



PRESENTATION

Format

Presenters are asked to submit their presentation in powerpoint or keynote format, the slide center. The use of personal computers/mac is not permitted. In case of any videos embedded within the presentations, authors are requested to bring the original source files in addition to their presentation.

The slides should be prepared in 16:9 format, and EURAPS/ERC recommends the use of the international system of units (si) as the official measurement system. Authors are invited to come to the preview as soon as they arrive, to check the functioning of the presentation and videos upfront, and avoiding unnecessary time pressure.

Time

This year we will have two types of presentations, please check carefully which type of presentations you are scheduled. First, classical scientific presentation with maximum allocated time for presentation is of 10 minutes with 4 minutes of discussion. **Speakers must adhere to the given minutes**, as the presentation will be stopped as soon as the time is up. Secondly, we introduce the ERC Talk, that will explore a fast lane type of communicating in science. Presenters in the ERC Talk are required to share their study using just one slide – prepared as a visual abstract -and they have 4 minutes to communicate their research.

Program

In the following program - abstracts section - the name of the original submitting author is presented and in the list the name of the presenting person is given. Therefore, please note that the name of the presenting person and submitting author may not be the same.

EURAPS RESEARCH COUNCIL MAY 22-23. 2019

FINLANDIA HALL HELSINKI FINLAND

WEDNESDAY 22.5.2019

8:00 GATHERING IN THE FINLANDIA HALL, VERANDA

8: 15 WELCOME - LOCAL HOSTS, EURAPS PRESIDENT, SECRETARY GENERAL

1. All About Fat

Chairs: *DOMINIK DUSCHER GERMANY, SUSANNA KAUKANEN FINLAND*

8:30 THE "STEM GRAFT": A SIMPLE TECHNIQUE TO ACHIEVE AN ADIPOSE DERIVED STEM CELLS-RICH MATRIX WITH MINIMAL MANIPULATION
SEGRETO FRANCESCO

8:44 AGED AND DIABETIC ADIPOSE DERIVED STROMAL CELLS SUFFER FROM A DISRUPTION OF CELLULAR ECOLOGY ON A SINGLE CELL LEVEL
DUSCHER DOMINIK

8:58 THE POTENTIAL OF ADIPOSE-DERIVED STEM CELLS FROM DIABETIC AND NON-DIABETIC DONORS TO ENHANCE WOUND HEALING
CHENG NAICHEN

9:12 PERIVASCULAR ADIPOSE TISSUE CONTROLS VASODILATATION AND TISSUE PERFUSION IN VIVO THROUGH ADIPOMUSCULAR MICROVASCULAR ANASTOMOSES
TURAIHI ALEX

9:26 ANALYZING TROPISM BETWEEN ADIPOSE DERIVED STEM CELLS AND BREAST CANCER CELLS OF DIFFERENT MALIGNANCIES
SAUTER MATTHIAS

9:40 15 YEARS OF ADIPOSE DERIVED STEM CELLS IN PLASTIC SURGERY: PAST, PRESENT, AND FUTURE
GIATSIDIS GIORGIO

10.08-10.40 COFFEE BREAK

2. Above the Neck

Chairs: *JUNNU LEIKOLA, FINLAND, MAIJU HARMA, CANADA*

10:40 ABNORMAL SEPS IN THE AFFECTED HEMISPHERE IN PATIENTS WITH POSTERIOR PLAGIOCEPHALY
HARMA MAIJU

10:52 COMPACTION FORCE APPLIANCE ON ALVEOLAR CLEFT BONE GRAFT
DISSAUX CAROLINE

11:04 THE PROPOSAL OF A SCORRING SYSTEM FOR EVALUATING PERIFISTULAR LOCAL TISSUE CONDITION IN TREATMENT OF RECALCITRAN PALATAL FISTULAS

GURAY EVIN SEYDA

11:16 INVESTIGATION OF DISCRIMINANT SENSORY LOSS IN PATIENTS WITH ANDROGENIC ALOPECIA

SEREL SAVAS

11:28 CORRECTING CONCAVITY OF RABBIT AURICULAR CARTILAGE: COMPARISON OF SINGLE SCORING INCISIONS WITH BUTHYL CYANOACRYLATE AIDED TECHNIQUES

YONTAR YALCIN

11:40 RESIDUAL MUSCULAR ACTIVITY OF THE ORBICULARIS OCULI MUSCLE AFTER LOWER TRANSCUTANEOUS BLEPHAROPLASTY WITH REIDY-ADAMSON FLAP: STATISTICAL ANALYSIS OF THE RESULT

ALESSANDRO INNOCENTI

3. Under Your Skin

CHAIRS: *GIORGIO GIATSIDIS US, VIRVE KOLJONEN FINLAND*

11:52 AUTOLOGOUS PLATELET-RICH PLASMA BOOSTS SAFELY AND EFFICIENTLY HUMAN FIBROBLAST EXPANSION IN VITRO

MODARRESSI ALI

12:04 VITAMIN D MAY ENHANCE WOUND HEALING WITH LESS SCARRING

TAY JING QIN

12:16 WOUND FLUID UNDER OCCLUSIVE DRESSINGS OF SPLIT SKIN DONOR SITES FROM DIABETIC PATIENTS SHOW AN INCREASED ANGIOGENETIC RESPONSE AND FIBROBLAST ACTIVATION

NICLAS BROER

12:28 QUANTITATION OF VASCULARIZATION EFFECT ON TUMOR GROWTH IN A MURINE SCC MODEL

YAACOBI (SHILO) DAFNA

12.40 – 13.50 Lunch

4. Technology

Chair: *PATRIK LASSUS FINLAND, GIORGIO GIATSIDIS USA*

13:50 THE IMPACT OF BREAST IMPLANT TEXTURIZATION ON BIOFILM DEVELOPMENT: AN EXPERIMENTAL STUDY

BULLA ANTONIO

14:02 DIFFERENTIAL ION MOBILITY SPECTROMETRY IMAGING FOR PATHOLOGICAL APPLICATIONS

TUOMINEN JALMARI

14:14 ACCURACY OF THREE SOFTWARE APPLICATIONS FOR BREAST VOLUME CALCULATIONS FROM 3D SURFACE IMAGES

WESSELIUS TYCHO

14:26 THREE-DIMENSIONAL ASSESSMENT OF THE BREAST: VALIDATION OF A NOVEL, SIMPLE AND INEXPENSIVE SCANNING PROCESS

ORANGES CARLO M:

14:38 VIRTUAL 3D PLANNING AND PREDICTION ACCURACY IN BIMAXILLARY FACIAL ALLOTRANSPLANTATION PATIENTS IN HELSINKI

MANNINEN ATTE

14:50 THE 'MICROSURGERY ARENA' - A NEW DEVICE TO DEVELOP MICROSURGICAL SKILLS

COSTA FRANCESCO

5. Flow- or No Flow

Chairs: *ERKKI TUKIAINEN FINLAND, ALI MODARRESSI SWITZERLAND*

15:02 ROLE OF LEUPEPTIN IN PREVENTING HIND LIMB ISCHEMIC TISSUE INJURY DURING RECONSTRUCTIVE SURGERIES

SINGH GURTEJ

15:14 SALVAGING THE ZONE OF STASIS IN BURNS WITH MONTELUKAST AND HYPERBARIC OXYGEN THERAPY: A COMPARATIVE EXPERIMENTAL STUDY IN RATS

KALAFATLAR KUBRA ECE

15:26 THE EFFECTS OF REMOTE ISCHEMIC PRECONDITIONING AND ADENOSINE WITH REMOTE ISCHEMIC PRECONDITIONING IN RAT FLAP ISCHEMIA REPERFUSION INJURY MODEL

SAVAS SEREL

15:38 QUANTIFICATION OF CHANGES IN DERMAL BLOOD FLOW AFTER TOPICAL ADMINISTRATION OF CAPSAICIN ON THE SKIN

SCHAEFER RUTH

15.50 – 16.15 Short break with refreshing beverages

6. ERC Talk

Chairs: *J.J. VRANX BELGIUM, JYRKI VUOLA FINLAND*

16.20 - 17.30 Four minutes each

TOPICAL MOISTENING OF THE WOUND SURFACE WITH TRANEXAMIC ACID 25 MG/ML REDUCES BLEEDING EQUAL TO INTRAVENOUS ADMINISTRATION AND MAY REDUCE NEED FOR RE-OPERATION OF POSTOPERATIVE HAEMORRHAGE

AUSEN KJERSTI

HEALTH-RELATED QUALITY OF LIFE IN PATIENTS HAVING UNDERGONE ABDOMINOPLASTY; *HOMSY PAULIINA*

A NOVEL PLATINUM-BASED COMPOUND FOR THE TREATMENT OF NON-MELANOMA SKIN CANCER (NMSC)—
PRELIMINARY RESULTS

SHACHAR YAIR

LOSS OF SHOULDERS STRENGTH FOLLOWING BREAST RECONSTRUCTION WITH THE LATISSIMUS DORSI FLAP
DOES NOT RESTRICT ACTIVITIES OF DAILY LIVING - A PROSPECTIVE STUDY

HÖJVIG JENS HJERMIND

A PRACTICAL NON-CONTACT MODEL TO CREATE STANDARDIZED EXPERIMENTAL BURN WOUNDS OF ANY
THICKNESS: BLUE BEAM LASER POINTER FOR BURN INDUCTION

DEMIROZ ANIL

HEALTH-RELATED QUALITY OF LIFE AFTER TREATMENT OF UPPER-EXTREMITY SOFT TISSUE SARCOMA

KJÄLDMAN MAGNUS

USE OF DCELL HUMAN DERMIS IN PRIMARY AND SALVAGE HYPOSPADIAS REPAIR INSTEAD OF AN
INTERPOSITION DARTOS FASCIAL FLAP

JOJI NIKITA

A COMPARISON OF THE EFFECTS OF NEGATIVE PRESSURE WOUND THERAPY (NPWT) AND STANDARD
SURGICAL DRESSINGS (SSD) ON OUTCOMES IN WOUNDS AFTER RESECTION OF A MALIGNANCY: A
SYSTEMATIC REVIEW

THOMAS HAYS

THE EAGER EARLY YEARS OF MICROVASCULAR SURGERY FROM 1979 TO 1987

SALOVAARA LAURA

THE ROLE OF SUBFASCIAL DISSECTION IN THE PREVENTION OF TEMPORAL HOLLOWING AS A COMPLICATION
CAUSED BY CORONAL INCISION

AHMET BILIRER

COMPARISON OF PATIENT-RELATED OUTCOME: CIRCUMFERENTIAL LOWER BODY LIFT VS. LOWER BACK LIFT
WITH AUTOLOGOUS GLUTEAL AUGMENTATION AFTER MASSIVE WEIGHT LOSS (MOUSTACHE FLAP
TECHNIQUE)

BU YOUN CHO

FOREIGN VISITING SURGEONS IN HUS HELSINKI UNIVERSITY HOSPITAL DEPARTMENT OF PLASTIC SURGERY
2014-2018

BARNER-RASMUSSEN IAN

PLICATION SUPPORTED BY MESH (PSUM) -TECHNIQUE FOR SYMPTOMATIC ABDOMINAL RECTAL MUSCLE
DIASTASIS REPAIR WITH OR WITHOUT CONCOMITANT MIDLINE HERNIA

TUOMINEN REETTA

COLOUR DOPPLER ULTRASOUND AND COMPUTED TOMOGRAPHIC ANGIOGRAPHY FOR PERFORATOR
MAPPING IN DIEP FLAP BREAST RECONSTRUCTION REVISITED

KAPPOS ELISABETH

ASSESSING BREAST ANIMATION DEFORMITY FOLLOWING DIRECT TO IMPLANT BREAST RECONSTRUCTION

DYRBERG DIANA LYDIA

SENSATE FREE ALT FLAP FOR FOOT RECONSTRUCTION IN PEDIATRIC POPULATION
EL FAHAR MOHAMMED

PATIENT HEIGHT, WEIGHT, BMI AND AGE AS PREDICTORS OF GRACILIS MUSCLE FREE-FLAP MASS IN LOWER
 EXTREMITY RECONSTRUCTION
ORANGES CARLO M.

THE CIRCUMFLEX SCAPULAR ARTERY PERFORATOR (CSAP) FLAP – CLINICAL UTILITY AND TECHNICAL
 REFINEMENT
SLATER KAREN

19.00 CASUAL DINNER HELSINKI MUSIC CENTRE'S RESTAURANT CLUB.

THURSDAY 23.5.2019

7. Nerve Wracking

Chairs: *DANIEL KALBERMATTEN SWITZERLAND, DIMITRIS DIONYSIOU GREECE*

8:30 DORSAL ROOT GANGLION CULTURE FOR NOCICEPTIVE AND PERIPHERAL NERVE INJURY MODELING:
 IMPROVING SENSORY NEURON ACCESS AND AVAILABILITY
REEKIE THOMAS

8:44 EVALUATION OF A GUIDED NERVE REPAIR USING MULTI-LUMEN ALIGNED NANOFIBRILLAR SCAFFOLD
 IN A RAT MODEL
DIONYSIOU DIMITRIOS

8:58 DISTINCT EFFECT OF NEUROTROPHIC FACTORS ON NEURONAL PROTECTION AND AXONAL
 OUTGROWTH
PRAUTSCH KATHARINA MINH ANH

9:12 IDENTIFICATION OF THE INDIVIDUAL AND JOINT CONTRIBUTION OF THE SENSORY NERVES TO THE
 SENSATION OF THE BREAST AND THE NIPPLE-AREOLA-COMPLEX
BIJKERK ENNIE

9:26 VALIDATION OF NF1 AS A DISEASE EXCLUSIVE TO SENSORY NERVES
MCKINNON MCKAY

9:40 DANGER ZONES FOR NERVE INJURIES IN PERCUTANEOUS NEEDLE FASCIOTOMY FOR TREATMENT OF
 DUPUYTREN'S CORDS
WILLIAMSON ADAM

9:54 PERFORATOR TO PERFORATOR VASCULARIZED SURAL NERVE FLAP USING SUPERMICROSURGERY IN
 EXTREMITY RECONSTRUCTION
EL FAHAR MOHAMMED

10:06 EFFECTS OF VARIOUS SELECTIVE NERVE TRANSFERS ON THE ADULT AND NEONATAL MOTOR UNIT
SPORER MATTHIAS

10:18 FASCICULAR SHIFTING IN THE RECONSTRUCTION OF GLOBAL OBSTETRIC BRACHIAL PLEXOPATHIES – FROM BENCH TO BEDSIDE
SPORER MATTHIAS

10:30 FROM BEDSIDE TO BENCH: THE EFFECT OF MUSCULAR DENERVATION ON FAT GRAFTING TO THE BREAST BY COMPARING TAKE RATE, QUALITY, AND LONGEVITY
KAPPOS ELISABETH

10.42 – 10.50 Short coffee break

8. Under Construction

Chairs: *HANS-GUNTHER MACHENS GERMANY, EFTIRPI DEMIRI GREECE*

10:50 AN ALLOGENIC 3D SCAFFOLD-FREE TISSUE ENGINEERED PRODUCT FOR DEEP THICKNESS SKIN REGENERATION: IN VITRO DEVELOPMENT TO IN VIVO PROOF OF CONCEPT
ALI MODARRESSI

11:02 ENDOTHELIAL CELL REPLACEMENT - A NOVEL PLATFORM FOR BIOENGINEERING OF PERSONALIZED VASCULAR COMPOSITE ALLOGRAFTS
HAR-SHAI LIOR

11:14 ANORECTAL TRANSPLANTATION: THE FIRST LONG-TERM SUCCESSFUL REPORT IN A PRECLINICAL CANINE MODEL
ARAKI JUN

11:26 SINGLE-CELL TRANSCRIPTOMICS REVEALS A PATHOGENIC PROFIBROTIC MESENCHYMAL SUBPOPULATION DRIVING DUPUYTREN'S DISEASE
WEST CHRISTOPHER

11:38 HIGH-THROUGHPUT FABRICATION OF SPHEROIDS FOR 3D BIOPRINTING VASCULARIZED ADIPOSE TISSUE
BENMERIDJA LARA

11.50 ADJOURNMENT OF THE MEETING AND SEE YOU NEXT YEAR IN ERC GREECE

12-13 ERC COUNCIL MEETING

THE "STEM GRAFT": A SIMPLE TECHNIQUE TO ACHIEVE AN ADIPOSE DERIVED STEM CELLS-RICH MATRIX WITH MINIMAL MANIPULATION.

Segreto Francesco, Policlinico Universitario Campus Bio-Medico, Rome Italy

Introduction

Several techniques were developed to isolate and concentrate adipose derived stem cells (ADSCs). However, enzymatic processing and dedicated hardware are expensive or not allowed by some legislations. On the other hand, minimal manipulation processing often results in lower ADSC concentration and retains some oil, likely increasing inflammation, oxidation or resulting in granuloma formation. The aim of the study was to develop a method to achieve an injectable purified graft containing high concentration of ADSCs, obtained by mechanical processing alone.

Materials and Methods

9 patients undergoing abdominal liposuction were enrolled in the study. For each patient, 10 cc of fat were decanted and 10 cc were processed to "stem graft". The latter was obtained by series of centrifugation, aggressive emulsification, oil and infiltration removal. The specimens were analyzed by cytofluorimetry. Stem cells viability and pluripotency were assessed by culture and differentiation protocols. Statistical analysis was performed.

Results

One cc of stem graft was obtained by 10 cc of harvested fat. The mean content of CD34+CD45- cells was 9.2% (± 12.1) in the stem graft, 2.5% (± 3.8) in the decanted fat. The concentration of ADSCs in the stem graft group was significantly higher than in decanted fat ($p < 0.05$). Cells isolated from the stem graft were viable and able to differentiate in both adipocytes and osteoblasts.

Conclusions

The "stem graft" technique allowed to mechanically obtain an oil-free matrix containing a higher concentration of ADSCs. The product was injectable with a 27 G needle, thus allowing intra-dermal or intra-scar use. It can be used alone, for regenerative or anti-inflammatory purposes, or in combination with fillers or PRP.

AGED AND DIABETIC ADIPOSE DERIVED STROMAL CELLS SUFFER FROM A DISRUPTION OF CELLULAR ECOLOGY ON A SINGLE CELL LEVEL

Duscher Dominik, Linz, Austria

Introduction

Mesenchymal stromal cells derived from adipose tissue (ASCs) have been used clinically to promote wound healing. However, the regenerative capacity of ASCs is impaired in diabetic and aged populations, limiting the efficacy of autologous cell based therapies. Exploring cell enrichment strategies to overcome this deficiency, we employed microfluidic single cell transcriptional analysis paired with a novel bioinformatics approach to identify and isolate a subpopulation of ASCs with increased regenerative potential.

Materials and Methods

Primary ASCs were isolated from human and murine healthy, diabetic and aged adipose tissue, and microfluidic-based single cell transcriptional analysis was employed to simultaneously characterize the expression of 96 angiogenic, stemness, differentiation and pre-selected surface antigen genes. A novel bioinformatic clustering analysis was used to identify ASC subpopulations based on transcriptional profiles, and a putatively pro-vasculogenic subpopulation was prospectively isolated using fluorescence assisted cell sorting (FACS) for assessment of enhanced functional capacity in vitro and in vivo.

Results

Single cell transcriptional analysis revealed a subpopulation of human and murine ASCs characterized by an elevated expression of multiple stemness-associated and pro-angiogenic genes, which was significantly depleted in ASCs isolated from diabetic and aged samples. Prospective subpopulation isolation using correlative surface markers resulted in prolonged retention of progenitor associated surface antigens, increased cell survival, proliferative capacity and clonogenicity, and upregulation of angiogenic cytokines when compared to negatively selected and parent populations. When applied to an in vivo diabetic wound healing model, this newly defined ASC subpopulation significantly improved healing compared to negatively selected and parent populations, and critically restored normal healing kinetics to diabetic wounds.

Conclusions

Enrichment of a highly functional ASC subpopulation was found to enhance the regenerative potential of ASC-based therapies in diabetic wounds. Moreover, the depletion of this same functional subset from diabetic and aged ASCs suggests a previously unreported mechanism for the cell dysfunction observed in these settings.

THE POTENTIAL OF ADIPOSE-DERIVED STEM CELLS FROM DIABETIC AND NON-DIABETIC DONORS TO ENHANCE WOUND HEALING

Cheng Naichen, NTU Hospital, Taiwan, Province of China

Introduction

Difficult wound healing in diabetic patients has become a global health care problem. While adipose-derived stem cells (ASCs) have been shown to be a promising source of cell therapy to promote wound healing, the effects of diabetic or non-diabetic ASCs applied for wound healing remains poorly investigated. In this study, we aimed to examine ASCs derived from diabetic and non-diabetic patients, and we also tested the treatment efficacy of diabetic and non-diabetic ASCs applied in a diabetic mouse wound model.

Materials and Methods

We collected ASCs derived from diabetic and non-diabetic patients for evaluation of cell surface markers and proliferation. In the animal study, we also isolated ASCs from diabetic db/db mice and non-diabetic C57BL/6 mice. Subsequently, two circular full-thickness cutaneous wounds were made over the back of the db/db mice. One wound was treated with saline as the control group, and the other treated with either diabetic or non-diabetic mouse ASCs. Percentage of wound healing area was measured regularly and the wound tissue was harvested at day 28 for histological analysis.

Results

The expression of cell surface markers in diabetic or non-diabetic ASCs was similar and characteristic of mesenchymal stem cells. However, diabetic ASCs exhibited decreased proliferation. In the animal study, significant faster wound healing was noted in mice that received allogenic non-diabetic ASCs, while the wound area in the group that received isogenic diabetic ASCs was comparable to the control group throughout the healing process. Enhanced formation of granulation tissue was also observed in wounds that received non-diabetic ASCs.

Conclusions

ASCs isolated from diabetic donors exhibited decreased proliferation. Our study further indicated that allogenic non-diabetic ASCs, but not isogenic diabetic ASCs, could improve diabetic wound healing. The finding suggested the potential benefit of using allogenic ASCs over autologous ASCs for ulcers in diabetic patients.

PERIVASCULAR ADIPOSE TISSUE CONTROLS VASODILATATION AND TISSUE PERFUSION IN VIVO THROUGH ADIPOMUSCULAR MICROVASCULAR ANASTOMOSES

Turaihi Alex, Amsterdam University Medical Centers, Amsterdam, The Netherlands

Introduction

Vasodilation regulates delivery of substrates to tissues undergoing regeneration and growth. Perivascular adipose tissue (PVAT) controls vascular function through outside-to-inside communication and through vessel-to-vessel, or "vasocrine" signaling. We studied this hypothesis in mice by examining effects of surgical removal of local intramuscular PVAT on muscle blood flow (MBF) and glucose uptake.

Materials and Methods

In lean C57/Bl6 mice we removed PVAT from the gracilis and femoral arteries. Mice underwent combined contrast-enhanced ultrasonography (CEUS) and Intravital Microscopy (IVM) to measure MBF and arteriolar diameter. PVAT vasodilator capacity was examined ex vivo using pressure myography. Local muscle glucose uptake was examined using positron emission tomography in vivo. Further, we used proteomic and microscopy experiments to understand the nature of the interaction between PVAT and the vessels.

Results

Local PVAT removal reduces muscle glucose uptake by ± 50 percent. Ex vivo, gracilis artery diameter increased in the presence of PVAT ($26.2\% \pm 25\%$; $p=0.03$) but not in absence of PVAT. CEUS and IVM of gracilis artery showed that PVAT removal abolishes increases in arterial diameter ($2.0\% \pm 7\%$ vs. $14.5\% \pm 6\%$) and abrogated insulin-stimulated increase in muscle blood volume (microvascular recruitment or IMVR; $-4.8\% \pm 7\%$ vs. $35.7\% \pm 31\%$). The effect of PVAT on IMVR was mediated by distinct microvessels or anastomoses, which we showed using lightsheet microscopy of mice expressing mCherry in endothelial cells. Proteomics analysis revealed that PVAT removal significantly alters expression of 109 of 1719 detected proteins in muscle. Observed changes in protein expression included reduction of a mitochondrial protein cluster and of vesicle-associated membrane protein 5 (Vamp5), involved in Glut4 trafficking.

Conclusions

We have found that PVAT within muscle regulates muscle perfusion, glucose uptake and muscle protein expression, communicating with the distal microcirculation via microvascular anastomoses. These data highlight the importance of PVAT in vascular and metabolic physiology, relevant for tissue regeneration and wound healing.

ANALYZING TROPISM BETWEEN ADIPOSE DERIVED STEM CELLS AND BREAST CANCER CELLS OF DIFFERENT MALIGNANCIES

Sauter Matthias, Technical University Munich, Germany

Introduction

The adipose derived stem cell has received appropriate scientific and clinical attention, given its multipotency and easy procurement. However, in the surgical world of breast cancer reconstruction and fat grafting, attraction of ASCs to the treatment zone is viewed as an oncogenic risk. The current scientific standard however does not yet fully illustrate the role of ASCs in breast cancer recurrence. This study aims to add new insights on the trophic effect of ASCs towards breast cancer cells.

Materials and Methods

Silicon chambers were used to seed isolated populations of cells in the same well of a cell culture dish. Once cell populations had adhered, chambers were removed and cells were allowed to follow natural trophic cues. Multiple permutations of MDA-MB-231, MCF-7, HS-27, and ASCs were engineered. Cells were stained with MitoTracker for fluorescent visualization. Cellular tropism was qualitatively analyzed photographically, and quantitatively measured by pixel densitometry in Image J. Metabolic assays were performed to quantify activity of the cell populations while migrating in vitro.

Results

Novel co-culture systems reveal that ASCs do not migrate faster towards a benign cancer (MCF-7) when compared synchronously to fibroblasts. Conversely, in a model with aggressive breast cancer cells (MDA-MB-231), ASCs are seen to have a highly pronounced tropism to the malignant cancer population which remains static. Simultaneously, in the same model, cancer cells exhibit significant migration towards a static fibroblast population ($p < 0.05$). The attraction of ASCs to MDA-MB-231 cells is dose dependent, showing higher migration for higher breast cancer cell numbers.

Conclusions

Taken in totality, these data show for the first time the attraction of ASCs to malignant breast cancer cells, compared to benign; a phenomenon which many ASC studies infer. This study should extend research to questioning what exact role (inducer, catalyst, inhibitor etc.) ASCs play with different types of breast cancer.

ABNORMAL SEPS IN THE AFFECTED HEMISPHERE IN PATIENTS WITH POSTERIOR PLAGIOCEPHALY

Harma Maiju, Hospital for Sick Children, Toronto General Hospital and Mount Sinai, Toronto, Canada and Department of Plastic Surgery, Helsinki University Hospital and University of Helsinki, Toronto Canada

Introduction

Purpose of this study was to evaluate whether patients with posterior plagiocephaly have abnormalities in EEG somatosensory evoked potentials (SEPs) and whether surgical treatment has an effect on the SEPs.

Materials and Methods

This prospective study was performed during 2012-2016. Altogether 408 children were referred to the Craniofacial Centre at Helsinki University Hospital for further examination due to flatness of the posterior skull. Twenty-two infants with severe posterior skull deformation but no synostosis were sent for further investigations, and EEG somatosensory evoked potential (SEPs) were monitored first at the age of 14-42 months, and if abnormal, controlled 12-18 months later. In our centre, neither helmet therapy nor distraction osteogenesis is in use, however, total cranial vault reconstruction has been considered in severe cases with neurological symptoms. While one group was treated with cranioplasty (n=10), the control group (n=12) did not receive medical treatment.

Results

Six of the 10 patients in the operation arm had abnormal SEPs (6/6 on the affected cerebral hemisphere), and all SEPs were recorded as normal when controlled postoperatively. In the control group 8/12 patients had abnormal SEPs (7/8 on the affected cerebral hemisphere) at the age of about 18 months, and all had normalized later.

Conclusions

In our material, abnormal SEP EEGs were seen in most patients with posterior plagiocephaly. SEPs became normal equally in both groups in 12-18 months. Currently, we do not know whether abnormal SEPs reflect true risk for neurological function or whether they merely reflect abnormal shaping of the skull per se. More long-term studies are needed to answer this question.

COMPACTION FORCE APPLIANCE ON ALVEOLAR CLEFT BONE GRAFT

Dissaux Caroline, Strasbourg university hospital, Strasbourg France

Introduction

Alveolar cleft bone grafting is now widely accepted as one step of cleft surgical treatment. The peculiarity of this graft stands in the particular geometry of the alveolar cleft: bone is placed in between two cortical surfaces. Several factors could influence alveolar bone graft results such as age of the child at operation, dental environment, origin of bone graft, vascularization density, technical precisions such as compaction force at the time of the bone graft placement, growth factors adjunction.

Materials and Methods

The objective of this research project is to use modeling based on in vitro and experimental animal models to dispense with experimentation on children. The model aims to first get a better comprehension of graft integration and second to simulate graft results according to the influence of different parameters. First step of this project includes in vitro and in vivo analysis to establish the effect of mechanical compaction on bone graft. Graft features (Young modulus, cellular vitality and density) are observed relying on magnitude of the applied force (0 to 50N). Cancellous human femoral and iliac bones are used. Micro-CT scanning and CFUs culture are performed.

Results

Micro-CT scan gives a precise characterization of the structure of the graft depending of the applied compaction forces 0, 5, 20 and 50N. The number of CFUs (Colony Forming Units) was higher when a compaction force is applied. This number is even more important at 50N than at 20N, however a flattening of the CFUs number curve is observed. These data are integrated into a biomechanical model of the human cleft bone graft.

Conclusions

This biomechanical model tends to better understand the bone remodeling influenced by compaction forces in the alveolar cleft particular environment, with the ultimate objective to guide the surgical procedure.

THE PROPOSAL OF A SCORRING SYSTEM FOR EVALUATING PERIFISTULAR LOCAL TISSUE CONDITION IN TREATMENT OF RECALCITRANT PALATAL FISTULAS

Guray Evin Seyda, Selcuk University, Konya, Turkey

Introduction

The aim of this study is to propose a scoring system about the quality and usability of peri-fistular local tissue in treatment of recurrent fistulas.

Materials and Methods

Between 2009- 2018, 42 patients operated with palatal fistula and included in study. Inclusion criteria were type 4-5 fistulas according to Pittsburgh classification, recurrence of fistula at least one time. Exclusion criteria were using of another surgical method other than local mucoperiosteal flap, big size fistulas (5mm>), vestibulonasal fistulas, patients without adequate data. Only 1 operation periods of patients operated more than once were included in the study. Preoperative palate photos, epidemiological information of the patients have been collected. Preoperative condition of palatal mucosa had been evaluated and scored by 2 surgeons according to a new scoring system contained color, shape and scar steps. Color; presence of a whiter tissue different from the normal palatal mucosa like scar tissue, there is:1 point, there isn't :0 point. Shape; with rugas like normal palatal mucosa (0 point), no rugas, atrophic palate (1 point). Scar; perifistular residual flaps there is:1 point, there isn't :0. Total score was calculated for all of the patients. Patients were grouped as with successful surgical result and failed result. The relationship between score height and failure was investigated

Results

22 male, 20 female patient included in study (mean age;12). 15 fistulas were type 4, 27 type 5. The number of small size fistula is 24, moderate ;18. Left cleft lip and palate (CL+CP) was 11, Right CL+CP; 5, bilateral CL+CP ; 16, isolated cleft palate;10. Mean number of the past operation was 1.4. There is statistically significant difference between low score (less scar indicator) of the color, shape and scar and operation success and low past operation number according to Pearson chi -square and Kruskal Wallis test in SPSS 21.

Conclusions

This scoring system offers an usable and easy method to evaluate condition of perifistular tissue before operation where random mucoperiosteal flaps will be used.

INVESTIGATION OF DISCRIMINANT SENSORY LOSS IN PATIENTS WITH ANDROGENIC ALOPECIA IN PATIENTS WITH ANDROGENIC ALOPECIA

SEREL SAVAL, Ankara University, Ankara, Turkey

Introduction

Although the postulated pathogenesis of androgenetic alopecia (AA) is both hormonal and genetic, the exact reason cannot be explained with both of them. Decrease in the anagen/telogen ratio and hair loss in the neuropathy suggests the possibility of sensory loss on typical sites for AA. The aim of this study was to investigate the loss of sensation in the related regions by a two-point threshold test.

Materials and Methods

A total 67 male participant was included in this study, 19 of them were control group, and 48 of them were study group, The study group patients were chosen according to the Norwood-Hamilton scale 3-7 subtypes, who have undergone no medical treatment for AA. The random sampling method was used to determine the sample of the study. The two-point discrimination threshold was measured bilaterally in the fronto-temporal and vertex regions by a two-point discriminator. The data were summarized with mean (standard deviation) and frequency (percentage) by using the SPSS 24.0 program. The difference between the study and the control group was evaluated by t test in the independent groups in terms of measurement variables.

Results

The right fronto-temporal, the left fronto-temporal, the right occipito-parietal and the left occipito-parietal regions were used for statically analysis. The results were $21,83 \pm 4,37$ [25 (10-25)], $21,75 \pm 3,86$ [22,5 (9-25)], $20,42 \pm 5,08$ [22,5 (11-25)], $20,31 \pm 4,89$ [20 (7-25)], respectively. The control group was analyzed with same statically method, and the results were $15,63 \pm 5,51$ [15 (8-25)], $18,68 \pm 5,67$ [20 (9-25)], $16,16 \pm 6,00$ [15 (9-25)], $16,32 \pm 5,20$ [15 (9-25)], respectively .A significant difference was observed in all regions, $P < 0.001$, $P = 0.038$, $P = 0.005$, $P = 0.005$.

Conclusions

The significant sensory loss on the typical sites of AA could be associated with neuropathy of the related dermatome on the scalp.

CORRECTING CONCAVITY OF RABBIT AURICULAR CARTILAGE: COMPARISON OF SINGLE SCORING INCISIONS WITH BUTHYL CYANOACRYLATE AIDED TECHNIQUES

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Introduction

We herein present the results of an experimental study, in which four different techniques were used for the correction of concave rabbit auricular cartilages.

Materials and Methods

Sixteen New Zealand adult male rabbits were used in the study. Buthyl cyanoacrylate aided cartilage graft fixation, buthyl cyanoacrylate aided bone graft fixation and a novel instrument ("Micrometer Scoring Knife") aided scoring technique, alone or combined with buthyl cyanoacrylate application, were performed in order to correct the concavity of rabbit auricular cartilage.

Results

Pre-correction and initial post-correction angle measurements showed that all four different techniques were efficient for the correction of the cartilage concavities. However, the mean post-sacrificiation angles of the cartilage graft fixation and the bone graft fixation groups, which were measured on the 9th month, were significantly higher than the other study groups, reflecting the fact that graft fixation with buthyl cyanoacrylate application was more efficient for preserving the final cartilage shape. Furthermore, on the 9th month, graft fixation groups had the lowest chondrocyte densities, highest degree of inflammation, highest degree of foreign body reaction, and highest buthyl cyanoacrylate density.

Conclusions

This study showed that fibrosis or chondrocyte proliferation on scoring incision lines is not an associated feature of this technique. The "Micrometer Scoring Knife", which has a 0,01 mm sensitivity, provides control over incision depth and makes the scoring technique more reliable. When a controlled depth adjustment cannot be achieved, application of buthyl cyanoacrylate to scoring incision lines increases the reliability of the scoring technique. Cartilage graft fixation and bone graft fixations with buthyl cyanoacrylate application were superior to other corrective procedures with regard to preservation of the final cartilage shape. Although graft fixation techniques resulted in greater toxicity, the cartilage correction was not affected unfavorably.

RESIDUAL MUSCULAR ACTIVITY OF THE ORBICULARIS OCULI MUSCLE AFTER LOWER TRANSCUTANEOUS BLEPHAROPLASTY WITH REIDY-ADAMSON FLAP: STATISTICAL ANALYSIS OF THE RESULT

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Introduction

The aging process affects skin, muscle, fat of the eyes in a different manner. Their individual rejuvenation would require specific surgical treatment according to their particular demands during lower eyelid blepharoplasty. This would require the separate management of the skin and the muscle by separating them into two different flaps. Basing on anatomy, during sub-ciliary myocutaneous incision in conventional lower eyelid transcutaneous blepharoplasty most of innervations of the lower orbicularis-oculi-muscle are transected and denervation sequelae at the pretarsal orbicularis oculi muscle would be expected. However sub/ciliary approach is still popular. The absence of signs or symptom of denervation of in our large case series even though injury to the motor innervation of the orbicularis oculi muscle during the operation led the authors to investigate the discrepancy between the anatomical concept and clinical outcomes.

Materials and Methods

The prospective study enrolled 5 patients Orbicularis oculi muscle functionality was investigate with electroneurography before and at least 6 months after the surgical procedure. Investigated parameters: Compound Muscle Action Potential (CMAP) as expressions of quantity of activated muscular fibres by the electrical stimulation of the facial nerve. Pre and post op collected data were analysed and compared.

Results

The mean age was 52.9; minimum follow up 6 months; ten eyes were investigated; 1 patient was excluded. Postoperative data didn't showed any significant reduction of the CMAP at all.

Conclusions

The study suggests that the buccal branch and medial branch of the zygomatic nerve of the facial nerve supplies efficiently to the orbicularis oculi innervation.

AUTOLOGOUS PLATELET-RICH PLASMA BOOSTS SAFELY AND EFFICIENTLY HUMAN FIBROBLAST EXPANSION IN VITRO

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Introduction

Nowadays autologous fibroblast application for skin repair presents an important clinical interest. In most cases, in vitro skin cell culture is mandatory; and xenogenic or allogenic products are used as culture media. However, these non-autologous culture media presents some disadvantages, such as the risk of infection transmission or slow cell expansion. In this study, we investigated an autologous culture system to expand human skin fibroblast cells in vitro with the patient's own platelet-rich-plasma (PRP). We assessed the optimal PRP concentration and the biological effects of media supplemented with PRP on migration, adhesion, differentiation and genomic stability of human skin fibroblast.

Materials and Methods

Human dermal fibroblasts were isolated from patients undergoing abdominoplasty. The blood was collected from the same patients to prepare non-activated fresh PRP using the CuteCell™ PRP medical device. Cultures were followed up to 7 days using a media supplemented with either fetal bovine serum (FBS) or different concentration of PRP (1, 5, 10, 20, 30, 40 and 50%).

Results

Fibroblasts cultured in medium supplemented with PRP showed dose-dependently significantly higher proliferation rates. The best concentration was 20% of PRP that increased cell proliferation 7.7 times in comparison to FBS; while chromosomal stability and cell phenotype was maintained. Fibroblast cultured in a media with PRP initiated a faster migration in the in vitro wound healing compared to FBS. At high PRP concentrations (>40%), fibroblast morphology changed with cytoskeleton rearrangement, increase of alpha-SMA and vimentin expression.

Conclusions

Our findings show that autologous non-activated PRP is an efficient and cost-effective supplement for fibroblast culture. As it respects the good-manufacturing-practices and regulatory agencies standards, it should be considered as a potent alternative and substitute to xenogeneic or allogenic blood derivatives for the validation of future clinical protocols using in vitro cell expansion.

VITAMIN D MAY ENHANCE WOUND HEALING WITH LESS SCARRING

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Introduction

Vitamin D supplementation may improve wound healing and prevent scarring; yet, the molecular mechanisms are unknown. Epidermal keratinocytes (EK) are vital in synthesising active vitamin D₃ (1,25-dihydroxyvitamin-D₃) in the skin, and are also target cells, expressing the vitamin D receptor (VDR). Since the role of dermal fibroblasts (DF) in autocrine/paracrine regulation of vitamin D₃ homeostasis is unclear, we sought to establish their role in wound healing.

Materials and Methods

Using qRT-PCR, mRNA expression of VDR, and vitamin D metabolising enzymes (CYP2R1, CYP27B1 and CYP24A1) were quantified in primary human EKs and DFs established from female skin. Effects of 1,25-dihydroxyvitamin-D₃ on migration and wound closure were assessed with scratch assays and ex vivo wound healing models. VDR knockdown confirmed the role of VDR. Differentiation of DFs into myofibroblasts was quantitated by alpha-smooth muscle actin (alpha-SMA) using immunocytochemistry and Western Blotting; gelatine zymography quantified matrix metalloproteinase-2 (MMP-2) activity, while the collagen type I to III ratio was confirmed by qRT-PCR.

Results

EKs (n=5 donors) expressed higher levels of enzymes, while DFs (n=8 donors) expressed more VDR. 1,25-dihydroxyvitamin-D₃ accelerated EK migration and ex vivo wound closure, but inhibited DF migration: silencing of VDR abolished this effect. 1,25-dihydroxyvitamin-D₃ upregulated nuclear VDR translocation, but down-regulated alpha-SMA, and MMP-2 secretion, and reduced the ratio of type I to III collagen in DFs in a scratch-wound assay. Proteomic data showed that DFs derived from younger donors secreted the vitamin D-binding protein (DBP), while this was not detected in DF supernatants from older donors.

Conclusions

The secretion of DBP by DFs highlights a paracrine role with the EKs metabolising the ligands, which changes with aging. Furthermore, downregulation of MMP-2, alpha-SMA and the type I to III collagen ratio suggests that 1,25-dihydroxyvitamin-D₃ may modulate DFs during wound healing to reduce scarring, while accelerating re-epithelialisation and restoration of the epidermal barrier.

WOUND FLUID UNDER OCCLUSIVE DRESSINGS OF SPLIT SKIN DONOR SITES FROM DIABETIC PATIENTS SHOW AN INCREASED ANGIOGENETIC RESPONSE AND FIBROBLAST ACTIVATION

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Introduction

Metabolic diseases like diabetes mellitus often show prolonged healing and chronic wounds. Occlusive wound dressings are known to support wound closure by creating a moist environment which supports collagen synthesis, epithelialization and angiogenesis. We aimed to assess the effect of occlusion on diabetic wound fluid on the cellular level regarding fibroblast activity and angiogenetic response.

Materials and Methods

22 split skin donor sites from 22 patients (11 patients with diabetes mellitus) were treated with occlusive dressings intraoperatively. On day 3 fluid and blood serum samples were harvested while changing the dressings. The influence of wound fluid on fibroblasts was assessed by measuring metabolic activity (Alamarblue assay, Casey Counter), cell stress (LDH assay) and migration (in vitro wound healing assay) of fibroblasts. Angiogenesis of endothelial cells (HUVEC) was analyzed with the tube formation assay.

Results

The influence of wound fluid under occlusive dressings from diabetic patients showed a significantly increased angiogenic response and fibroblast migration compared to the non-diabetic patient group. Additionally cell stress was increased in the diabetic group.

Conclusions

Occlusive dressings seem to stimulate regenerative effects in diabetic wounds. Our study shows the influence of wound fluid under occlusive dressings from diabetic patients on angiogenesis, migration and proliferation of fibroblasts, which are essential modulators of wound healing and scar modulation.

QUANTITATION OF VASCULARIZATION EFFECT ON TUMOR GROWTH IN A MURINE SCC MODEL

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Introduction

Surgical management of large skin cancer is based on resection & reconstruction by vascularized tissue. In our clinical observation, transfer of well-vascularized flap into a resected tumor bed, has accelerated tumor recurrence with changed biological behavior. We used a murine SCC model to examine the theory using various modalities to influence tumor bed vascularity: radiation therapy, anti-VEGF and vascularized flap-transfer.

Materials and Methods

30 white male BALB/C-rats were injected with a murine-SCC-cell-line and divided into four groups. 1. Control group-no treatment. 2. Radiation group-one dose (8Gy) was given on day-13. 3. Anti-VEGF group-one dose of Avastin® bevacizumab (5mg/gr) was given on day-13. 4. Combined treatment -Radiation+Avastin®. On days 0-35 we have followed after tumors characteristics- mice weight, tumor dimensions, ulcerative+/-, mice viability and photographs. On day 35 we have operated the mice- excisional biopsy and closure by local flaps based on the cremaster pedicle. In groups 2,3 and part of group 1 we have injected Avastin® into flap. Histology & immunohistochemistry were performed.

Results

It seems there is a clear tendency of delayed tumor-growth of treatment groups compared to control group. Tumor metastases were found in 75% of controls, 50% of Avastin®, and 0% of Radiation and combined. The recurrence was much greater in controls and Avastin® groups (67-75%) than in Radiation and combined groups (25-29%).

Conclusions

It seems that in our limited pilot study, Avastin®, an anti-VEGF drug, has independent effect on a murine-SCC. It seems that a combination of Radiation and anti-VEGF can reduce all above factors, even in a sub-therapeutic level. In this model we have reconfirmed our clinical observation- transfer of vascularized tissue to slow growing tumor bed, of a led to a rapid tumor recurrence appeared and more aggressive biology observed.

THE IMPACT OF BREAST IMPLANT TEXTURIZATION ON BIOFILM DEVELOPMENT: AN EXPERIMENTAL STUDY

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Introduction

Texturization has been advocated to improve outcomes in breast implant surgery. However, texturization is also related to increased risk of complications such as late seromas and double capsules. Recently, it has been associated with BIA-ALCL. Texturization may also raise the susceptibility to biofilm development. The aim of this study is to investigate biofilm formation on different implant texturizations.

Materials and Methods

24 samples from the surface shell of smooth, microtextured, macrotextured, and intermediate-textured implants, were added with 5×10^7 colony forming units of six strains of *S. Epidermidis* and *S. Aureus*. The samples underwent quantitative bacterial colony-forming unit (CFU) determination at 3 and 24 hours. Samples inoculated for imaging purposes were analyzed by scanning electron microscopy. ANOVA was conducted to compare bacterial growth on different surfaces.

Results

Smooth implants showed a mean CFU of 371×10^3 (SD 282.5×10^3), microtextured implants 865.9×10^3 (SD 782.8×10^3), intermediate-textured 2744.7×10^3 (SD 1038.9×10^3) and macrotextured implants 2966.4×10^3 (SD 1257.5×10^3). There was a statistically significant difference between microtextured and both macrotextured and intermediate-textured samples. There was also a significant difference between smooth samples and both macrotextured and intermediate-textured samples. No statistically significant difference was found between smooth and microtextured samples and between intermediate-textured and macrotextured samples. The scanning electron microscopy showed denser biofilm on the surface of macrotextured and intermediate-textured implants compared with microtextured and smooth implants.

Conclusions

Our results suggest a relationship between the roughness of implant surfaces and the risk of biofilm formation. Smooth implants are the least prone to bacterial adhesion, but they are not immune to it. Microtextured surfaces behave more like smooth implants. Macrotextured implants showed more susceptibility to biofilm development. Even if our conclusions come from an in vitro study they will be useful to develop safer surfaces.

DIFFERENTIAL ION MOBILITY SPECTROMETRY IMAGING FOR PATHOLOGICAL APPLICATIONS

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Introduction

Pathologic examination of clinical tissue samples is time consuming and often does not involve the comprehensive analysis of the whole specimen. Differential ion mobility spectrometry (DMS) is a rapid and affordable technology for analysis of complex gas mixtures. Surgical smoke created with a diathermy blade from different tissues have distinguishable molecular compositions. In this study an automatic tissue analysis system (ATAS), which utilizes DMS coupled with a diathermy blade, was applied to analyse surgical smoke from porcine tissue and to present a cost-efficient system for automated histopathological tissue mapping.

Materials and Methods

Fresh tissue sample slices (width 3 mm) of a landrace pig were gathered and placed on a protective agar plate. Tissues included in the study were lungs, kidneys, liver, brain, skeletal muscle and adipose tissue. The ATAS incised each sample with a diathermy blade with a 1-2 mm spatial resolution between each sample point and the produced surgical smoke was analysed. The tissue samples were photographed prior and after the measurements to annotate each tissue of the tissue matrix.

Results

With linear discriminant analysis (LDA) the classification accuracy for intermuscular fat and skeletal muscle was 92 % (n=1240), 71 % for white and grey matter (n=470) and 91 % for renal cortex and renal pelvis (n=822). The eight tissues included in the study were identified with a mean accuracy of 81 % (n=3418).

Conclusions

Automated tissue analysis systems are a promising new technology aiming to make the workflow of a pathologist more efficient and to support in clinical decision-making. In this study, we show with an animal model that DMS is a viable option in tissue imaging. These results lay foundation for histopathological tissue mapping with DMS from surgical smoke.

ACCURACY OF THREE SOFTWARE APPLICATIONS FOR BREAST VOLUME CALCULATIONS FROM 3D SURFACE IMAGES

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Introduction

For many breast surgery procedures, knowing breast volumes prior to surgery helps the surgeon to obtain breast symmetry. Calculating breast volumes from 3D surface images is possible with the aid of specialized software applications. However, limited data exists concerning the accuracy of such 3D surface based volume measurements. The purpose of this study was to investigate the accuracy of breast volume calculations performed with the 3D BreAST, 3dMD Vultus-, and VECTRA software.

Materials and Methods

Patients who were scheduled for a uni- or bilateral simple mastectomy were included in this study. Preoperative 3D surface images were acquired with a VECTRA XT 3D stereophotogrammetry device. Breast volumes were calculated from the 3D surface images with the three software applications. During surgery, the mastectomy specimens were weighed to derive their actual volume for comparison with the software outcomes.

Results

Twenty-six subjects who underwent 44 mastectomies were enrolled in this study. For all three methods, a positive correlation between the breast volume and absolute measurement error was found ($p < 0.001$), but not for the errors as an absolute percentage of the breast volume ($p = 0.17, 0.80, \text{ and } 0.42$). Respectively, the 3D BreAST, 3dMD Vultus, and VECTRA provided mean volume calculation errors of 21, 186, and -32 ml ($p = 0.27, < 0.001, \text{ and } 0.14$) or $2 \pm 25, 48 \pm 26, \text{ and } -6 \pm 27\%$ ($p = 0.67, < 0.001, \text{ and } 0.16$).

Conclusions

Despite the accurate mean errors of two applications, all three applications showed a high standard deviation in terms of percentage of the breast volume. Therefore, the usefulness of 3D surface based absolute breast volume calculations seems limited.

THREE-DIMENSIONAL ASSESSMENT OF THE BREAST: VALIDATION OF A NOVEL, SIMPLE AND INEXPENSIVE SCANNING PROCESS

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Introduction

Methods to assess three-dimensionally the breast surface are increasingly used in plastic and reconstructive surgery for pre-operative planning and post-operative outcome evaluation. This includes the use of three-dimensional scanning devices and software applications. The aim of this study was to validate the use of the Structure Sensor 3D scanner (Occipital, Inc., Boulder, Colo.) connected to an iPad Pro (Apple, Inc., Cupertino, Calif.) as a novel, inexpensive and handheld three-dimensional scanning process.

Materials and Methods

Surface images of a medical human female anatomy torso model of rigid plastic were repeatedly acquired with Structure Sensor 3D scanner and compared with those obtained using the clinically established Vectra M3 scanner 3D imaging system (Canfield Scientific Inc., Parsippany, NJ, USA) and Artec Eva 3D scanner (Artec3D, Luxemburg). Digital measurements of vector and surface breast distances were analyzed using Mirror® Medical Imaging Software (Canfield Scientific Inc., Parsippany, NJ, USA).

Results

The analysis of variance (ANOVA) revealed no statistical significant difference among measurements obtained using different scanning process for all of the variables examined ($p > 0.05$).

Conclusions

The study demonstrates analogous practicability and reliability for surface images acquisition using the newly introduced Structure Sensor 3D scanner and the established Artec Eva 3D scanner and Vectra M3 scanner. These data open the perspective to use an inexpensive and handled device for the three-dimensional assessment of the breast.

VIRTUAL 3D PLANNING AND PREDICTION ACCURACY IN BIMAXILLARY FACIAL ALLOTRANSPLANTATION PATIENTS IN HELSINKI

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Introduction

3D planning and CAD/CAM (Computer Aided Design/Computer Aided Manufacturing) technology are widely used in orthognathic and maxillofacial surgery in planning surgeries and enabling the manufacturing of customized implants for precise adaptation, reduced surgical times and better cosmesis. Hence, it is only intuitive that 3D planning and 3D modelling has found its application in facial transplantation also. The aim of this study is to describe the 3D planning process in our two facial composite transplantations and to analyze the accuracy of a virtual transplantation in predicting the end-result of transplantation.

Materials and Methods

The study material consists of two bimaxillary composite facial transplantations performed in the Helsinki University Hospital in 2016 and 2018 respectively. Data was collected by reviewing the patient charts for clinical data and CT-scan information for evaluating the skeletal parts of the transplants. We will also briefly present our methods for 3D-printing and 3D-planning.

Results

The first postoperative facial CT-scan was taken 6 days for the first and at 6 weeks postoperatively for the second face transplant patient. For the first patient, the maxilla was positioned 5,1 mm too caudal due to the excess bone planned but not removed at the surgery. For the second patient, the adjustment of the donor and patient radix had resulted in slight malposition and rotation of the donor maxilla. The donor radix was 0,1 mm to the left and there was 3,9 degrees of rotational angle from the vertical line.

Conclusions

3D-planning is accurate and feasible in facial transplantation surgery. Virtual transplantation can help the difficult planning process, especially in bimaxillary transplants where accurate osteotomies and sawing guides are of vital importance. Indeed, 3D-planning is an integral part of Helsinki facial transplantation protocol.

THE 'MICROSURGERY ARENA' - A NEW DEVICE TO DEVELOP MICROSURGICAL SKILLS

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Introduction

The usefulness of low fidelity simulators to improve microsurgery skills and mastering them in clinical practice has been well documented. We developed a portable, reusable device to help trainees to practice at their convenience and improve wrists and finger movements, besides fluidity and coordination.

Materials and Methods

By using CAD and 3-D printing technologies, we designed a 'Microsurgery Arena' trainer that contains a middle circular section with 8 projections with holes, arranged as a circle. The microsuture - preferably 7/0 or 8/0 sutures, is passed in a clockwise manner with the needle passing 'out to in' and 'in to out' through each hole. This central 'circle' is surrounded by a 3D-printed silicone mesh. This section can allow the trainees to apply correct tension on the suture to make a secure knot.

Results

The circular section of the arena allows the trainee to gain wrist flexibility and achieve better control over the micro needle. The multiple grids available allow adequate opportunity to practice knot tensioning.

Conclusions

This innovative, low-cost reusable device is designed to introduce trainees to microsurgery. It could allow development, maintenance, and progression of the microsurgical basic skills.

ROLE OF LEUPEPTIN IN PREVENTING HIND LIMB ISCHEMIC TISSUE INJURY DURING RECONSTRUCTIVE SURGERIES

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Introduction

Prolonged tourniquet ischemia leads to progressive muscle, nerve and vascular injuries. Tissue ischemia leads to calpain activation and Wallerian like degeneration. Calpain is implicated in several vascular inflammatory and degenerative disorders. Leupeptin inhibits the expression of calpain. We hypothesized that by inhibiting the expression of calpain with Leupeptin, we could diminish these injuries in a rat model of prolonged hind limb ischemia.

Materials and Methods

10 rats were subjected to two-hours of blood flow occlusion in the left hind limb by application of a neonatal blood pressure cuff set to 300 mmHG. 5 rats were then randomly selected to receive intramuscular injections of leupeptin while the others received injections of saline. All animals were monitored for gait quality using the sciatic functional index (SFI). Following two weeks, the animals were euthanized and the sciatic nerves, gastrocnemius muscles, veins and arteries, were harvested and underwent histological analysis.

Results

The histological images of the gastrocnemius muscle fascicle cross-sectional areas from both the hind limbs for the two groups - leupeptin and control- were imaged. The difference between the muscle cross sectional areas of the left hind limbs (ischemic limbs) between these groups was found to be significant (leupeptin - 774.57 μm^2 , vs control - 472.70 μm^2 ; $p=0.043$). These two values were significantly lower as compared to their respective right muscle fascicle areas (where no tourniquet was applied; leupeptin - 1725.30 μm^2 : control -1548.22 μm^2). However, the differences in the SFI scores between these 2 groups were not found to be different ($p=0.785$).

Conclusions

The application of Leupeptin post hind limb ischemia led to greater preservation of hind limb muscles. We postulate that by inhibiting calpain, Leupeptin inhibits the pathways that trigger cell death leading to greater tissue preservation. Studies focusing on the gross and histological changes in the arteries, veins and nerves are currently being performed.

SALVAGING THE ZONE OF STASIS IN BURNS WITH MONTELUKAST AND HYPERBARIC OXYGEN THERAPY: A COMPARATIVE EXPERIMENTAL STUDY IN RATS

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Introduction

Salvaging the zone of stasis is a major subject of experimental burn studies. Recent studies showed that the irreversible tissue necrosis of stasis zone is result of progressive hypoxia and tissue ischemia within the first 48 hours. It is claimed that increased perfusion, tissue tolerance for hypoxia and inhibiting inflammatory response could help salvaging this zone. The aim of this study is to examine and compare the effect of hyperbaric oxygen therapy (HBOT) and montelukast on zone of stasis.

Materials and Methods

21 female Sprague-Dawley rats were used in this study and divided into 3 groups. The burn model defined by Regas and Erlich is used as experimental burn model under anaesthesia. 1st group didn't get any treatment. 2nd group took 1 ml 10mg/kg montelukast solution via gastric gavage every day. In the 3rd group 2 ATA HBOT was applied for 90 min once daily. Each group monitored for 10 days. Punch biopsy from stasis zone is performed on day 0, day 3 and day 10. Tissue malondialdehyde (MDA) and myeloperoxidase (MPO) levels were investigated. Histological evaluation was made to investigate tissue neutrophil count.

Results

When compared with control group both of treatment groups had statistically lower MDA levels. Compared with both control and HBOT group, montelukast group showed lower MDA levels. Neutrophils decreased significantly in HBOT group compared to control group in day 0 vs. day 3 and day 3 vs. day 10 comparison.

Conclusions

The results we obtained showed that both HBOT and montelukast have effect on reducing oxidative stress in stasis zone. According to the results of MDA, an important inflammatory marker, it could be said that montelukast is superior to HBOT in reducing inflammation and effects of HBOT are more significant in early period of burn injuries.

THE EFFECTS OF REMOTE ISCHEMIC PRECONDITIONING AND ADENOSINE WITH REMOTE ISCHEMIC PRECONDITIONING IN RAT FLAP ISCHEMIA REPERFUSION INJURY MODEL

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Introduction

The efficacy of remote ischemic preconditioning and remote ischemic preconditioning with adenosine in order to prevent ischemia reperfusion injury was investigated an important problem is encountered clinically in this study.

Materials and Methods

Animals were randomly divided into 5 groups, with 7 animals in each group. Inferior epigastric flap was planned in 3x6 cm size. The first group, sham group, no procedure was performed. The second group is ischemia reperfusion control group, in which pedicle microclamping was performed to create ischemia and two hours of ischemia followed by two hours of reperfusion. The third group was remote ischemic preconditioning group in which the left lower extremity was subjected to 10 minutes of ischemia and 10 minutes of reperfusion 3 times. In the fourth group, firstly the left lower extremity was subjected to 10 minutes of ischemia and 10 minutes of reperfusion 3 times and then in which pedicle microclamping was performed to create ischemia and two hours of ischemia followed by two hours of reperfusion. In the last group, 1 mg / kg intraperitoneal adenosine was administered between the two treatments, unlike the fourth group.

Results

A statistically significant protective difference was found in inflammatory cell level in the remote ischemic preconditioning group ($p < 0.001$). In the adenosine with remote ischemic preconditioning group total oxidant stress levels ($p:0.005$), inflammatory cells ($p < 0.001$) statistically significant difference was found in protective effect.

Conclusions

Remote ischemic preconditioning and adenosine with remote ischemic preconditioning had beneficial effect on ischemia reperfusion injury and flap survival in skin flaps.

QUANTIFICATION OF CHANGES IN DERMAL BLOOD FLOW AFTER TOPICAL ADMINISTRATION OF CAPSAICIN ON THE SKIN

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Introduction

The dermal blood flow is crucial for wound healing and survival of dermal flaps in plastic and dermatologic surgery. Application of topical agents is an easy way of administering active agents to optimize postoperative results. The purpose of this study was to evaluate the characteristics in changes of dermal blood flow in healthy subjects by quantitatively assessing the perfusion dynamics after application of capsaicin compared to dexpanthenol to establish a reference for measurements at injured sites.

Materials and Methods

The skin perfusion dynamics after local application with capsaicin and dexpanthenol on the back of 46 healthy subjects were noninvasively assessed, determining the cutaneous oxygenation saturation, relative hemoglobin count and blood flow using an Oxygen to See device.

Results

Incubation of healthy skin with capsaicin provokes a significant raise in superficial and deep skin oxygenation compared to control after 30 minutes post incubation. The effect is also significant at sites 1 and 2 cm distant to the application point. Further a highly significant raise in measurements of flow and velocity were present in superficial and deep sites. The relative hemoglobin count was only significantly rising at the superficial site while at deep points an increase was seen for the surrounding areas 1 and 2 cm distant to application site. These effects only showed to be a statistic trend. An overall hyperemia also showed by a local flair surrounding the application point of the capsaicin ointment.

Conclusions

With the introduced model applied to observe changes in dermal blood flow in healthy subjects the authors can reliably monitor the effects of topically administered capsaicin. This baseline can be used as reference for further studies to improve oxygenation in the settings of endangered flap survival or critically perfused wounds as has been proven in animal studies.

TOPICAL MOISTENING OF THE WOUND SURFACE WITH TRANEXAMIC ACID 25 MG/ML REDUCES BLEEDING EQUAL TO INTRAVENOUS ADMINISTRATION AND MAY REDUCE NEED FOR RE-OPERATION OF POSTOPERATIVE HEMORRHAGE

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Introduction

Intravenous use of tranexamic acid (TXA) (Cyklokapron®) in surgery reduces bleeding by about 1/3.. Use in surgery with high risk of bleeding is widespread; fear of possible systemic adverse effects prevent use in all surgery. Our plastic surgery unit has applied TXA topically to most wound surfaces since 2012, reducing the risk of systemic effect. In a previous small pilot randomized clinical trial (RCT) we found a 39% reduction in bleeding ($p=0.038$). As topical use is off-label, efficacy, mode of administration, optimal dosing, and potential local and systemic adverse effects need to be explored. We present a confirmatory study regarding effect from moistening a wound surface with TXA and intend to publish further studies regarding safety.

Materials and Methods

Design: RCT in 202 patients with breast cancer undergoing mastectomy. Intervention: Moistening the wound surface with TXA 25 mg/ml or placebo prior to wound closure. Primary outcome: Bleeding as measured by drain production at 24 h. Secondary outcomes: Early postoperative hematoma, cumulative total drain volume, days with drains, seroma formation, late postoperative complications. Data were adjusted for wound size and axillary clearance.

Results

Moistening a wound surface with 25 mg/ml TXA reduced 24-h bleeding with 32.4% ($p<0.001$) and total drain production with 33.0% ($p=0.003$). We observed seven re-bleedings in the placebo group and one in the TXA group ($p=0.057$). There was no difference regarding late hematomas, infections or wound ruptures. In patients undergoing axillary clearance, seroma formation was significantly more voluminous in TXA patients ($p=0.008$) but there was no increase in chronic seroma.

Conclusions

Moistening a wound surface with 25 mg/ml TXA is a simple and inexpensive way to reduce bleeding equal to iv use. It may also prevent re-bleeding and reduce drain output. We recommend this as a routine intervention for most wounds in plastic surgery. Local adverse effects of topical use should be further explored.

HEALTH-RELATED QUALITY OF LIFE IN PATIENTS HAVING UNDERGONE ABDOMINOPLASTY

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Introduction

Proper evaluation of the outcomes of abdominoplasty after massive weight loss using disease-specific health-related quality of life (HRQoL) instruments is lacking. The aim of the current study was to examine the association of appearance, satisfaction, and HRQoL after abdominoplasty using the BODY-Q instrument.

Materials and Methods

Altogether 52 patients having undergone abdominoplasty due to massive weight loss completed the BODY-Q and the generic 15D HRQoL instruments. The 15D scores were compared to age-, sex- and BMI-adjusted control sample of the general population.

Results

The HRQoL of abdominoplasty patients was lower compared to age-, sex- and BMI-adjusted general population ($p = 0.001$). Sleeping, discomfort, depression, excretion and sexual activity were the patients' main concerns. Body image and psychological well-being was strongly associated with the perceived HRQoL. The mean score of BODY-Q Abdomen scale was 50.7 out of 100 (SD 24.4). The satisfaction with appearance of the abdominal area was not associated with generic HRQoL.

Conclusions

The HRQoL of abdominoplasty patients is lower compared to general population with similar age, sex and BMI. The most important factors associated to HRQoL of the patients were body image, psychological well-being and physical function. Further prospective studies are needed to reveal the true impact of abdominoplasty on body image, satisfaction and HRQoL.

A NOVEL PLATINUM-BASED COMPOUND FOR THE TREATMENT OF NON-MELANOMA SKIN CANCER (NMSC)A—PRELIMINARY RESULTS.

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Introduction

Worldwide, approximately one third of all cancers are designated as Non Melanoma Skin Cancer (NMSC), and of these, the majority are basal and squamous cell carcinomas (BCC and SCC, respectively). These lesions often grow near strategic organs such as the eyelids and nose, and may erode and subsequently jeopardize their normal function. Although surgical removal remains the mainstay of treatment for the majority of lesions, surgical excision may not always be practically permissible due to anatomic location, lesion size, and the patient's overall health condition. Surgical alternatives include topical treatments, but these frequently exhibit limited penetration and may cause non-negligible damage to surrounding tissue. Platinum compounds are commonly used in many chemotherapeutic regimens for solid malignancies, yet in order to enhance maximize tissue penetration and anti-neoplastic potency, certain chemical modifications of such platinum based compounds must be made. The aim of our study was to examine a chemically modified Platinum based compound (OPA) in a model of living skin tissue in both healthy and NMSC samples.

Materials and Methods

Normal and NMSC skin samples were exposed to OPA and assessed for viability and apoptosis (caspase activity). The results were compared to a control group and to current available topical medications.

Results

In the healthy and control samples, OPA exposure resulted in similar cell viability and with no increase in caspase activity. In the NMSC samples, exposure to OPA resulted in decreased cell viability and increased apoptosis ($p < 0.05$). Moreover, OPA was superior to 5-FU and oxaliplatin in decreasing cell viability and inducing apoptosis ($p < 0.05$).

Conclusions

Preliminary results with this new compound (OPA) show great potential for non-surgical treatment of NMSC. Further studies, particularly in-vivo, are indicated to maintain such promise.

LOSS OF SHOULDERS STRENGTH FOLLOWING BREAST RECONSTRUCTION WITH THE LATISSIMUS DORSI FLAP DOES NOT RESTRICT ACTIVITIES OF DAILY LIVING - A PROSPECTIVE STUDY

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Introduction

Despite a trend towards the use of perforator-based flaps for autologous breast reconstruction in recent years, the latissimus dorsi (LD) flap remains a popular alternative. It is easily dissected, does not require microsurgical expertise and is associated with a low perioperative complication-rate. However, the LD flap has come under scrutiny in recent years due to possible severe donor-site morbidity. Several studies have sought to uncover the shoulder-related donor-site morbidity, but the results are inconsistent. Furthermore, most of the previous studies are of retrospective nature that compare results to a control group or utilize inadequate methods of measuring shoulder strength.

Materials and Methods

We prospectively examined 20 consecutive female patients undergoing delayed breast reconstruction with an LD-flap. Isokinetic as well as isometric shoulder strength for adduction and extension were measured with the Biodex System4 Pro dynamometer and range of motion (ROM) was tested using two-dimensional photogrammetry. We compared the results to the patients' self-reported pain, lymphedema, sensory disturbances and ability to perform activities of daily living (ADL) using a questionnaire previously validated for patients undergoing reconstruction after mastectomy. Measurements as well as questionnaires were performed pre-operatively, at 3 months and 12 months post-operatively.

Results

Of the 20 included patients, 17 completed the follow up. We found no significant change in isokinetic shoulder strength, but we found a significant average loss of shoulder strength of 17% for adduction($p<0.01$) and 20% for extension($p<0.01$). ROM and ability to perform ADL were unchanged. Lymphedema improved in 30% of the patients after reconstruction.

Conclusions

Breast reconstruction with an LD-flap does not restrict the patients' ability to perform activities of daily living, but a measurable loss of shoulder strength occurs for high-intensity performance (isometric work). LD breast reconstruction should safely be considered a viable alternative to microvascular reconstructive modalities.

A PRACTICAL NON-CONTACT MODEL TO CREATE STANDARDIZED EXPERIMENTAL BURN WOUNDS OF ANY THICKNESS: BLUE BEAM LASER POINTER FOR BURN INDUCTION

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Introduction

The objective of this study was to describe a predictable and easy-to-use model that can create standardized burn wounds.

Materials and Methods

A 450 nm 1000 mW blue beam laser pointer was used to create burn wounds on the dorsal skin of 24 Sprague Dawley rats. 12 distinct areas of dorsal skin were pulsed for 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21 and 23 seconds with the help of a punched plastic card template. 3 groups of 8 animals were sacrificed immediately after, on the 3rd day and on the 7th day of the procedure and tissue samples were taken for histological evaluation and measurements.

Results

A second degree burn was obtained in all animals with 3 and 5 seconds of laser application on the same day, 3rd and 7th day measurements. 7 seconds of application resulted with a burn depth of 84.87% of dermis on the application day which deepened to involve the whole dermal layer on the 3rd and 7th day. 9 seconds and longer application times resulted 3rd degree burn wounds.

Conclusions

Burn induction with blue beam laser pointer is an easy-to-use, predictable and safe model to create a standardized burn wound of desired thickness.

HEALTH-RELATED QUALITY OF LIFE AFTER TREATMENT OF UPPER-EXTREMITY SOFT TISSUE SARCOMA.

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Introduction

We aimed to investigate health-related quality of life (HRQoL) after treatment of soft tissue sarcoma of the upper extremity.

Materials and Methods

After institutional review board approval, as a joint venture between Helsinki and Tampere University Hospitals, we embarked to unravel the HRQoL among patients at least 18 years old with full understanding of written Finnish and who had undergone limb-sparing treatment for upper-extremity sarcoma. Patients completed the QLQ-C30 and 15D HRQoL instruments and the Toronto Extremity Salvage Score patient-reported outcome measure. Outcomes of the 15D instrument were compared with age- and gender-standardized general population.

Results

Fifty-five patients were enrolled for the study. Generic HRQoL correlated strongly with upper-extremity function. A statistically significant difference was found between the 15D dimension of "Usual activities" our patients and the control group. Strong correlation with upper extremity function was measured in Physical and Role functioning of the QLQ-C30 instrument.

Conclusions

HRQoL is good after treatment of an upper-extremity soft tissue sarcoma and comparable to an age and gender adjusted control group. However, limitations in usual activities such as working, studying, housework and freetime activities may occur.

USE OF DCELL HUMAN DERMIS IN PRIMARY AND SALVAGE HYPOSPADIAS REPAIR INSTEAD OF AN INTERPOSITION DARTOS FASCIAL FLAP

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Introduction

Amongst hypospadias surgeons, there is a general consensus that the majority of primary repairs can be performed in one-stage using techniques that involve tubularisation of the ventral tissues. Most surgeons use a dartos fascia interposition flap. However, when the suture line of the neourethra is long, a larger dartos flap may be needed and the extensive dissection required to raise such a flap can result in de-vascularisation of the overlying skin. To avoid these problems, we have started to use dCELL as the interposition layer in both primary and salvage cases of hypospadias. dCELL[®] Human Dermis is a decellularised dermal allograft produced from split thickness skin grafts. The theoretical benefits of using dCELL are significant as the dissection required to raise a dartos flap is avoided completely, thus diminishing the risk of both skin necrosis and haematoma.

Materials and Methods

Between March and July 2018, a consecutive series of 8 patients underwent a primary or secondary hypospadias repair with dCELL. Three patients had previously undergone a two-stage primary repair. One patient was a primary repair. The other two patients had undergone a one-stage primary repair. Surgery was performed to close a ventral fistula in three cases. In two cases, surgery was performed to revise dehiscence of a glans repair.

Results

Our data show that all the patients who underwent surgery combined with dCELL had a successful repair of their underlying condition.

Conclusions

Overall, hypospadias repair reinforced with dCELL confers numerous advantages. In this case series, the senior author noticed that using the dCELL adds mechanical strength to the neourethra repair. In salvage cases, where the dartos layer may be absent or heavily scarred, it gives the hypospadias surgeon the means for reliably separating the skin closure from the neourethra repair.

A COMPARISON OF THE EFFECTS OF NEGATIVE PRESSURE WOUND THERAPY (NPWT) AND STANDARD SURGICAL DRESSINGS (SSD) ON OUTCOMES IN WOUNDS AFTER RESECTION OF A MALIGNANCY: A SYSTEMATIC REVIEW

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Introduction

NPWT has gained popularity as a post-operative alternative to traditional wet-to-dry dressings for open wounds. Published research has detailed its advantages including accelerated wound healing, reduced complication rates, reduced hospital stay, and cost savings. Although NPWT is contraindicated in malignant wounds for concern it may promote recurrence, it is often used for such cases clinically. A systematic review was performed to evaluate the outcomes of NPWT application on cancer resected wounds.

Materials and Methods

A systematic review was performed following PRISMA guidelines using PubMed, EMBASE, CINAHL, and Cochrane Central. Inclusion criteria contained randomized controlled trials (RCTs) and retrospective or prospective cohort studies detailing the use of NPWT on cancer resected wound beds (including sarcoma, malignancy and neoplasms). Case reports were excluded.

Results

Thirty-three of 746 identified articles met inclusion criteria. These studies included skin, breast and sarcoma and other malignancies. Two studies were RCTs, 13 were prospective cohort studies and 18 were retrospective reviews. 88% of papers (n=29) recommended NPWT use in cancer resected wounds. 1,119 subjects (46.37%) received NPWT and 1,294 subjects (53.63%) received standard dressings. Mean NPWT group wound area ranged from 7.2-107 cm², recurrence rates ranged from 0-28.57%, SSI rates were 0-70%, Mean control group wound area ranged from 7.1-34.2 cm², recurrence rates ranged from 0-45.63%, SSI rates were 7.2-61.5%.

Conclusions

Our systematic literature review did not reveal statistically significant differences in wound healing outcomes between patients receiving NPWT versus SSD post-operative therapy for malignant tumor resected wounds; however, recent studies have produced results that are challenging NPWT's clinical reputation. Some studies involving skin, rectal and gastrointestinal malignancy are recommending against the use of NPWT. This review validates the need for more high-power RCTs to accurately assess the impact of NPWT on malignant wound beds.

THE EAGER EARLY YEARS OF MICROVASCULAR SURGERY FROM 1979 TO 1987

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Introduction

Since the 1980's microvascular surgery has been the gold standard for severe tissue defect reconstruction. The indications and choices of flaps have changed over the years. The evolution of microsurgical techniques and the accumulated knowledge of anatomy, muscles, angiosomes and perforants, have led to the introduction of new flaps whereas others have been set aside.

Materials and Methods

In this retrospective study we studied patients who underwent reconstruction with microvascular free flaps in our department from 1979 until 1987. The patients were identified from OR logbooks. Their files, either on paper or microfilms, were reviewed in detail.

Results

102 patients and 108 microvascular free flaps were verified. The overall success rate was 79.6%. Cases of flap loss were distributed evenly across the time period. 90 (83%) were men [age 5-69, mean 35yrs] and 18 (16%) women [age 5-70, mean 34yrs]. Latissimus dorsi (LD) was the most common flap (n=38, 35%), followed by subscapular (n=13, 12%), gracilis (n= 11, 10%), dorsalis pedis p (n=9, 8%) and rectus abdominis muscle (n=8, 7%). The causes for tissue defects were trauma (67.6%), malignant tumor (11.1%) and burns (9.2%). The most common trauma was a complicated tibial fracture (43%). Only 12.5 % of the flaps for tibial fractures were performed within the first week and 68% within the first month post trauma.

Conclusions

Young men with posttraumatic tissue defects dominated in this early series. They presented late after trauma with deep infections, after complications in the primary treatment. The defects were covered with various muscular flaps, some types of which are still used (LD, gracilis). Microvascular breast reconstructions started in the late 1980's and reconstructions of tumor related defects have become more common during the recent decades.

THE ROLE OF SUBFASCIAL DISSECTION IN THE PREVENTION OF TEMPORAL HOLLOWING AS A COMPLICATION CAUSED BY CORONAL INCISION

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Introduction

Aim of this study is to investigate the effect of subfascial dissection on causing temporal hollowing

Materials and Methods

Between 2009-2017, 24 patients were operated by using subfascial dissection via unicoronal incision due to zygomatic arch fracture were included in this study. Minimum period for the formation of temporal hollowing was determined as at least 6 months. To evaluate temporal depression the method had been used by Steinbacher was used. According to this method; three soft tissue measurements were done on pterion, lateral side of orbital roof and adjacent helix in addition thickness of the temporal fat pads were calculated in Mimics software. All measurements were compared with the contralateral, unaffected side

Results

Of the 24 patients, 18 were male and 6 were female. 14 patients had right and 10 patients had left zygomatic arch fracture. No major complication after surgery and follow up was detected. P values were obtained by using two independent sample T tests in SPSS. First, second, third and thickness of the fat pads were found 0.112, 0.188, 0.967, 0.397 respectively. There was no statistically significant difference between the dissected and untreated sides in terms of soft tissue reserve and fat pads. Conclusions The rate of temporal hollowing after coronal access in facial fracture repairs is quite frequent between 50-70%. Coronal incision for repair of zygomatic arch fractures can be made in 4 different (suprafascial, subfascial, through intermediate fatpad and supratemporal) planes. A wide margin was reported in the literature on temporal depression caused by subfascial dissection. (Guo; 62.3%, Shetty and Zhang; 0-4%) our rate was 12.5%. Subfascial dissections without damaging the middle temporal artery protect both the middle fat pad from atrophy and reduce the possibility of damaging the frontal branch, thereby preventing the fat pad denervation

Conclusions

As a conclusion, we believe that subfacial dissection is a safe dissection plan to prevent temporal hollowing

COMPARISON OF PATIENT-RELATED OUTCOME: CIRCUMFERENTIAL LOWER BODY LIFT VS. LOWER BACK LIFT WITH AUTOLOGOUS GLUTEAL AUGMENTATION AFTER MASSIVE WEIGHT LOSS (MOUSTACHE FLAP TECHNIQUE).

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Introduction

Massive weight loss (MWL) patients may require lower body contouring to address excess skin and gluteal deformities, as gluteal ptosis may lead to functional problems, psychological distress, and impaired quality of life. Circumferential body lift is widely used in body contouring after MWL. In selected patients, lower back lift may be supplemented with autologous augmentation, using an adipodermal flap (moustache transposition flap) in order to restore contour and volume. Hitherto, no comparison of these methods is available; hence to address this paucity the present study was conducted.

Materials and Methods

In this retrospective study of MWL patients, we addressed patient satisfaction, gluteal pain, gluteal sensibility and major complications after lower back lift with autologous gluteal augmentation (n=26), in comparison with standard circumferential body lift in age- and gender-matched patients (n=30). Patient-related outcomes were assessed using the BodyQ® Buttocks Scale. Follow-up was 5 years.

Results

Overall patient-satisfaction was similar in the two groups. The lower back lift-group reported a significantly higher rate of gluteal pain (30%), compared with (0%) in the circumferential body lift-group, $p=0.0001$, as well as a significantly higher rate of altered gluteal sensibility (65%) vs. (31%), $p=0.02$. Major complications were observed in 12% in the lower back lift-group compared with 7% in the circumferential body lift group.

Conclusions

The results of the present study suggest that lower back lift with autologous gluteal augmentation lead to a significantly higher degree of gluteal pain and altered gluteal sensibility, compared with the circumferential body lift procedure. In future clinical decision making, these data could be taken into consideration, when offering lower body contouring after massive weight loss.

FOREIGN VISITING SURGEONS IN HUS HELSINKI UNIVERSITY HOSPITAL DEPARTMENT OF PLASTIC SURGERY 2014-2018

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Introduction

A visit or fellowship, often abroad, is a traditional part of surgical training. The Department of Plastic Surgery at Helsinki University Hospital receives several foreign residents, plastic surgeons, and other surgical specialists each year. The aim of our study was to investigate the reasons for choosing our unit, experiences of Finland in general and our department in particular, and ideas on how to develop our service.

Materials and Methods

An electronic survey was administered to 57 former visiting surgeons, that had visited Helsinki between 2014 and 2018. The results were analysed, and key areas to improve in were identified.

Results

35 former visitors (61%) completed the survey. The majority of respondents had spent >1 month in Finland. The average score for the visit was 4,7 out of 5. Positive feedback was given for the attitude of hospital staff towards visiting surgeons, the lack of hierarchy, the size of our unit, and the broad repertoire of reconstructive surgery performed. Negatives were the high cost of living in Finland, cold weather, and surgeries being divided between several hospitals. Some respondents would have liked a clearer orientation at the start of their visit, as well as more responsibilities in preparing presentations or during ward rounds. A more active social programme was also suggested. The vast majority of respondents wished to have an official certificate for the time spent in Helsinki.

Conclusions

Foreign visiting surgeons are on average very satisfied with their stay in Helsinki. Advantages of the Finnish system are a relaxed work culture that encourages discussion, and a low hierarchy between residents and specialists. Visiting surgeons are ambitious and used to a fast-paced work environment and need to be challenged in order to get the most out of their visit. Everyone benefits from a successful visit abroad - both the visiting surgeon and the hosting institution!

PLICATION SUPPORTED BY MESH (PSUM) -TECHNIQUE FOR SYMPTOMATIC ABDOMINAL RECTAL MUSCLE DIASTASIS REPAIR WITH OR WITHOUT CONCOMITANT MIDLINE HERNIA

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Introduction

Abdominal wall midline hernia combined with abdominal rectus muscle diastasis (ARD) is a common complaint in women after childbirth. To some individuals ARD causes functional disability. Fascia heals poorly, and primary closure of ventral abdominal wall hernias is accompanied with 9% recurrence rates. After suture repair of primary hernia the concomitant ARD predisposes to midline hernia recurrence and therefore, mesh augmented repair is recommended. Convincing data of the long-term results of ARD repair are lacking especially when ARD is severe. This abstract reports a novel surgical technique aimed at reliable and minimally traumatic repair of ARD with or without midline hernia.

Materials and Methods

37 patients with symptomatic ARD with (19) or without (18) concomitant midline hernia were operated on using a narrow piece of a self-gripping mesh (32) or the tails of preperitoneal mesh (5). Patients were slim (mean BMI 23.7 kg/m²) and ADR were wide (mean 5.2cm) The mesh was placed in between the plicated linea alba. A standard abdominoplasty was performed in 14 cases and a modified abdominoplasty in 11 cases. In 12 patients a herniorrhaphy was performed without abdominoplasty. The outcome and patient satisfaction in this pilot study were analyzed.

Results

The mean follow-up was 13 months. There was one recurrence of ARD in the follow up period. A hematoma after abdominoplasty required reoperation in two patients. A significant subjective improvement in body balance after surgery was reported by 34 patients (92%).

Conclusions

The PSUM mesh augmentation is a novel, minimally invasive surgical procedure for treatment of patients with abdominal rectus diastasis with or without concomitant abdominal wall hernia. In this preliminary study the complication rate was low and patient satisfaction good.

COLOUR DOPPLER ULTRASOUND AND COMPUTED TOMOGRAPHIC ANGIOGRAPHY FOR PERFORATOR MAPPING IN DIEP FLAP BREAST RECONSTRUCTION REVISITED

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Introduction

Preoperative imaging by Computed Tomographic Angiography (CTA) has been promoted as gold standard tool for perforator mapping in abdominally based microsurgical breast reconstruction, while Colour Doppler Ultrasound (CDU) has lost its popularity. CDU is usually cheaper and can potentially be performed by the surgeons themselves. CTA X-ray exposure can be avoided, which is of even more significance in a younger patient population seeking risk reducing surgery for e.g. BRCA mutation. The goal of this study was to compare the value of CDU and CTA in predicting intraoperative perforator selection.

Materials and Methods

We performed a retrospective chart review of patients who underwent microsurgical breast reconstructions with DIEP flaps at one institution. CTA and CDU were both routinely performed prior to surgery. Perforator identification, number, size and location were assessed analysing operative reports and correlated with CTA and CDU findings.

Results

Ninety-eight patients were identified who underwent 125 DIEP flap surgeries. A significantly stronger correlation was found between CDU findings and intraoperative perforator detection. This was true for perforator size ($p < 0.0001$) and selection ($r = 0.9987$, CI 0.9981-0.9991, $p < 0.0001$ and $r = 0.01$, CI -0.18-0.2, $p = 0.91$, respectively), when compared with CTA data. If none of the preoperative imaging studies matched intraoperative perforator selection, an increase of microvascular complications (Odds ratio 4.483, CI 0.5068 - 39.65, $p = 0.2171$) was found.

Conclusions

Preoperative imaging is considered part of the gold standard in microsurgical abdominally-based breast reconstruction. Our data suggests that CDU might regain relevance as a safe and reliable preoperative imaging study.

ASSESSING BREAST ANIMATION DEFORMITY FOLLOWING DIRECT TO IMPLANT BREAST RECONSTRUCTION

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Introduction

Following immediate breast reconstruction, a high incidence of Breast Animation Deformity (BAD) has been reported in women with subpectoral placed implants. The aim of this study was to assess and compare the incidence of BAD in women reconstructed by either subpectoral or prepectoral direct to implant breast reconstruction (DTI). For the purpose of this we developed a grading tool and tested the reproducibility in a clinical setting.

Materials and Methods

Video recordings of 37 women who had undergone unilateral or bilateral DTI were evaluated by two independent consultant plastic surgeons. The degree of BAD was assessed by our own grading tool evaluating the degree of tissue distortion in three areas of the breast; Nipple, Surrounding skin, Entire Breast (NSE) grading scale. The assessment was blinded and performed twice by each observer.

Results

Eighteen patients were reconstructed by subpectoral implant DTI and nineteen by prepectoral DTI. When using the NSE grading scale, we found a significant difference in the degree of BAD between the groups, in favor of patients reconstructed by prepectoral DTI (0.2 vs 4, $P=0.0001$). The inter- and intra-observer agreements were moderate (74%) to strong (88%) using the NSE scale for evaluation of BAD.

Conclusions

The incidence of BAD was significantly lower and less severe in women reconstructed by prepectoral DTI compared to women reconstructed with subpectoral DTI. All patients reconstructed by the subpectoral technique had some degree of BAD. The inter- and intra-observer agreements were high when using the NSE grading scale, suggesting that it is an easy to use, reproducible scale for assessing BAD in DTI reconstructed women.

15 YEARS OF ADIPOSE DERIVED STEM CELLS IN PLASTIC SURGERY: PAST, PRESENT, AND FUTURE.

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Introduction

Since first reports in early 2000s, Adipose Derived Stem Cells (ADSCs) have become a major focus of plastic surgery research and care. We analyzed how the field has evolved over time, placing an emphasis on three aspects: scholar scientific production, translation into clinical care and therapies, and commercialization potential. This research aims to highlight trends that could help guide future research efforts, and the optimization of ADSCs-based clinical therapies.

Materials and Methods

We used Pubmed and Web of Science to analyze all publications and citations related to research on ADSCs. Some of the tracked parameters included: first/senior authors, institutions, geographic and chronologic distribution, topic, journals, and citations. We used public registries (e.g., Clinicaltrials.gov) to analyze available data on clinical studies using ADSCs, using the same parameters reported above. Finally, we analyzed publicly available data on patents related to ADSCs filed/assigned in this same time-period and reviewed information on assignees.

Results

Research on ADSCs has steadily increased over years, yet publications and citations have recently been plateauing. Basic science and clinically-oriented research are almost equally represented. The U.S. have shown a strong leadership in the field, despite China is becoming a major contributor. Plastic Surgery accounts only for a portion of research on ADSCs: within the discipline, a stronger focus is on fat grafting. Registered clinical research using ADSCs has been increasing in the last 5 years: the vast majority of trials are based in the U.S. and are industry-sponsored. Private companies hold most intellectual property rights on ADSCs, despite regional differences are observed.

Conclusions

Translation of ADSCs research from the bench to the bedside has been steadily increasing and spreading in the last decade. Fat grafting is a major area of interest; yet, cross-disciplinary efforts are contributing to the advancement of the field. As this process continues, industry is assuming a more prominent leadership.

SENSATE FREE ALT FLAP FOR FOOT RECONSTRUCTION IN PEDIATRIC POPULATION

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Introduction

The myriad of anterolateral thigh (ALT) in adult reconstructive microsurgery is well established, especially in the lower extremity. In the opposite side, the publication in pediatric lower extremity reconstruction is still limited. The aim of this study is to focus on the possibility of using the sensate free ALT flap for reconstruction of soft tissue defects in the foot. Retrospective analysis of all patients who underwent sensate free ALT for lower foot reconstruction in the last 4 years with the least follows up 2 years postoperatively.

Materials and Methods

The study included 23 patient aged 3.2 -14.6 years with a mean of 9.4 years. All patients had crush injuries after run over motor vehicle accidents. All flaps were raised in sub facial plane and included one or two branches of the lateral cutaneous nerve of the thigh.

Results

Nerve anastomosis was done over sensory nerve around the ankle while vascular anastomosis on the anterior tibial vessels. No thinning was performed prior to flap inset. Mean Flap surface area was 123.2 cm². 60 % of the donor site required a skin graft. Primary flap survival rate was 100%. Post-operative hospital stay averaged 7.2 days. Sensory recovery in nearly 0.95 of the cases as tested by the pinprick test and two-point discrimination of the new flap.

Conclusions

We suggest that sensate free ALT flap could be as safe, reliable, and aesthetically appealing option for foot/ankle resurfacing in children after traumatic soft tissue loss

PATIENT HEIGHT, WEIGHT, BMI AND AGE AS PREDICTORS OF GRACILIS MUSCLE FREE-FLAP MASS IN LOWER EXTREMITY RECONSTRUCTION

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BACKGROUND: Gracilis muscle flap is commonly used for the reconstruction of defects of the lower extremities. Preoperative evaluation of gracilis muscle dimension is a key aspect in surgical planning. This study aimed to determine whether patient height, weight, body mass index (BMI) and age are reliable proxy measurements of the mass of gracilis muscle flap.

PATIENTS AND METHODS: Twenty-two patients treated for lower extremity reconstruction with free gracilis flap between December 2010 and December 2014 were considered. The relationships between the mass of gracilis muscle and patient height, weight, BMI and age were assessed with Pearson's product moment correlation coefficient. Defect size, mass of gracilis muscle resected and surgical outcomes were also evaluated.

RESULTS: There was a moderate correlation between the mass of the gracilis muscle and patient height ($r=0.4$), weight ($r=0.4$), and BMI ($r=0.3$), and moderate inverse correlation with age ($r=-0.04$). Lower extremities defects ranged in size from 3×4 cm (12 cm²) to 26×11 cm (286 cm²) with a mean of 81.6 cm². All defects were reconstructed with the gracilis muscle, which required a resection ranging between 3 g and 105 g (mean=37.4 g) to adapt the flap to the recipient site. Complete flap loss was observed in one case.

CONCLUSION: In our series, the mass of the gracilis muscle flap was predictable in relation to height, weight, BMI, and age, which can be considered reliable proxy measurements. This will contribute to adequate flap selection for microsurgical reconstruction of lower extremity defects.

THE CIRCUMFLEX SCAPULAR ARTERY PERFORATOR (CSAP) FLAP - CLINICAL UTILITY AND TECHNICAL REFINEMENT

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Introduction

The Circumflex Scapular Artery Perforator (CSAP) flap was first described by our unit (cadaveric anatomy, radiological description, clinical proof of principle). A larger series now permits mature clinical description of this predictable, versatile, robust, and non-hirsute flap. Refinements in surgical technique and clinical knowledge of its anatomy and applications are described.

Materials and Methods

Retrospective case series. Prone / lateral position. CSAP located using surface markings and handheld Doppler. Flap then designed for the required skin characteristics (medially for thicker dermis, laterally for thinner skin). From one margin a branch of the circumflex scapular artery is located. Dissection proceeds retrogradely until one or more CSAP is identified and skeletalised. The remaining flap is then raised in Scarpa's plane, and intermuscular CSA pedicle dissection continued until sufficient reach / calibre is obtained. Options exist for chimeric inclusion of bone, adipofascial, and muscle flaps. Primary thinning completed prior to pedicled or free (n=17) transfer.

Results

43 flaps in 40 patients, aged 3-75 years. Indications include axillary hidradenitis suppurativa (16), burn contracture, trauma, post-oncological reconstruction, primary / secondary hand / limb reconstruction, osseoplastic thumb reconstruction, congenital hand surgery, adjunct to nerve surgery. Flap dimensions 8x3cm - 30x9cm (5 chimeric), based on 1-4 perforators. Head & neck, axillary, upper & lower limb, hand recipient sites. No flap failure. Reconstructive aim achieved in all cases. One partial flap necrosis required re-advancement. One delayed healing. Flaps survived subscapular axis ligation (1), infection (3), axillary vein thrombosis (1; Darier's Disease). Donor site morbidity minimal, 1 re-explored for haematoma.

Conclusions

The CSAP flap predictably provides high quality non-hair-bearing skin, with a predictable pedicle that neither requires intra-muscular dissection nor compromises muscle flaps. Surface markings are reliable, and flap outcomes excellent. It is highly adaptable due to the differing thickness of skin harvestable, safe primary thinning, multiple chimeric options, and reliable pedicled or free transfer.

DORSAL ROOT GANGLION CULTURE FOR NOCICEPTIVE AND PERIPHERAL NERVE INJURY MODELING: IMPROVING SENSORY NEURON ACCESS AND AVAILABILITY

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Introduction

The poor translational specificity of murine models hinders progress in nerve injury and pain research. A critical need, and 3Rs case, exists for human data earlier in research pipelines. We present a 5-year programme (CrackIt DRGNet), modelled from porcine data, to retrieve human dorsal root ganglion neurons (hDRG) from transplant donors.

Materials and Methods

NHS Blood & Transplant (Scotland) processes enabled surgical retrieval of hDRG following solid organ retrieval. Cell extraction / culture protocols reflected porcine modelling (pDRG; ~150kg Landrace). Cellular yield was quantified. Output was characterised by histochemistry and single-cell electrophysiology.

Results

Favourable ethical / legal assessment, mean 82% donor authorization. Median 22 hDRG retrieved/donor (pre-retrieval ischaemia 133min, range 67-257; post-retrieval ischemia 118 minutes, range 55-175min). Yield was low (median 20,966 neurons, range 5670-44400) but after 4 days in culture neurons persist (viable >4 weeks). Neuronal phenotype is maintained. Cryopreserved then thawed neurons are viable, but better survive shipping (50-750 miles) when plated / in suspension. A remarkably ischaemia tolerant neuronal population exists: post-mortem, pDRG retain comparable viability, morphology, and electrophysiology after 24 vs. 48 hours warm anoxia, with minimal loss vs. 3 hours. T.E.M., timelapse imaging, qPCR and metabolomics data provide mechanistic insight. hDRG exhibit homologous findings.

Conclusions

Significant ethical, practical, and biological barriers were overcome. Protocols will be offered internationally to enhance translational research. Neuronal ischaemia data offers high impact cross-cutting research options.

EVALUATION OF A GUIDED NERVE REPAIR USING MULTI-LUMEN ALIGNED NANOFIBRILLAR SCAFFOLD IN A RAT MODEL

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Introduction

Autologous nerve grafting remains the gold standard reconstructive approach in a nerve segmental loss. In the present study we compared i) the BioBridge® bioabsorbable multilumen aligned nanofibrillar collagen scaffold (CS), ii) the Neuragen® porous collagen nerve guide tube (CT), iii) a combination of BioBridge® into a Neuragen® tube (CS+CT), with iv) the autologous nerve grafting (AN), using neurophysiologic and histopathologic analyses.

Materials and Methods

A 10-mm sciatic nerve defect was created from the right hind limb of 32 male Wistar albino rats. Four groups (8 rats in each group) were used: i) the AN, ii) the CS, iii) the CT, and iv) the CS+CT. All animals were evaluated before and 4, 8, 12 weeks postop for a walking track analysis (WTA) using the Sciatic Function Index (SFI), and an electric stimulation analysis (ESA) for motor nerve recovery in 3 different rat's paw points (proximal, middle, distal). Finally the nerve specimen was histologically analyzed.

Results

For the WTA, the SFI showed a statistical significant difference at 3 months between groups AN vs CT ($p=0,000$), and CS+CT vs CT ($p=0,016$). Also at 3 months period the ESA revealed a statistical significant difference between CS vs CT ($p=0,035$) at the proximal paw point, and AN vs CT ($p=0,000$), CS vs CT ($p=0,014$), CS+CT vs CT ($p=0,011$) at the middle paw point. The histological analysis indicated a high proliferation of Schwann cells and alignment of myelinated fibers in the CS and CS+CT groups. The number of nerve fibers, axon diameter, and myelin thickness were also found in favor at the same groups.

Conclusions

The CS with or without CT produced comparable results, which were significantly better than CT alone. The first preclinical study of the multilumen aligned nanofibrillar collagen scaffold in nerve reconstruction recommended that the CS represents a reliable alternative to nerve grafting.

DISTINCT EFFECT OF NEUROTROPHIC FACTORS ON NEURONAL PROTECTION AND AXONAL OUTGROWTH

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Introduction

The promotion of axonal survival and outgrowth is crucial in order to ensure peripheral nerve regeneration and has therefore been subject of intensive research during the past 20 years. One of the factors that drive neurite elongation are neurotrophic factors (NTF) which are retrogradely transported from the injured axonal tip to the neuronal cell soma. In this in vitro study, these survival and growth stimulatory factors were to be investigated for their neurotrophic potential on chicken embryonic dorsal root ganglia (DRG).

Materials and Methods

DRG explants from 10 days old chicken embryos were isolated and cultured in culture medium enriched with either nerve growth factor (NGF), glial cell line-derived neurotrophic factor (GDNF), brain derived neurotrophic factor (BDNF), ciliary neurotrophic factor (CNTF), neurotrophin-3 (NT-3) or neurotrophin-4 (NT-4) at a concentration of 10ng/ml. As control, DRG explants were grown in NTF-free culture medium. After 48h of incubation time, axonal outgrowth was visualized by tubulin beta-III immune staining and the growth response was quantitatively analyzed by measuring the length and area of neurite outgrowth.

Results

Striking differences can be observed in the axonal outgrowth of DRG explants for distinct experimental conditions in terms of axonal count, elongation, density and branching. Interestingly, NT-3 and BDNF exerted the most potent neurotrophic effect as evidenced by axonal length and growth-area when compared to all the other conditions.

Conclusions

This in vitro study revealed the regenerative potential held by NT-3 and BDNF that even exceeded the stimulatory effect of potent and widely acknowledged growth factors such as NGF and GDNF. Further experiments in order to study the growth kinetics and the cell survival rate of NT-3 and BDNF treated neuronal cells are in progress.

IDENTIFICATION OF THE INDIVIDUAL AND JOINT CONTRIBUTION OF THE SENSORY NERVES TO THE SENSATION OF THE BREAST AND THE NIPPLE-AREOLA-COMPLEX

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Introduction

The altered feeling in the reconstructed breast often comes as unexpected for breast cancer patients, and negatively affects the physical and mental well-being and the quality of life (QoL). Improving QoL can be attempted by improving sensation in the autologous reconstructed breast by performing a sensory nerve anastomosis. Better sensation in the reconstructed breast is associated with improved QoL. The aim of this study was to evaluate which intercostal nerve would be most suitable for sensory nerve coaptation during autologous breast reconstruction.

Materials and Methods

A case study was performed at the Maastricht University Medical Center on a healthy 22-year old female. The areas supplied by the intercostal nerve levels 2 to 5 were studied. Both individual and joint contribution was evaluated, on two separate occasions. Level 2 and 5 on the right side and level 3 on the left side were studied the first occasion. Level 4 on the right and all levels on the left side were studied the second occasion. Lidocaine was sonographically guided into each intercostal space at the targeted nerve. The desensitized area was marked out on the skin.

Results

The first measurement showed that the left 3rd intercostal nerve supplied the largest skin area, which was located in the upper-inner-quadrant (UIQ) and lower-inner-quadrant (LIQ), extending up to the areola. Sensation in the nipple-areola-complex (NAC) itself was not affected. The second measurement showed a bigger area supplied by the right 4th intercostal nerve, also located in the UIQ and LIQ, not affecting the NAC. However, blockage of all levels did affect sensation in the medial half of the areola.

Conclusions

Only blockage of all levels affected areola sensation, suggesting a nerve plexus supplying the NAC. The largest individual area was supplied by the 4th intercostal nerve, making it the most suitable for sensory nerve coaptation in autologous breast reconstruction.

VALIDATION OF NF1 AS A DISEASE EXCLUSIVE TO SENSORY NERVES

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Introduction

Much recent interest in plexiform NF1 has focused on pathogenetic origin, cellular pathology, and animal modeling. There has not, however, been research confirmation that NF1 is limited to sensory nerves. This study attempts to analyze recent laboratory and clinical findings which may confirm that NF1 is not expressed in motor nerves, as postulated by the author.

Materials and Methods

The study comprises review and analysis of the research literature of the past 20 years and the long term clinical findings of 40 consecutive surgical patients of the author who demonstrated pathologically confirmed plexiform NF1 tumors. Tumors included those of both central and peripheral nervous system origin.

Results

The clinical patients demonstrated 100% involvement of sensory nerve tissue. There was no demonstrable involvement of motor nerve axons either clinically or pathologically. The research literature is either equivocal regarding strict motor nerve pathology outside the brain, or the findings are non-categorical vis-a-vis motor versus sensory involvement. Adults who underwent radical tumor nerve excision (Sunderland Type V axonotmesis) demonstrated virtually no evidence of local recurrence of tumor. Children undergoing similar procedures showed a preponderance of non-local recurrence of tumor.

Conclusions

The pathology of plexiform NF1 in humans and in laboratory animals appear to be similar, although laboratory tests are compromised by non-confirmation of shared genetic pathology and a lack of longitudinal analysis. The premise that NF 1 is exclusive to sensory nerves contradicts some published laboratory findings, but is strengthened by the clinical portion of this study; and it is the basis of the further need for laboratory confirmation. Plexiform NF1 and malignant peripheral nerve sheath tumors are highly destructive and lethal. Understanding their true origin and permanent treatment/prevention remain vital.

DANGER ZONES FOR NERVE INJURIES IN PERCUTANEOUS NEEDLE FASCIOTOMY FOR TREATMENT OF DUPUYTREN'S CORDS

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Introduction

Percutaneous needle fasciotomy (PNF) is a minimally invasive option to treat Dupuytren's cords but carries some risk of injury to digital nerves (DN). We performed an anatomical study to identify danger zones.

Materials and Methods

Sixteen fresh-frozen below elbow specimens were dissected to investigate the relative position of DNs and longitudinal fibres of palmar aponeurosis.

Results

The radial index finger DN and ulnar little finger DN lie along the outer boundaries of the palmar aponeurosis. The common DN to index and middle fingers crossed longitudinal fibres in 4/18 specimens and otherwise ran between the respective tendons, not crossing longitudinal fibres. The common DN to ring and little fingers originates from the ulnar nerve ulnar to the little finger flexors and moves to their radial side proximal to the transverse fibres. It crosses tendons deeply and longitudinal fibres superficially mid-way between the distal margin of the carpal tunnel and the transverse fibres. The common DN to middle and ring fingers less predictably crosses the flexors of the middle finger distal to the carpal tunnel. In six cases this crossing did not occur. The 3rd ray pretendinous band does not lie exactly above the tendons, and the crossing with the band can be more distal.

Conclusions

Two "danger zones" for nerve injuries were identified within the quadrangular area of the palmar aponeurosis, at risk in proximal pretendinous cord PNF. PNF in the 1st web space should be safe if performed within and at some distance from the lines of the distal margin of the flexor pollicis brevis and the radial margin of the index finger. The risk of nerve damage can be minimized with the use of focal subdermal injections of tiny volumes of local anaesthetic at needling ports - this does not anaesthetise nerves and allows constant monitoring for nerve symptoms.

PERFORATOR TO PERFORATOR VASCULARIZED SURAL NERVE FLAP USING SUPERMICROSURGERY IN EXTREMITY RECONSTRUCTION

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Introduction

Vascularized nerve grafts are superior to traditional nerve grafts, particularly in a scarred recipient bed. Longer defects are best repaired primarily with vascularized tissues, and a vascularized sural nerve is one option. In our series, we investigated the harvest of the vascularized sural nerve flap (VSNF) based only on one gastrocnemius perforator for the reconstruction of different nerve defects.

Materials and Methods

Nine patients with evident nerve injuries were diagnosed clinically and confirmed by nerve conduction, and EMG studies were performed. The VSNF was divided and folded to bridge the desired girth. Anastomosis was performed as perforator to perforator concept using supermicrosurgery.

Results

The average nerve gap was 9.1 ± 1.1 cm. The VSNF was used to reconstruct peripheral nerve injuries in the extremities of the patients, including 5 cases of median nerve injury, 2 of posterior tibial nerve injury and 2 of peroneal nerve injury. The main cause of injury was machinery accidents (67%). The average harvested VSNF was 25.2 ± 4.2 SD cm, with a range of 20 to 31 cm. The follow-up period was 26.4 ± 2.6 months.

Conclusions

The use of a VSNF is a very promising solution for the treatment of long gapping neuroma in peripheral nerves. The sural nerve flap is one of the best donor sites with constant anatomy. Supermicrosurgery allows a very short pedicle to be anastomosed without deep muscular dissection.

EFFECTS OF VARIOUS SELECTIVE NERVE TRANSFERS ON THE ADULT AND NEONATAL MOTOR UNIT

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Introduction

Selective nerve transfers (SNTs) have been used extensively for the past decade to treat slow nerve regeneration, neuroma pain and improve prosthetic control. SNTs change the motor unit extensively by connecting motor neurons to new functional targets. Good outcomes have been reported but little is known of the structural and functional effects. Our laboratory has conducted several experimental studies to investigate the effects of SNTs on the different motor unit levels. Therefore an overview of the latest results shall be presented.

Materials and Methods

In male OFA-rats the ulnar nerve (UN) and an even more selective fascicular group, the deep branch of the ulnar nerve (DBUN) were selectively transferred to the long head of the biceps. These transfers were not only performed in adult but also in neonatal rats within 24 hours after birth. After 12 weeks of nerve regeneration neurophysiological effects were assessed by tetanic muscle force, MUNE, retrograde labelling, muscle fiber typing, neuromuscular junction staining and immunohistochemical staining to quantify axon population.

Results

The various nerve transfers successfully reinnervated the biceps muscle in all animals. Compared against the UN-transfer in the DBUN-group equivalent regeneration was found. Impressive changes on all levels of the motor unit were depicted. Most interestingly functional and structural hyperinnervation of the muscle was thereby evaluated. Retrograde labeling and motory axon quantification of the nerves offered valuable clues on how much donor nerve is needed to restore elbow function.

Conclusions

Transferring various high capacity donor nerves, and exploring the effects on the motor unit provides us with a deeper understanding of the neuronal plasticity of the peripheral nervous system. Especially when comparing the neonatal to the adult rat model a glimpse of the enormous potential can be caught. As SNTs play a major role in extremity reconstruction findings of these studies might further help to improve clinical approaches.

FASCICULAR SHIFTING IN THE RECONSTRUCTION OF GLOBAL OBSTETRIC BRACHIAL PLEXOPATHIES - FROM BENCH TO BEDSIDE

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Introduction

Several models have investigated different biological and synthetic matrices as alternatives to conventional nerve grafts. However, the autologous nerve graft remains the gold-standard, even though here a pure sensory nerve is used to reconstruct mixed or pure motor nerves. Furthermore, limited donor sites often necessitate a significant mismatch of needed nerve tissue. Here we present a new concept that overcomes these problems: the fascicular shift procedure. A fascicle group of the nerve segment distal to the injury site is harvested in appropriate length to bridge the injury site

Materials and Methods

The fascicular shift was compared to nerve reconstruction with sensory, motor and mixed nerve grafts in the rat model. Nerve regeneration was assessed by functional muscle testing, histomorphometry and retrograde labelling. To evaluate clinical applicability and potential graft lengths in the brachial plexus an anatomical study was conducted consecutively. This presentation, however, will mainly focus on the long-term follow-up of four obstetric brachial plexopathies, who received fascicular grafts.

Results

The fascicular shift provided sufficient guidance to overcome nerve defects and had higher motor neuron counts compared to sensory grafts. Since a fascicular graft requires a corresponding nerve thickness to enable regeneration and a maintainable graft length only the median, radial, ulnar and suprascapular nerve were found to be appropriate donor nerves in the brachial plexus. In the three-year follow-up satisfying recovery was found in all patients, which was evaluated by various hand scores. In the five-year follow-up outcomes further improved.

Conclusions

Experimental investigations and clinical results both show that harvesting a transplant from the nerve segment distal of the injury site provides a mixed graft without causing additional donor-site morbidity. These grafts perform statistically better than a standard sensory graft regarding motor recovery. The fascicular shift presents a novel method to reconstruct large proximal nerve defects, and hence, is immensely attractive in brachial plexus reconstruction.

FROM BEDSIDE TO BENCH: THE EFFECT OF MUSCULAR DENERVATION ON FAT GRAFTING TO THE BREAST BY COMPARING TAKE RATE, QUALITY, AND LONGEVITY

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Introduction

Autologous fat grafting (AFG) to the breast is a frequent procedure in aesthetic and reconstructive surgery. Despite pure volume gain, questions remain regarding the engraftment rate, quality, and longevity. Little is known about the role of recipient tissue or innervation of the grafted area. The goal of this study was to determine the optimal recipient layer and muscular pretreatment of AFG.

Materials and Methods

Fat was grafted to the breast, pectoralis muscle, or adjacent subcutaneous tissue of 42 rats. Nerve treatment included excision of a nerve segment, botulinum toxin (BTX) injection, or no treatment. Magnetic resonance imaging (MRI) and histological workup were carried out after 2 and 6 weeks.

Results

Six weeks after AFG, the proportion of viable fat cells within the grafted fat stayed high (median, [IQR]: 81% [72% to 85%]). The signs of inflammation decreased over time. Intramuscular grafting with intact nerves had a decreasing effect on the viability of the grafted cells compared with subcutaneous treatment (-10.21%; 95% confidence interval [-21.1 to 0.68]).

Conclusions

If utilized on an intact nerve, intramuscular injection may lead to inferior results. If the nerve was cut or treated with BTX; however, intramuscular injection tends to be superior. These findings may prove interesting for future studies and eventual clinical application.

AN ALLOGENIC 3D SCAFFOLD-FREE TISSUE ENGINEERED PRODUCT FOR DEEP THICKNESS SKIN REGENERATION: IN VITRO DEVELOPMENT TO IN VIVO PROOF OF CONCEPT.

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Introduction

Deep thickness skin wound remains a major challenge for reconstructive surgery. A novel approach of tissue engineering, based on an allogeneic adipose-derived 3D scaffold-free technology, was proposed.

Materials and Methods

Adipose-derived stromal cells (ASCs) were isolated from human adipose tissue to constitute the 3D-scaffold free graft by the production of the extracellular matrix (ECM, n=9). The ultrastructure of the graft was assessed by microtomography/SEM. The protein and growth factors contents were determined by proteomic analysis (LC-MS/MS) and ELISA, respectively. The in vivo biocompatibility (inflammatory reaction, biodegradation) was assessed in nude and Wistar rats up to 4 weeks (n=20) as well as the safety in terms of tumorigenicity/toxicity/biodistribution. The efficacy was then evaluated in a xenogenic (human to rat) model of ischemic (vs. non-ischemic) wound in hyperglycemic Wistar rats (n=42, 3D grafts vs. sham/Ctrl+).

Results

The 3D-graft is a translucent and malleable membrane with a mean of 175 ± 86 cells/mm² found to be embed in the ECM with a low level of mineralization ($0.30 \pm 0.31\%v/v$). The proteomic and genes analysis revealed the stimulation of the biological pathways involved in early wound healing and the over-expression of pro-angiogenic genes (ANG, ANGPT1, EPHB4, VEGFA, VEGFB, VEGFC, EDN1, THBS1, PTGS1, LEP) in the graft (in comparison to ASCs alone), respectively. The VEGF/SDF1a contents (181 ± 12 and 663 ± 27 ng/g, respectively) were also improved in the scaffold-free implant. The biocompatibility and the safety of the 3D-graft were confirmed at 4 and up to 24 weeks post-implantation, respectively. The 3D-graft was easily handled and applied (by a simple bandage) on the ischemic/hyperglycemic wounds (on the leg) and promoted an earlier wound closure (27 vs. 34 days for sham, respectively) associated with angiogenesis, dermis/epidermis reconstruction, transient and reversible increase of α SMA, lymphocytes/macrophages recruitment at 10-15 days.

Conclusions

The scaffold-free approach with allogeneic 3D-graft (derived from ASCs) demonstrated the safety and efficacy in stringent xenogenic model of hyperglycemic and ischemic deep-thickness wound.

ENDOTHELIAL CELL REPLACEMENT - A NOVEL PLATFORM FOR BIOENGINEERING OF PERSONALIZED VASCULAR COMPOSITE ALLOGRAFTS

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Introduction

Vascularized composite allotransplantation (VCA) is an emerging area of reconstructive surgery, involving transplantation of extremities, face, abdominal wall, larynx, penis and uterus. However, chronic rejection and long-term complications of lifetime immunosuppression remain key barriers in this field. Perfusion decellularization has been proposed as a promising method for generating non-immunogenic organs from allogeneic or xenogeneic donors, by removing the cellular content of an organ, leaving behind 3D extracellular-matrix with preserved ultrastructure and biochemical composition. However, the ability to recellularize cell-free VCA scaffolds with multiple patient-specific cell types in a spatially-controlled manner remains challenging. The aim of this study is to address these limitations by testing a modified decellularization technique. Our approach is based on the hypothesis that selective replacement of donor endothelial cells lining the VCA vasculature while preserving the remaining tissue intact and viable, may reduce immunogenicity and achieve tolerance.

Materials and Methods

Rat and porcine hind limbs were cannulated through the iliofemoral vessels and perfused in-situ under controlled flow conditions designed to selectively eliminate donor endothelial cells while keeping the remaining tissue intact and viable. Preservation of vascular patency was assessed in-situ by fluoroscopic angiography. Efficacy of cell removal has been assessed by histology. Stem cells isolated from human placentae were used to assess the ability to replace endothelial cells in rat limbs.

Results

Perfusion decellularization of limbs under controlled flow conditions resulted in successful selective removal of endothelial cells. Sub-endothelial tissues remained intact and viable. Placental stem cells readily engraft within de-endothelized limb vasculature. In-situ limb perfusion while keeping it in its native anatomical location yielded less peri-organ dissections and better control of perfusate leakage.

Conclusions

Our findings suggest that limited decellularization of donor endothelial cells followed by re-endothelization with non-immunogenic cells is feasible and may be used to generate possibly fully functional, tolerable VCA for transplantation.

ANORECTAL TRANSPLANTATION: THE FIRST LONG-TERM SUCCESSFUL REPORT IN A PRECLINICAL CANINE MODEL

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Introduction

Although anorectal transplantation is a challenging procedure, it is a promising option for patients who have completely lost or failed to develop their anorectum. In this study, we utilized a canine model of anorectal transplantation, evaluated the long-term outcomes, and controlled the rejection and infection in allotransplantation.

Materials and Methods

In the pudendal nerve functional study, six dogs were randomly divided into two groups: cut and anastomosis, and compared with a sham operated dog. In anorectal transplantation model, four dogs were assigned to four particulars: autotransplant, allotransplant with immunosuppression, allotransplant without immunosuppression, and normal control. In the both studies, macroscopic findings, anorectal manometry, and microscopic findings of the pudendal nerve and the sphincter muscle were evaluated.

Results

In the pudendal nerve functional study, anorectal manometry indicated the mean pressure of anastomosis group and resection group were significantly dropped compared to sham group after operation. Anastomosis group showed partial recovery from postoperative six months onward and resection group never showed recovery to end. The pudendal nerve and the sphincter muscle were regenerated and well-maintained in anastomosis group. Anorectal transplantation was technically successful with three-staged operative procedure. Anorectal manometry of transplanted dogs showed partial recovery from postoperative six months onward as well as the pudendal nerve functional study. Dog in allotransplant with immunosuppression was given tacrolimus and methylprednisolone after transplantation. He had two episodes of mild rejection, which were all reserved by methylprednisolone and tacrolimus treatment. Survived dogs took effective control of their defecation and the pudendal nerve and the sphincter muscle were microscopically regenerated and well-maintained.

Conclusions

We described the first long term outcome after anorectal transplantation in a canine model. This report is a proof-of-concept for anorectal transplantation as a treatment for ostomy patients due to anorectal dysfunction. Furthermore, the results show the feasibility of the first human trial in the future.

SINGLE-CELL TRANSCRIPTOMICS REVEALS A PATHOGENIC PROFIBROTIC MESENCHYMAL SUBPOPULATION DRIVING DUPUYTREN'S DISEASE

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Introduction

Dupuytren's disease (DD) is a common, progressive fibroproliferative disease affecting the palmar fascia of the hands and is a major cause of morbidity, resulting in both physical disfigurement and significant loss of function. Surgery is the mainstay of treatment for DD, but recurrence rates are high and currently there are no medical therapies available for DD. To obtain cellular resolution on the pathogenic cell types driving fibrosis in DD, we used scRNA-seq to profile the transcriptomes of 35,276 human single cells from DD, healthy patient matched control and human keloid scars, yielding molecular definitions for the major cell types within DD.

Materials and Methods

Fresh Dupuytren's tissue was washed and cut into 1mm pieces and incubated with digestion solution at 37 degrees for 30 minutes before analysis by FACS to ensure viability. Single cells were processed through the ChromiumTM Single Cell Platform using the ChromiumTM Single Cell 3' Library and Gel Bead Kit v2 (10X Genomics, PN-120237) and the ChromiumTM Single Cell A Chip Kit (10X Genomics, PN-120236).

Results

In total, we present scRNA-seq data from 3 human keloid scars, 3 Dupuytren's samples and 3 healthy skin samples (matched to the 3 Dupuytren's samples). Cells could be partitioned into 10 distinct clusters, which we visualized using t-distributed stochastic neighbourhood embedding (t-SNE). Clusters were annotated using signatures and integrating with known lineage markers. All datasets contained the major lineages, with excellent reproducibility between samples in each of the tissue types. Close interrogation of the mesenchyme revealed a disease specific subset of cells associated with Dupuytren's disease.

Conclusions

We uncover a novel mesenchymal subpopulation with a Dupuytren's disease-specific fibrogenic phenotype. Our work identifies a key pathogenic collagen-producing mesenchymal subpopulation driving Dupuytren's disease, which should facilitate the design of rational, highly-targeted antifibrotic therapies for patients with this debilitating condition.

HIGH-THROUGHPUT FABRICATION OF SPHEROIDS FOR 3D BIOPRINTING VASCULARIZED ADIPOSE TISSUE

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Introduction

For patients with soft tissue defects, repair with autologous in vitro-3D bioprinted adipose tissue constructs could be a promising alternative to current surgical therapies. The layer-by-layer printing process allows specific and high-throughput placement of cells. One method that can accelerate the process of early vascularization in vivo is the preformation of vascular networks within engineered tissue constructs in vitro, also referred to as prevascularization.

Materials and Methods

In the first step, an ASC/HUVEC-co-culture-spheroid model was explored, that would enable both adipogenic differentiation while simultaneously supporting the formation of presvascular-like structures. After validation, this model was tested for encapsulation and 3D bioprinting. In short, 23.000 ASC/HUVEC-co-culture-spheroids were suspended in 1.5 ml 10% w/v GelMA (DS 78%)/Li-TPO-L-solution. The cell-laden GelMA was subsequently bioprinted (3DDiscovery©, 23 °C, 0.200 MPa, 5 mm/s) in squared scaffolds of 13 mm² and 0.8 mm high. This model was validated in terms of proliferation and differentiation through immunohistochemistry and -fluorescence (CD31/perilipin), morphometric evaluation, live/dead assays, inverted (fluorescence) microscopy, oil red o staining and RT-qPCR (PPARG, FABP4). All tests were independently repeated three times and results submitted for statistical analysis.

Results

The co-culture-spheroids showed a multivacuolar and polyhedral morphology, indicating adipogenic differentiation, confirmed by RT-qPCR, as well as presvascular-like structures in all assays. Encapsulated and 3D bioprinted spheroids showed a steady 90% cellular viability up to 14 days. The constructs were positive for specific adipogenic and vascular markers 14 days post-printing and showed spheroid sprouting and fusion.

Conclusions

This is the first study that successfully generates viable high-throughput 3D bioprinted prevascularized adipose tissue constructs using a novel ASC/HUVEC-co-culture-spheroid model as building blocks, which enables both adipogenic differentiation in vitro while simultaneously supporting the formation of presvascular-like structures within engineered tissues in vitro. This model lays the foundations for further research in the field of vascularized engineered adipose tissues for reconstructive surgery.