion (IR) latissimus dorsi muscle flap elevation, 4 h ischemia, 24 h reperfusion. 15-i-NOS Inhibition with S-Methylthiourea (SMT) 3 mg/kg at three different time points: a) 30 min before ischemia b) 30 min before end of ischemia c) 12 h after reperfusion. At the end of the surgical and IR protocol, operated muscle from the middle third were harvested. The muscle was fixed in formalin and paraffin sections were prepared for apoptosis analysis with fluorescent TUNEL assay (Roche Applied Biosciences, USA). The apoptotic index (ratio of apoptotic nuclei and total nuclei in a unit area) was calculated with image analysis of digital photos.

**RESULTS:** Two sided Student's test was utilised for statistical analysis. Control group showed lower apoptotic index when compared to IR (0.06 vs. 0.31, p< 0.05) and i-NOS inhibition group. Animals in IR group demonstrated higher apoptotic index when compared to i-NOS inhibition group and the difference was statistically significant (0.31 vs. 0.20, p<0.05).

**DISCUSSION:** Apoptosis is up-regulated following ischemia reperfusion injury. i-NOS inhibition protects against cell death following reperfusion injury. Future studies looking in to molecular pathways of apoptosis induction and regulation in ischemia-reperfusion events are warranted.

**OP28:** A DERMAL SUBSTITUTE (MATRIDERM®) IS SERVING AS A SCAFFOLD FOR ADIPOSE TISSUE ENGINEERING: FIRST RESULTS OF AN IN VITRO STUDY

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**BACKGROUND:** Millions of plastic and reconstructive surgical procedures are performed each year in order to repair soft tissue defects that result from significant burns, tumour resections or congenital defects. Preadipocytes represent a promising autologous
cell source for adipose tissue engineering. These immature precursor cells, that are located between the mature adipocytes in the adipose tissue, are much more resistant to mechanical stress and ischemic conditions than mature adipocytes. Aim of the present study, was to determine, if a bovine derived collagen matrix with an elastin component (Matriderm®) could serve as a carrier for preadipocytes under in-vitro conditions. We also investigated if there was any influence, caused by processing of preadipocytes prior to seeding, on the reconstructed adipose tissue formation.

MATERIALS AND METHODS: Human preadipocytes were isolated from human subcutaneous adipose tissue and divided into three groups. Group I was seeded onto the scaffold directly after isolation, cells of group II were proliferated for 4 days before seeding and group III was proliferated and induced to differentiate before seeded onto the scaffold. A three dimensional scaffold containing bovine collagen and elastin served as a carrier. 21 days after seeding all scaffolds were histologically evaluated, using hematoxylin and cosin as well as immunofluorescence labeling with Pref-1 antibody (DLK (C-19)) and DAPI (4',6-diamidino-2-phenylindole).

RESULTS: Cells of all groups adhered to the scaffolds on day 21 after seeding. Cells of group I and II adhered well and penetrated into deeper layers of the matrix. In group III penetration of cells was primarily observed to the surface area of the scaffold.

DISCUSSION: The collagen-elastin matrix serves as a useful scaffold for adipose tissue engineering. Freshly isolated preadipocytes as well as proliferated preadipocytes show good penetration into deeper layers of the scaffold, whereas induced preadipocytes attached primarily to the surface of the matrix.

OP29: THE NEUROIMMUNOLOGIC BACKGROUND OF BURN-INDUCED ORGAN DYSFUNCTION: NEUROIMMUNOMODULATION OF CARDIO-DEPRESSIVE PROINFILAMMATORY MEDIATOR GENERATION
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INTRODUCTION: The interaction of the CNS and the immune system is well known. The "inflammatory reflex", a parasympathetic anti-inflammatory pathway, has been described recently. It was shown that either electrical or pharmacological parasympathetic stimulation greatly attenuates the production of proinflammatory mediators and induces survival after injection of lethal-dose bacterial endotoxin. We and others have shown that burn-injury induces bacterial proinflammatory cytokine generation, which prompted us to evaluate whether parasympathetic stimulation, electrical or pharmacological, after experimental burn injury leads to decreased mediator generation, which may consecutively have a positive impact on post-burn mediator-induced organ dysfunction.

METHODS: We used a standardised, full-thickness rat burn model comprising 30% TBSA. For the electrostimulation experiments, the cervical portion of the vagus nerve was microsurgically prepared, and stimulated for 12 minutes at time t=0 and t=60min post-injury (5V, 40 ms pulse duration, 1 Hz). At time t=3 hours after injury, serum was harvested and organ samples of the heart, liver, lung, kidney and spleen were homogenised in protease-protected RIPA buffer. For the pharmacologic stimulation experiments, transdermal nicotine was applied at time t=0 after injury and left in place for 6, 12 or 24 hours. Organ and serum samples were also harvested as described above.

All samples were subjected to sandwich-ELISA specific for TNF-α, IL-1β and IL-6. Prior to sacrificing the animals, in vivo left ventricular function and pressure parameters were assessed using left ventricular microcatheterisation. Statistical analysis was done using analysis of variance (ANOVA) and Tukey's post-hoc tests where appropriate.

RESULTS: Experimental burn injury induced a significant rise of TNF-α, IL-1β and IL-6 in organ homogenates and serum compared to sham control animals. After cervical electrostimulation and transdermal application of nicotine, the serum and organ homogenate levels of all three proinflammatory cytokines were significantly reduced compared to non-stimulated or non-nicotine-exposed burn controls. Left ventricular microcatheter assessment of various left ventricular pressure parameters demonstrated no cardiodepressive effect of the parasympathetic stimulation itself.

DISCUSSION: Our results demonstrate a novel therapeutic strategy for the immunomodulation of proinflammatory, cardiodepressive mediator generation after burn injury. In light of the multiple, organ-damaging effects (e.g., burn cardiomyopathy) of the assessed mediators, our results encourage further research to gain more insight into the neuroimmunologic background of burn injury which may lead to the development of a novel treatment option of burn-induced organ dysfunction and immunodisturbance.

OP30: EXPLOITING INNATE WOUND HEALING FOR ACCELERATED INTEGRATION: DEVELOPMENT OF THE SMART MATRIX SCAFFOLD
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INTRODUCTION: The use of synthetic dermal scaffolds for full thickness reconstruction is limited by slow take rate with susceptibility to infection, and poor long-term outcome. Understanding cellular integration mechanisms is important for developing biologically enhanced scaffolds. We have devised a new Smart Matrix (SM) material in order to optimise the intrinsic potential of endothelial cells or progenitors for ingress and vasculogenesis.

MATERIALS AND METHODS: Integration of prototype SM scaffolds, Integra (INT) and Matriderm (MD) were evaluated in a porcine full-thickness wound chamber model. Wound biopsy samples on d3, 7, 14 and 21 were analysed by histology (H&E) and immunostaining (vWF, CD31, VE-cadherin, VEGF, CD133, CD34, CD45). Statistical analysis was performed using 2-way ANOVA.
RESULTS: Optimised SM integration was near complete within 7 days. Neo-vascularisation into SM was both significantly faster than INT (2x) and deeper (7.6 x)(p<0.001). This correlated with vasculogenesis in SM and angiogenesis in INT, and persistently low capillary density. INT persisted over the regeneration period, and was fibrogenic. MD was resorbed rapidly during integration, functioning in-between a scaffold and a wound dressing. SM scaffold was substantially resorbed by the completion of tissue regeneration.

DISCUSSION: The rapidity of Smart Matrix integration in the porcine model may translate to clinical benefit for full thickness regrowth.

OP31: FUNCTIONAL RECONSTRUCTION AFTER LIMB-SPARING SURGERY FOR UPPER EXTREMITY SARCOMA: ASSESSMENT OF FUNCTIONAL OUTCOMES AND COSTS OF SURGERY
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INTRODUCTION: Limb-sparing surgery has become the surgical treatment of choice for upper extremity sarcomas. Previous studies have not investigated functional outcomes and cost impact parameters for functional reconstruction performed after limb-sparing surgery for upper extremity sarcomas.

MATERIALS AND METHODS: Patients who underwent functional reconstruction surgery following upper extremity soft-tissue sarcoma resection between December 1998 and March 2004 were retrospectively identified. Hospital lengths of stay, operative times, and total hospital charges were analyzed. Cost data was adjusted for 2008 US dollars. Functional outcomes and patient satisfaction were assessed via patient surveys and the Toronto Extremity Salvage Score (TESS).

RESULTS: 13 patients met inclusion criteria. Average age was 55 years, with a male to female ratio of 3 to 7. 11 cases were for primary resections. 2 cases were for local recurrence. Average follow-up was 43.3 months. Overall survival was 85% (n=11), and disease free survival was 69%. 77% of patients achieved local disease control. Average operative time was 643 minutes. Reconstructive methods included rotational innervated muscle flaps (n=6), free innervated myocutaneous flaps (n=1), and tendon transfers or grafts (n=6) with free or rotational non-innervated flaps for soft tissue coverage. 11 reconstructions were immediate. Average total cost of surgery was $25,700. Average length of stay was 6.8 days. Patients undergoing reconstruction for hand and forearm sarcomas had significantly longer hospital stays (8.7 days) than those undergoing reconstruction for elbow and upper arm sarcomas (4.8 days), p= 0.01. Survey response rate for living patients was 87% (n=9). Average TESS score was 76. No patient stated that they would have preferred amputation. 88% of patients returned to work post-operatively, and all patients who returned to work currently use their affected limb at work. Average recovery time was 2.6 months.

DISCUSSION: Patients achieved very good to excellent functional outcomes with quick recovery times and a high return-to-work rate, thus minimizing surgical cost impacts.

OP32: A NOVEL HUMAN SKIN CHAMBER MODEL TO STUDY WOUND INFECTION EX VIVO
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INTRODUCTION: Wound infections increase morbidity and mortality and are of considerable socioeconomic impact. They can lead to impaired wound healing, resulting in rising treatment costs. This study proposes an ex vivo human full thickness skin model in order to establish a standard strategy to advance wound care and infection research.

MATERIALS AND METHODS: Human full-thickness skin is fixeded into the BO-Drum. Full-thickness skin was implanted into the BO-drums and cultivated for 7 days. On day 8, the skin was inoculated with P. aeruginosa and S. aureus [10^9 cfu, n=3] and was compared to non-infected drums. 3 days after inoculation the bacterial numbers in the tissue and in the media were counted.

RESULTS: A reliable and reproducible wound infection could be established for 72h after inoculation. At this timepoint, 2x10^6 cfu/g tissue of P. aeruginosa and 2x10^7 cfu/g tissue of S. aureus were detected. Only a marginal contamination of the culture medium could be detected in the S. aureus group. In contrast, a bacterial count in culture medium of P. aeruginosa inoculated group was measured on the same level of the tissue.

DISCUSSION: The BO-drum® is a robust, easy-to-use, sterilisable and reusable wound chamber system. To investigate wound infection, treatment and healing, the BO-drum® presents a convenient ex vivo full-thickness skin model and may help to standardise wound research.

OP33: HOST DEFENSE-LIKE LYTIC PEPTIDE SUPPRESSES GROWTH OF HUMAN LIPOSARCOMA
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INTRODUCTION: Soft tissue sarcomas are a rare and heterogeneous group of tumours but the response rate to chemotherapeutics is relatively poor. As effector molecules of the innate immune system host defense peptides might provide a more effective option for the treatment of this cancer entity.

MATERIALS AND METHODS: In vitro: The human liposarcoma cell line SW872 and primary human fibroblasts were exposed to [D]-K3H3L9, a 15-mer D,L-amino acid peptide. Anti-proliferative (BrdU
test), apoptotic (TUNEL assay) and anti-metabolic (MTT test) effects were quantified and the IC50 was determined.

In vivo: SW872 cells were injected subcutaneously into athymic nude mice. [D]-K3H3L9 was administered intratumorally 3 times per week for a period of 3 weeks. Phosphate buffered saline served as negative control.

RESULTS: In vitro: [D]-K3H3L9 significantly inhibited cell metabolism and proliferation in a dose dependent manner. The IC50 was 44.4 M. An apoptotic effect of [D]-K3H3L9 was detected at 12.5 µM.

In vivo: Compared to the tumour volume of the control group the tumour volume of the treatment group was almost 3 times smaller. Macroscopically full remission could be observed in one case.

DISCUSSION: [D]-K3H3L9 exerts very promising oncolytic activity on liposarcoma cells. This study demonstrates the potential of host defense peptides as a novel therapeutic option for the treatment of soft tissue sarcomas.

OP34: RECONSTRUCTION OF FUNCTION IN THE SPASTIC HAND IN PATIENTS WITH CEREBRAL PALSY, AFTER BRAIN STROKE, BRAIN INJURY AND AFTER ENCEPHALITIS – A REVIEW OF 120 PATIENTS AFTER 5 YEARS

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INTRODUCTION: The typical deformity of the upper extremity in the patients with cerebral palsy is a problem of function, hygiene and aesthetics. Proximal deformities, such as internal rotation and adduction of shoulder and flexion of elbow, cause difficulties in dressing, pronation of forearm in hygiene, flexion and ulnar deviation of wrist, flexion or swan-neck deformity of fingers, and flexion and adduction of thumb cause difficulties in grip.

Improvement of function of spastic hand depends on severity of deformities, sometimes also on IQ of the patient and other neurologic diseases.

MATERIALS AND METHODS: A retrospective case series of 120 individuals with spastic hand treated from March 2004 to March 2009 was reviewed. Most of these patients were aged from 11 to 20 years old, the youngest one was 6 years old, the oldest one was 61 years old. Most of them had cerebral palsy - 85, after brain stroke 16, after brain injury 16, after operation of brain 3, after encephalitis 2. In 2004, 2 patients were treated and 4 operations were performed, in 2005 4 patients were treated and 6 operations were performed, in 2006 18 patients and 29 operations, in 2007, 41 patients and 56 operations, in 2008 42 patients and 62 operations, and in the first three months of 2009, 13 patients and 18 surgeries. More operations mean multiphase reconstructions of function.

After surgery we used static splinting in each patient, dynamic splinting only after rerouting of the pronator teres. The pronator teres was supinated only 3 times but mostly there were multiple transfers. One half of patients did not have release of flexors and the second half did. In each reconstruction of extension of elbow was performed Z plasty of biceps and release of brachialis.

Range of motion, video-documentation and Canadian Occupational Performance Measurements were measured performed pre- and post-operatively on all patients.

RESULTS: Extension of elbow was improved on average in 40 degrees. Better results are seen after the pronator teres was supinated than after release. Improvement of extension of wrist was on average 55 degrees, abduction of thumb 30 degrees and ulnar deviation of wrist was improved in all patients.

Wound healing complications occurred once, in two patients there was poor function after the first operation due to poor cooperation of patients with low IQ, but after a second reconstruction the results for both were improved.

DISCUSSION: In 90 percent of cases we aim to first reconstruct a good grip. The second stage is reconstruction of supination of forearm, the third stage is flexion of elbow. Sometimes, we change our plan when supination is significantly improved during the first stage. Rarely, we operate first on elbows with severe flexion contractures. All of our patients were satisfied as the procedures improved their quality of their life.

OP35: IMMUNOINFLAMMATORY CELLS IN POST-TRAUMATIC TENDON ADHESIONS: AN IMMUNOHISTOCHEMICAL STUDY

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INTRODUCTION: It is well known that T-lymphocytes and macrophages are significantly involved in the dysregulation of wound healing and the formation of pathological scars. Despite the development of advanced tendon suture techniques and special therapy concepts, tendon adhesions are still a significant clinical problem after surgery, trauma or infection. In this study we investigated whether or not these cell types also play a role in the formation of tendon adhesions.

MATERIALS AND METHODS: Tendon sheath tissue that was obtained from patients undergoing tenolysis after trauma or surgery was analysed. Control tissue was obtained from fresh human cadavers. Immunohistochemistry was done on cryo sections. The quantity of CD3+, CD4+, CD8+, CD25+ and CD68+ cells was evaluated under blinded conditions, by microscope based “manual” counting of the immuno-stained cells in the sections and by relating the absolute cell numbers to the tissue area defined by unspecific counterstaining. The tissue area of the section in mm² was determined using a computer-based automatic image analysing tool and a calibrated digital photo microscope.

RESULTS: A several-fold increase of CD3+ cells in patient tissue compared to control was observed. We also found a significant increase in CD4+ and CD8+ cells. The absolute numbers of CD4+ cells were higher; however, the relative increase of CD8+ cells appeared to be more impressive. We also recognised an increase of
lymphocyte activation in patient tissue by analysing CD25+. Furthermore, there was an increase in CD68+ cells.

**DISCUSSION:** Our study suggests that immunological processes driven by T-lymphocytes and macrophages are involved in the formation of tendon adhesions after trauma and surgery. Further investigations on lymphocyte characterisation, cell-cell-interactions and on the role of dendritic cells and macrophages are conducted to clarify the role of the immune system in the process of fibrosis in these patients.

**OP36: PEDIATRIC SCAPHOID NONUNION: CLINICAL AND RADIOLOGICAL MID-TERM OUTCOME OF 21 PATIENTS UNDERGOING OPERATIVE TREATMENT**

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**INTRODUCTION:** The management of the exceedingly rare problem of scaphoid nonunion in children is essentially based on experience in adults and at least a few published pediatric cases. We studied history, pathology and mid-term results of 21 patients who were operated on for scaphoid nonunion to evaluate the benefit of operative treatment and to suggest prognostic indicators in this setting.

**MATERIALS AND METHODS:** 21 Patients (19 boys, 2 girls) with mean age of 12.3 years (range 5-15) were treated operatively for scaphoid nonunion. Diagnosis was based on radiographic criteria such as cystic and sclerotic changes according to Herbert and Fisher. Standard posterior-anterior and lateral radiographs of the wrist joint were used to show evidence of scaphoid nonunion in all patients. Comparison views from both wrists were not routinely obtained. Additionally CT- or MR-Imaging were carried out in 12 patients. At time of primary operative treatment none of the 21 patients showed radiographic evidence of radiocarpal degenerative changes. The nonunion was localised at the waist in 12 patients, in the proximal third in 6 patients, and in 3 patients nonunion was localised in the distal third of the scaphoid. Avascular necrosis (AVN) was identified in two patients with initial multifragment fracture of the proximal pole. Diagnosis of AVN was made intraoperatively as recommended by Green.18 patients were treated with bone grafting and Herbert-Screw fixation. Vascularised bone grafting, Matti-Russe-Procedure and resection of the proximal scaphoid pole was done each in one patient. The mean follow-up was 71.9 month (range 12-180). Follow-up included clinical (range of motion, grip strength, DASH score) and radiographic evaluation. Radiographic evaluation was based on standard frontal and lateral views of the wrist and posterior-anterior views of the wrist joint with the wrist in maximal ulnar deviation. In four patients with persisting pain CT- and MR-imaging was additionally obtained at final follow up.

**RESULTS:** Bony healing was found in 17 patients. Nonunion persists in 4 patients. In 2 patients, there was evidence for advanced carpal collapse (SNAC). Radiocarpal osteoarthritis was seen in 3 patients. Dorsal intercalated segment instability (DISI) was found in 6 patients. The mean value for the DASH score was 8.3 points (range 0-59). The mean deficiency of range of movement compared with the opposite wrist amounts to 15° in the dorso-palmar plane and 10° radioulnar. There was no limitation found for pronation and supination. Measured with the Jamar® Dynamometer, grip strength averaged 37.9 kg for the injured hand and 43.0 kg at the opposite hand.

**DISCUSSION:** Operative treatment of paediatric scaphoid nonunion in children leads to good clinical and radiological results. The clinical and radiological results correlate with the morphology of the initiate fracture. Time between initial injury & operative treatment correlate with occurrence of osteoarthritis. AVN occurs in children & leads to poor radiographical and clinical results. Vascularised bone graft from radius is even in children an option, if graft is harvested far enough from the active growth plate.

**OP37: EXPERIENCES WITH THE NOVEL 1ST AND 2ND FINGERTIP SUPPORT MICROSURGICAL TECHNIQUE IN PLASTIC AND RECONSTRUCTIVE SURGERY**

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**INTRODUCTION:** The elimination of the natural hand tremor of the plastic and reconstructive surgeon by certain techniques allows procedures to be performed more precisely, which leads to more effective revascularisation, nerve repair or free flap transfer. The improvement of the accuracy in microsurgery enables working on a microscopic scale that has not been previously attainable (e.g., fingertip replantations with revascularisation in children).

**BACKGROUND:** The physiological tremor, which may extend up to 0.4-0.6 mm in case of a well-skilled microsurgeon, may cause difficulties in any field of microsurgery, despite using different arm and hand rests. The limit of correctness of medical robots is about 0.1 mm so far, but the application of these machines is expensive and not convenient for surgeons because the direct touch via microinstruments with living tissues is impossible.

**MATERIALS AND METHODS:** Our concept describes a very simple and cost-efficient microsurgical technique called the 1st and 2nd fingertip support technique (or "robot hand technique"). We report the possible application and perspectives of our microsurgical technique in plastic surgery.

**MEASUREMENTS:** The technique consists of a special support for the surgeon’s thumb and index finger distal phalanges on the crossing bridge above the operating (working) point, by which the 0.1 mm precision of the surgeon’s hand could be reached at microsurgical procedures. This extra precise work has not been available by hand so far. The significant effect of the technique on the surgeon’s hands has been proven by randomised analysis by exact measuring of the reduction of tremor by tremorometry and MEMS measurement.

**RESULTS:** We have further developed our instruments and techniques to match requirements in various anatomical regions accessed in plastic surgery, where we are able to use the technique
with success. Our aim is to present the application of the technique in many fields of plastic and reconstructive surgery.

Future clinical trials will assess which microsurgical procedures in the field of plastic surgery can be improved with the 1st and 2nd fingertip support microsurgery technique assistance.

**OP38: ALTERNATIVE APPROACH TO PROSTHESIS INFECTION: COATING WITH A NEW ANTIBIOTIC RELEASING POLYMER**

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**BACKGROUND:** Infection is one of the most important complications following implantation of a prosthetic materials in reconstructive surgery. This study was designed to assess the efficacy of a new biodegradable polymer for local application of antibiotic. A polypropylene mesh (PP) was used as experimental model.

**MATERIALS AND METHODS:** Three groups were made: PP without coating, PP coated with copolymer (POL group) and PP coated with copolymer supplemented with vancomycin (VC group). *Staphylococcus aureus* ATCC 25923 strain was used. In vitro bioassays were performed by measuring zone of inhibition diameters on agar plates for 14 days. In vitro time kill assays in 10 ml of Mueller Hinton broth was made. Partially defects (5 3cm) created in the anterior abdominal wall of 48 New Zealand rabbits were repaired using the meshes. The repair site was previously inoculated with 10^8 CFU/ml *S. aureus*. At 14 days specimens were examined by light (LM) and scanning electron microscopy (SEM).

**RESULTS:** Inhibition halos around VC group persisted for 14 days on agar culture plate. SEM revealed large numbers of bacteria on the PP filaments in meshes without antibiotic, whereas fragments of VC group showed no significant bacterial adhesion. In time kill assay an adequate bactericidal response was achieved at least at 24 hours. Animals inoculated with *S. aureus* in the PP and POL, but not VC groups, showed considerable abscess formation and clinical infection. Two animals from PP group and one from the POL group died during the period of the study. No animals from the VC group died.

**DISCUSSION:** *S. aureus* infection can be significantly reduced if the prosthetic graft used is a bioactive polypropylene mesh is coated with this antibiotic-releasing polymer.

**OP39: COMPARISON OF 2D-SCHWANN CELL-NEURON-CULTURE WITH 3D-SCHWANN CELL-NEURON-SPHEROIDS - EFFECT ON NEURITE OUTGROWTH AND LENGTH**

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**INTRODUCTION:** The 2D-co-culture of Schwann Cells (SC) with neurons leads to an increased outgrowth of neurites and an increase of neurite length. Both, the cell-cell contacts as well as the secretion of neurotrophic substances are important factors. This study aims to investigate whether the spheroidal 3D co-culture of SC and Neurons with its intensified cell-cell contacts leads to higher rates of neurite outgrowth and length compared to the 2D Co-culture.

**MATERIALS AND METHODS:** SC were cultivated from sciatic nerves of neonatal rats; the neural cell culture NG108-15, a hybrid cell line from mouse neuroblastoma and rat glioma was purchased. SC1NG spheroids were fabricated and embedded in collagen. 2D-Co-Cultures of SC and NG cells were cultivated on flasks. Using the microscope Axioplan (Zeiss) and the software Axiovision (Zeiss) both the 2D-culture and the 3D-culture were analyzed after 10 days of incubation in regard to neurite outgrowth and neurite length.

**RESULTS:** Both co-cultures (2D and 3D) showed considerable neurite outgrowth after 10 days of incubation. The direct comparison of both co-cultures revealed a significantly higher number of neurites and significantly higher neurite lengths in the SC-NG-spheroids. Furthermore myelination processes could be observed in the 3D co-cultures.

**DISCUSSION:** By simply transferring a 2D into a 3D culture with multiplication of cell-cell contacts a significant increase of neurite reaction can be achieved. This, together with the observed myelination processes could make the spheroidal co-culture a close-to-reality model for further studies of neuroregenerative mechanisms.