

## **First robotic-assisted breast reconstructions using a novel robotic microscope**

ID: 487

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### **Background:**

Robotic-assisted surgery (RAS) has evolved over the past decades and become part of clinical routine. Currently, novel robotic systems for microsurgery are being launched onto the European market. This robotic microscope (RoboticScope<sup>®</sup>, BHS, Innsbruck, Austria) is a high-definition camera system, connected to an augmented reality headset, projecting a clear image with high magnification in front of the surgeon's eyes. Motion tracking translates the surgeon's head movements onto the system via a multi-axis robotic arm. We report the first use of the robotic microscope for autologous breast reconstruction in humans.

### **Materials and methods:**

In 2020, ten autologous breast reconstructions were performed. Five reconstructions (three PAP flaps, one bilateral DIEP flap) were conducted with the robotic microscope and matched to five reconstructions using a conventional microscope. We compared ischemia times, times for arterial and venous anastomosis, and complications

### **Results:**

All procedures were performed successfully and safely. Overall time for anastomosis was 31.02 min (+/- 6.62 min) in the robotic group and 25.04 min (+/- 6.91 min, p= 0.30) in the control group. Flap ischemia was 53.50 min (+/- 7.63 min) in the robotic group and 51.6 min (+/- 21.74 min, p= 0.87) in the control group. No intraoperative complications such as venous thrombosis or arterial embolism occurred.

### **Conclusion:**

Robotic microscopes provide the technology to combine flexibility to choose different angles during pedicle preparation and improve the stationary procedure of vessel anastomosis. Novel robotic systems tailored towards refinement in microsurgery hold great potential for implementation in Plastic Surgery procedures.

## **Surgical treatment of abdominal symptoms in a case of Ehlers-Danlos syndrome**

ID: 562

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### **Background:**

Ehlers-Danlos syndrome (EDS) is a heterogeneous group of hereditary connective tissue disorders characterized by varying degrees of skin hyperextensibility, joint hypermobility, and generalized skin fragility. It may also affect vasculature, muscles, ligaments, tendons and internal organs. EDS results from defects in the synthesis of collagen with variable clinical presentations. Gastrointestinal manifestations are frequent in most subtypes of EDS, including dysautonomia, hiatal hernia, rectal evacuation disorder, diverticulosis, gastritis, constipation, diarrhea, nausea, vomiting, abdominal pain, and reflux disease. The most common gastrointestinal symptom in EDS is abdominal pain. Conservative treatment is regarded the standard of care.

### **Materials and methods:**

A 43-year-old female patient with genetically confirmed EDS classic subtype presented with diffuse gastrointestinal symptoms (bloating, belching and pain) that were controlled by the patient through inclined posture and external abdominal compression. She had been treated before for recurrent visceral ptosis by various pexy procedures. The patient also suffered from posture related tachycardia that had been treated with a  $\beta$ -blocker for 6 years. A standard abdominoplasty with rectus muscle plication and mesh implantation was performed with uneventful healing.

After 7 years, the patient was again seen with severe, persistent abdominal pain and inclined posture. Elevation of the right arm was painful and limited to below shoulder level. There was no abdominal, back or neck pain and no recurrence of previous gastrointestinal symptoms. However, the lumbar pain was debilitating and could be ameliorated only by wearing an abdominal compression belt and adopting an inclined posture. Physical examination revealed a right lumbar swelling at the lumbotomy scar with moderate pain on palpation and pressure. Upper lumbar (Grynfeltt) and lower lumbar (Petit) herniations were confirmed by MRI. However, there was no recurrence of the previous abdominal midline weakness and related gastrointestinal symptoms. Open lumbar hernia repair and mesh implantation was performed with uncomplicated healing.

### **Results:**

The abdominoplasty resulted in immediate and complete relief of symptoms, which allowed the patient to assume an upright posture and enabled her to resume all daily activities again. At 12 months follow-up, the patient reported no bloating, belching, back or neck pain. She had resumed her previous sports activities. Also, the tachycardia ceased and the  $\beta$ -blocker was discontinued.

Open hernia repair with mesh implantation allowed the patient to ambulate in upright posture without the need of a walking frame on the day of surgery. She reported complete and persistent relief of lumbar pain and recaptured full elevation of the right arm above shoulder level at 6 months follow-up.

### **Conclusion:**

Although conservative treatment of EDS is primarily recommended and most surgeons are reluctant to operate on these patients except in life threatening situations, we present the successful and long-lasting surgical relief of disabling abdominal symptoms in a patient with EDS classic subtype.

Regarding the variability and complexity of symptoms in different subtypes of EDS, a personalized multimodal treatment including surgical approaches should be considered and achieved a significant and long-lasting improvement in quality of life in our patient.

## **Multistep reconstruction of large soft tissue defects following Girdlestone-procedure with AV-loop and free myocutaneous latissimus dorsi flap**

ID: 897

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### **Background:**

Deep soft tissue wounds and dead-space formation of the hip and lower extremity following Girdlestone-procedure are a rare but life-threatening complication.

The large soft tissue damage and dead-space formation in our studied patients following Girdlestone-procedure developed in most cases due to infection. Free flaps represent the working horse for reconstruction of such defects requiring larger amounts of tissue volume. Free flaps depend on a good vascular access point, which in most cases of Girdlestone-procedure is not available; therefore creating an arteriovenous loop can ensure a sufficient and well-structured vascular supply for the free tissue flap.

We report the successful reconstruction of nine cases of Girdlestone-procedure complications with large soft tissue defects, via the usage of an AV-loop and subsequent free flap coverage.

### **Materials and methods:**

We performed nine AV-loop based reconstructions of soft tissue damage after Girdlestone-procedure. In all cases, an AV-loop was introduced by the department of vascular surgery and subsequently used as vascular access point for a free musculus latissimus dorsi flap. The AV-loop was created using the great saphenous vein, which was anastomosed either with the common femoral artery or with the superficial femoral artery. We performed a retrospective study regarding post-operative complications, flap survival and infection rates.

### **Results:**

The Patients went through a multistep interdisciplinary surgical approach and returned to our clinic for regular post-surgical checkups.

In our study, most cases showed successful long-term perfusion of the flap. Only one flap was completely lost. The free-flap reconstruction allowed for obliteration of the dead-space and complete closure of the wound.

### **Conclusion:**

The multistep and interdisciplinary approach of AV-loop based free flap reconstruction, represents a well-structured, goal oriented and successful method for large and complex soft tissue defects following Girdlestone – procedure where direct flap reconstruction is not possible due to the poor vascular supply available in that area.

## **Thumb reconstruction after radical tumor resection using free osteocutaneous lateral arm flap with secondary humerus fracture - A case report**

ID: 1006

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### **Background:**

Malignant diseases with infiltration of bony structures in the area of the phalanges or metacarpals require either amputation or complex reconstruction. Deciding for reconstruction means to restore length, mobility, sensibility, stability as well as aesthetics.

### **Materials and methods:**

We present a case of complex reconstruction of the first metacarpal of the left hand by means of free osteocutaneous lateral arm flap from the ipsilateral side. The reconstruction was performed after radical resection of the os metacarpale I, the os trapezium, proportional the os trapezoideum and os scaphoideum as well as proportional resection of the EPL, EPB, APL and FCR tendon and thenar muscle cuff in an exulcerated squamous cell carcinoma of the hand. The osteosynthetic restoration was achieved by a wire cerclage and a proximal K-wire suspension. Moreover, to reconstruct the EPL tendon the palmaris longus tendon was harvested and used. Postoperatively, a secondary humerus fracture occurred, which was initially attended to plate osteosynthesis. The resulting pseudarthrosis was treated by autologous spongiosaplasty.

### **Results:**

Eight months postoperatively the patient showed a satisfactory outcome with length preservation, an excellent range of motion with a Kapandji score of 5, a flexion of 40° and an extension of 12° of the carpometacarpal joint, good sensibility with a **two-point-discrimination of 5 mm**, stability and aesthetics of the thumb. Furthermore, the quarterly tumor aftercare showed no evidence of recurrence.

### **Conclusion:**

This case report presents the complex reconstruction possibility of the first metacarpal after radical tumor resection with a great functional and aesthetic outcome. To prevent a secondary humerus fracture a plate osteosynthesis simultaneous with the osteocutaneous flap elevation could be considered.

**Complex shoulder reconstruction with an innervated pedicled latissimus dorsi flap**

ID: 1037

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The shoulder joint and its associated joints stabilized mostly through the rotator cuff, the deltoid and the biceps brachii in the anterior side of the arm form one of the most complex joint systems and the uttermost mobile joint of the human locomotor apparatus with a tremendous range of motion. Major injuries in this region entail paramount consequences in overall moveableness of the affected side. Restoration of the functionality of the afflicted shoulder requires sometimes not only the recuperation of the affected bone structures but also a refurbishment of the muscular function through a muscle flap, in particular a free or pedicled innervated latissimus dorsi flap.

**Materials and methods:**

In the following, we would like to present the case of a 17 years old male patient, who was shot and injured at the age of 12 in the Somali Civil War in his left shoulder. Due to his severe injury to his left shoulder he was operated as an emergency in Somalia, thus his left humeral head was removed. The patient didn't receive a muscular reconstruction and he was consequently affected by a significant loss of function in the impaired shoulder. The residual humerus bone was covered solely by a thin layer of skin.

The interdisciplinary reconstructive surgery encompassed the partial resection of the proximal humerus to constitute the mainstay for the prosthetic reconstruction such as a shoulder hemiarthroplasty and a left sided innervated pedicled latissimus dorsi flap to replace the damaged and missing surrounding musculature of the shoulder, which was attached to the crest of the scapula, the trapezius and the clavícula.

**Results:**

Twelve months postoperatively the patient showed an outstanding outcome with properly healed wounds, anatomically formed shoulder silhouette and an excellent range of motion, adduction/abduction: 30°/0°/40, shoulder flexion / shoulder extension: 75°/0°/30° taking into consideration the extent of the infringement with the correct position of the prosthesis.

**Conclusion:**

This is another example for the potential, flexibility and versatility of an innervated pedicled latissimus dorsi flap to reconstruct larger defects and the ability to gain and obtain the loss of muscular functions. This case demonstrates likewise the unwrinkled compatibility of latissimus dorsi flap with prosthetic implants to achieve considerable muscular activity and therefore regaining functionality of joints

**Non-invasive monitoring of soft-tissue sarcoma response to neoadjuvant radiotherapy through quantification of circulating tumor DNA (ctDNA) and multiparametric MRI (mpMRI)**

ID: 199

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Wide resection remains the cornerstone of treatment for localized soft-tissue sarcomas (STS). Neoadjuvant radiotherapy may decrease the risk of local recurrences; however, its effectiveness for different histological subtypes has not been systematically investigated.

This ongoing prospective study evaluates the response of STS during the course of neoadjuvant radiotherapy using non-invasive methods.

**Materials and methods:**

Liquid biopsies: Detection of circulating tumor DNA (ctDNA) in patient blood samples through targeted next-generation sequencing (NGS). Patient specific exome sequencing allows the detection of individual tumor DNA translocations and single nucleotide polymorphisms (SNPs). Leukocyte DNA and ctDNA is isolated and matched from peritherapeutically collected patient plasma samples. Bioinformatic analysis is performed using the MIRACUM Pipeline. Through quantification of ctDNA, tumor activity and thus therapy response will be evaluated in correlation with mpMRI during neoadjuvant radiotherapy.

Multiparametric MRI (mpMRI): Combination of classical MRI sequences with diffusion weighted imaging (DWI) and dynamic contrast enhancement (DCE). Multiparametric MRI occurs before, during and after neoadjuvant radiotherapy. Accurate co-registration and correlation of mpMRI with the macroscopic, histologic, and immunohistochemical resected specimen is performed to identify imaging markers that allow an analysis of tumor transformation under neoadjuvant radiotherapy.

**Results:**

Here, we present preliminary data of our first cases that show that ctDNA levels correlate with vital tumor volume. Furthermore, we present imaging markers that allow the characterization of tumor masses for heterogenous STS.

**Conclusion:**

Preliminary data support the notion that quantification of circulating tumor DNA in combination with tumor mass characterization through co-registration of mpMRI and histopathology predict the response of STS to neoadjuvant radiotherapy. This observation needs a broader discussion and the participation and support of a wider group of oncologic surgeons in order to collect more data on this rare tumor type in a short period of time.

## **Bioprinted Endothelial Cells in Bone Tissue Form Functional Blood Vessels In Vivo**

ID: 215

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### **Background:**

Construction of large bone tissue engineering constructs has been hampered by lack of vascularization. Bioprinting is a progression of tissue engineering, offering the advantage that cells can be placed with high spatial fidelity within three-dimensional tissue constructs. We previously demonstrated that 3D bioprinting of human umbilical vein endothelial cells (HUVECs) leads to controlled lumen formation. The purpose of this study was to investigate whether this approach can lead to formation of function blood vessels in vivo

### **Materials and methods:**

Cuboid bone tissue constructs containing human adipose-derived mesenchymal stem cells (ASCs) and HUVECs were created by extrusion printing and drop-on-demand (DoD) printing, respectively. Cell viability was evaluated in live/dead assays. Constructs were implanted subcutaneously in immunodeficient mice (N=6). Constructs without cells served as control (N=6). Calcification was evaluated by alizarin red staining, and blood vessels were imaged in immunohistochemistry by CD31 (human) and  $\alpha$  smooth muscle actin (mouse).

### **Results:**

Survival rate of ASCs was  $97,1 \pm 1,0\%$  and that of HUVEC was  $84,0 \pm 11,1\%$ . After subcutaneous implantation of bioprinted constructs, no human blood vessels were seen in the negative control. However, blood vessels could be detected in ASC/HUVEC containing constructs. These blood vessels showed calibers ranging from 9.8 to 188.7  $\mu\text{m}$ . Human blood vessels were encased and stabilized by mouse mural cells and contained mouse erythrocytes. Bioprinted ASCs were able to synthesize calcified bone matrix as an indicator of ectopic bone formation.

### **Conclusion:**

These results indicate that combined bioprinting of ASCs and HUVECs represents a promising strategy to produce pre-vascularized artificial bone tissue for prospective applications in the treatment of critical-sized bone defects perfused by the host blood circulatory system.



**Sternal en bloc Resection and interdisciplinary treatment for Deep Sternal Wound Infections**

ID: 758

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Deep sternal wound infections (DSWI) are a rare but still life threatening complication after thoracic and cardiac surgeries. Removal of the sternum and subsequent treatment of these critically ill patients presents a surgical as well as a medicinal challenge. The en bloc resection and targeted therapy of the confirmed osteomyelitis ensures a sufficient and goal-oriented treatment of these patients.

**Materials and methods:**

The study was developed as a retrospective cohort study. 69 patient were included who received a piecemeal or an en-bloc sternal resection at our institution between August 2017 and February 2021. Histopathological and microbiological examinations were then performed. Furthermore, the cohorts were retrospectively examined for complications, germ spectrum and the corresponding therapy.

**Results:**

The average age of the cohort was 67.4 years, and 21 % of patients were female. The mean hospital stay was reduced in the en-bloc group to 26.5 days compared to 36,94 days. During the hospital stay five patients (7,2%) died. The postoperative hemorrhage rates were 20% in the en-bloc group which is significantly below the compared group with 42 %. The main germs were represented by staph. aureus and epidermidis and all patients showed osteomyelitis on histopathological examination.

**Conclusion:**

The combination of the en bloc resection of the sternum established in our clinic and the rapid histopathological and microbiological processing of the specimens represents a timely, targeted and risk-reduced treatment of the patients. Histopathological processing of the en bloc resected specimen allows further conclusions to be drawn about the pathogenesis of the disease. Treatment requires an interdisciplinary approach to the disease with subsequent defect reconstruction and minimize the hospital stay.

## **Heel stress zone reconstruction using innervated free flaps**

ID: 927

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### **Background:**

Wounds in the heel stress zone do not occur very often but require very specialized care. Diabetes mellitus is one of the most common and one of the most difficult to treat causes, nevertheless no contraindication for a free tissue flap. A satisfying reconstruction is, because of the required stability of the tissue as well as the very important sensitivity in this area, a great surgical challenge and often the last resort in saving the extremity.

### **Materials and methods:**

The study was developed as a retrospective cohort study. Five patient were included in who received a recostruction of the heel stress zone in our institution between June 2019 and July 2021. We performed four reconstructions using the anterolateral thigh flap and one using the lateral arm flap.

### **Results:**

Four men and one woman were included in the study. The average age of the cohort was 55.6 years. 4 of the 5 patients showed wound healing disorders after the reconstruction. These have been corrected by follow-up surgeries. Four patients had osteomyelits, four patients had diabetes mellitus Type 2. Due to the diabetic polineuropathy, although the two point discrimination on the flap was >15 mm it was comparable to the surroundig tissue. The protective sensitivity was nevertheless present.

### **Conclusion:**

Although this is a long and arduous treatment, the free flap transplant can be the saving therapy for wounds in the heel stress zone. Transplantation of well-vascularized, adequately sized and innervated tissue represents a well-structured, goal oriented and successful method.

## **The influence of C-reactive protein on allograft rejection in VCA - crossing the border between innate and adaptive immunity**

ID: 944

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### **Background:**

Initial activation of the innate immune system during surgery affects the long-term survival of vascularized composite allotransplants. The underlying mechanisms remain largely unknown. C-reactive protein (CRP) exacerbates innate inflammation and accelerates acute graft loss. To bring elective vascularized composited allotransplantation to broader clinical use, a profound perception of the processes in chronic rejection is necessary. CRP mainly activates the innate immune system. However, the predominant cells of chronic rejection remain T cells as part of the adaptive immune system. In this study, we investigated the influence of CRP on T cells, monocytes, and intercellular crosstalk.

### **Materials and methods:**

We established *ex-vivo* co-culture experiments of human monocytes and T cells. We analyzed the CRP-dependent T cell activation in both a direct and indirect setting by flow cytometry and confocal microscopy, respectively.

### **Results:**

CRP induces upregulation of pro-inflammatory cytokines IFN $\gamma$  and TNF $\alpha$ , among others. Additionally, CRP upregulates the surface expression of the co-stimulatory molecules CD80, CD86, and MHC-II molecules, respectively. In co-culture experiments of human monocytes and T cells, CRP leads to both a swift and a long-term activation and evokes the proliferation of the CD4<sup>+</sup> T cells. However, T cell monocultures showed none of these effects after CRP stimulation. Further, CRP in co-cultures without direct cell contact failed to activate T cells.

### **Conclusion:**

Here, we show that CRP does not activate T cells directly. However, we found a CRP-dependent pro-inflammatory interaction between monocytes and T cells. Direct cell contact between monocytes and T cells appeared necessary, while soluble factors enhanced CRP-dependent T cell activation. We suggest this interaction plays a crucial role in the early phase of conditioning, leading to transplant rejection in VCA. Thus, CRP may represent a feasible target in the therapy of VCA rejection.

## **Using combined white light spectrometry and laser Doppler flowmetry (O2C) to evaluate local tissue perfusion after negative pressure wound therapy - A pilot study**

ID: 1021

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### **Background:**

An important part in modern wound treatment is the use of topical negative pressure wound therapy (TNPWT). Research and development during the last decades have widened the range of indications. Although regularly used precise statements on the underlying mechanism remain unsatisfying. Nevertheless, an increased perfusion and improved wound healing can be seen clinically.

### **Objective:**

The study aimed to understand the effect of TNPWT on tissue perfusion, provide extensive information on the underlying mechanisms and define the time extent of the changed tissue perfusion due to TNPWT.

### **Materials and methods:**

For 30 minutes TNPWT was applied to the anterior thighs of 40 healthy individuals. Before and after TNPWT measurements with combined white light spectrometry and laser Doppler flowmetry (O2C ®) were conducted. After the removal of the dressing, the measuring period was set for 90 minutes including five separate measurements. For each the amount of regional haemoglobin (rHb), capillary venous oxygen saturation (sO<sub>2</sub>), blood flow (flow) and velocity were determined within two different depths/skin layers by using two different probes.

### **Results:**

All parameters show significant changes after the intervention compared to the baseline measurements. Superficially, a greater effect was seen. A significant increase was shown for the superficially measured rHb, sO<sub>2</sub> and flow. Furthermore, at the end of the protocol these parameters remained above the baseline. Whereas deeply measured, a decrease of the rHb was noticed. Moreover, the deeply measured flow and sO<sub>2</sub> showed only a significant increase up to 60 minutes after the intervention.

### **Conclusion:**

An increase in sO<sub>2</sub> and rHb of at least 90 minutes after applying TNPWT on healthy tissue can be measured. To use the information in clinical practice further studies investigating the actual duration of the effect are required. A possible application could be the use of TNPWT as preconditioning method to enhance tissue perfusion in high-risk patients for developing wound healing disorders after surgical interventions.

## **pecs block during surgery: a quick and effective method to optimize pain control in oncological breast surgery**

ID: 868

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### **Background:**

Pectoral nerve block (PECs I and II) is a pain control technique usually performed under sonographic guidance by the anesthesiologist before surgery to relieve chest and axillary pain after surgery. Although it has been proven successful, it is time consuming and requires a trained and specialized team of anesthesiologists. Our preliminary study aims to assess the benefits of this technique performed directly by the surgeon after the demolitive part of the intervention.

### **Materials and methods:**

This single-center retrospective study was performed by our Breast Unit Team, in the Central Hospital of Bolzano, over a time period of two years from 2018 to 2020. Of the 120 patients enrolled, 60 underwent quadrantectomies (QD) with sentinel lymph node biopsy and 60 underwent mastectomies (MT), with or without subpectoral expander, 21 of which underwent axillary dissection. Each subgroup was equally divided into a control group, and a study group undergoing surgical PECs block. The study was based on timed assessing of perceived pain at 0, 6, 12 and 24 hours after surgery (measured by NRS - Numeric Rating Scale) and on the use of analgesic therapy in the first 24 hours after surgery (expressed in defined daily doses - DDD). Statistical analysis was conducted with Spss®software (Welch t-test, chi-square test, Fisher test).

### **Results:**

Patients undergoing QD, on whom PECs block was performed, presented a significant pain reduction 6 hours after surgery compared to the control group ( $p=0.045$ ). Patients undergoing MT showed pain reduction after 6 ( $p=0.028$ ) and 12 hours ( $p=0.011$ ) and less analgesic consumption in the first 24 hours ( $p=0.032$ ). Patients undergoing MT with expander were the only subgroup who did not benefit from this procedure.

### **Conclusion:**

According to our results, performing PECs block during surgery is a useful and easy technique with a low complication rate and offers many advantages, such as reduction of postoperative pain in most breast surgery procedures and reduction of analgesic consumption after mastectomy.

**Treatment algorithm for difficult to treat wounds using a collagen-elastin matrix**

ID: 984

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Collagen-elastin matrices offer a reliable and well-functioning alternative for wound coverage. In different situations where flap surgery is not a feasible alternative, the combination of collagen-elastin matrices with negative pressure wound therapy and skin grafting can ensure the wound closure. Our study aims at establishing an algorithm for wound closure using collagen-elastin matrices.

**Materials and methods:**

A retrospective cohort study was performed in our institution between 2017 and 2020. Patient characteristics, operative procedures and postoperative treatments were recorded and analysed. The wounds were treated either simultaneously with collagen-elastin matrix and skin grafting or sequentially, with the skin grafting in taking place in a secondary procedure. Finally, an algorithm was produced in order to facilitate the usage of these products.

**Results:**

Most of the wounds could be successfully closed without flaps. Only eleven wounds overall needed flap surgery, two in the one-step approach and nine in the two-step ( $p=0,17$ ). The mean followup was at 22,9  $\pm$  12,1 months. There was no significant difference between the two groups regarding the successful soft tissue reconstruction in the long-term follow-up ( $p=0,11$ ).

**Conclusion:**

Collagen-elastin matrices can be an important tool in wound closure, especially in cases where flap surgery is not a viable option. The developed algorithm can help surgeons in choosing the right approach for treatment.

## **Complications after medial thigh lift are reduced by prolonged postoperativ antibiotic administration**

ID: 720

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### **Background:**

There is widespread consensus that there is no indication for postoperative antibiotic administration after elective surgery. However, medial thigh lift (MTL) remains a procedure with a notoriously high rate of wound healing disorders and infections. This study investigates the correlation between prolonged antibiotic administration and complications after MTL in massive weight loss patients.

### **Materials and methods:**

We performed a single-institution retrospective review of 121 patients undergoing MTL between 2009 and 2020. Data on postoperative outcome, demography, surgery and comorbidities were collected. All patients received intravenous antibiotics preoperatively. One group was continued on oral antibiotics for two weeks postoperatively. Complications and surgical site infections were observed and evaluated.

### **Results:**

There was no difference between the groups regarding to age, BMI, or the presence of obesity-associated risk factors. We observed complications in 76 patients (71%), with 60 (56%) minor and 16 (15%) major complications. The group without prolonged antibiotic administration had a higher number of total complications (OR 3.5;  $p=0.0037$ ), major complications (OR 4;  $p=0.01$ ), and wound infections (OR 6.8;  $p=0.0004$ ). Logistical regression analysis showed that this effect was independent of BMI  $\Delta$ , BMI, type of weight loss, resection, and type of surgery. Reduction of major infections by prolonged antibiotics was, however, dependent on BMI  $\Delta$ . No side-effects associated with antibiotics were registered in this series

### **Conclusion:**

This study suggests that prolonged antibiotic administration may decrease complications in MTL. We thus continue to use prolonged antibiotic administration after MTL. Further research is needed to verify the correlation and to determine the optimal duration of antibiotic treatment.

## **Changes in functional disability and quality of life in patients with extremity sarcoma resections**

ID: 402

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### **Background:**

Sarcomas are rare tumour diseases with an incidence of less than 1% of all malignancies. There is an increased rate of diagnostic and therapeutic misjudgements outside specialised centres, which is partly due to the non-specific nature of symptoms and rarity of disease. This leads to unplanned resections, for which the data available on oncological influence is inconsistent. The necessary safety distances in surgical therapy are constantly discussed. Modern oncological sarcoma therapy, in addition to undisputed requirement of limb preservation and function, also increasingly aims to consider quality of life (QoL). There is still very little data of functional impairments and QoL after limb-sarcoma-surgery available.

### **Materials and methods:**

Out of 258 soft tissue (STS) and bone sarcoma patients (BS) recorded at UKSH Kiel in period from 1 July 2010 until 1 April 2016. Exclusions were made in absence of surgical therapy, if last follow-up treatment was more than 12 months ago or if 6-month minimum observation period following start of therapy was not reached. Retrospective data collection with a prospective perspective was finally performed on 95 STS and 16 BS.

To clarify progression of diseases, survival time analyses were performed using Kaplan-Meier estimators and Logrank-Test. Cox-Regression was conducted for variables with significance ( $p < 0.05$ ) in Logrank-Test. Statistical comparison of survival times of BS was waived because of too small patient number.

Functional impairments of extremities were recorded using 49 Toronto Extremity Salvage Score questionnaires and health-related-QoL using 58 EORTC-QLQ-C30 questionnaires. They were evaluated by group comparisons using Mann-Whitney-U and Kruskal-Wallis test.

### **Results:**

Median observation time for STS patients was 39 months (95%CI [29.0, 48.9]; SE=5.1), for BS patients 53 months (95%CI [34.7, 71.3]; SE=9.4) from start of therapy.

The 2-year disease-specific (OS), metastasis-free (MFS) and local-recurrence-free survival rates (LFS) were 85%, 77% and 72% for STS and 87%, 86% and 82% for BS.

Significantly negative impact on OS of STS patients in univariate analysis comprised presence of distant metastasis (2-year-OS: 56% vs. 98%;  $p < 0.001$ ), lymphatic metastasis (2-year-OS: 33% vs. 88%;  $p < 0.001$ ), local recurrence (2-year-OS: 79% vs. 90%;  $p=0.022$ ), tumour size  $>5\text{cm}$  (2-year-OS: 82% vs. 95%;  $p=0.012$ ) and grading (2-year-OS: G3 76% vs. G1 96%;  $p=0.010$ ). Significantly lower levels of MFS were seen in STS patients age  $<70$  years (2-year-MFS: 66% vs. 91%;  $p=0.028$ ) and in case of G3 compared to G1-grading (2-years-MFS: 60% vs. 100%;  $p=0.002$ ).

In Cox-Regression, grading had significant negative impact on OS (HR=1.99; 95%CI [1.02, 3.88]; SE=0.34;  $p=0.045$ ) and MFS (HR= 2.65; 95%CI [1.33, 5.27]; SE= 0.35;  $p=0.006$ ), with risk of metastasis



increasing 2.65-fold with each one-level increase in grading. Age <70 years at first diagnosis was shown to have significantly negative impact on levels of MFS, with 3.09-fold increased risk of metastasis (HR=3.09; 95%CI [1.03, 9.26]; SE=0.56; p=0.44).

In cases of unscheduled first surgery there was a significantly higher proportion of small ( $\leq 5$ cm) STS (40.0% vs. 11.5%; p=0.003) and a significantly higher number of operations (M=2.3 vs. M=1.4; p< 0.001) than in cases of scheduled first surgery. Following unscheduled first surgery, there was no significant worsening in OS (2-year-OS: 82% vs. 86%; p=0.869), MFS (2-year-MFS: 75% vs. 80%; p=0.587) and LFS (2-year-LFS: 77% vs. 71%; p=0.777). QoL were also not significantly reduced following unscheduled surgery (p=0.199) and there were no increased limitations in postoperative limb function (p=0.298).

Resection distances from tumour to resection margin at R0 resection ( $\leq 1$ mm vs.  $>1$ mm) did not significantly influence OS (2-year-OS: 93% vs. 100%; p=0.112), MFS (2-year-MFS: 71% vs. 77%; p=0.418) and LFS (2-year-LFS: 54% vs. 83%; p=0.066). The postoperative function of the extremities did not differ between resection distance  $\leq 1$ mm and  $>1$ mm (p=0.738).

### **Conclusion:**

1. A high grading (G3) can be confirmed as a negative influencing factor on OS and MFS of STS patients. Furthermore, we recognise that STS patients who are < 70 years of age at initial diagnosis, have an increased risk of metastasis, whereas no treatment-specific-factors with significant oncological influence can be identified.

2. Resection distance ( $\leq 1$ mm vs.  $>1$ mm) continues to not have any influence on oncological and functional outcome in STS. If necessary, narrow resection margins of  $\leq 1$ mm are acceptable as part of multimodal therapy of sarcoma centre without significant deterioration in oncological outcome.

3. Unscheduled first operation does not lead to worse oncological results, higher functional impairments or reduced QoL if follow-up resection and multidisciplinary therapy concepts are applied in sarcoma centre. Nevertheless, it is important to avoid unscheduled first operations, as these require significantly increased numbers of operations, which can lead to an increased level of morbidity and burdening of health-care-system.

## **Soft tissue sarcoma - Significance and accuracy of core needle biopsy for histological diagnosis of soft tissue sarcoma**

ID: 404

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### **Background:**

Soft tissue sarcomas (STS) are a rare and highly heterogeneous group of malignancies. Quick and correct histological diagnosis and tumor grading are paramount to STS treatment. However, the biopsy technique of choice is controversial. Here, we examined the diagnostic accuracy of percutaneous core needle biopsy (CNB) and compared it to open incisional biopsy.

### **Materials and methods:**

In this retrospective study, we included 193 previously undiagnosed patients with STS, of which 91 underwent incisional biopsies and 102 CNB. We then compared the biopsies to the definitive histological workup and accuracy concerning entity and grading. We further evaluated patients' data for the average time until diagnosis and complications. Additionally, we conducted a pair-match investigation on 19 patient pairs, comparing sensitivity, specificity, and diagnostic accuracy.

### **Results:**

In 81/91 (89%) patients with incisional biopsy, definitive pathology confirmed the sarcoma subtype, whereas this was the case in 89/102 (87%) core needle biopsy patients ( $p=0.52$ ). Grading remained unchanged in 46/55 (84%) of incisional and 77/89 (87%) of core needle biopsies ( $p=0.63$ ). The pair matched analysis showed that the correct entity was determined in 96% of incisional and 97.6% of core needle biopsies. Definitive pathology confirmed tumor grading in 89.5% of incisional and 93.8% of CNBs ( $p=0.62$ ). The usage of CNBs significantly reduced the time between the initial consultation and the interdisciplinary tumor board's treatment recommendation (8.37 vs. 15.63 days;  $p<0.002$ ). Incisional biopsies required general anesthesia and led to two wound infections and one hematoma requiring revision. In contrast, we performed all CNBs under local anesthesia as outpatient procedures and reported one wound infection.

### **Conclusion:**

Core needle biopsy led to faster diagnosis while reaching the same histological accuracy and was less burdensome for patients and clinic resources. Still, surgeons need to remain aware of the possibility of sampling errors when using CNB.