

## Winter Scientific Meeting 2014- Abstracts of Free Papers

(listed in alphabetical order by presenter surname)

### Airway management in syndromic craniosynostosis: the role of the palatal split

Mr F Ahmad, Mr W Flapper, Mr G Thomas, Professor P Anderson, Professor D David

Australian Craniofacial Unit

#### Introduction

The aetiology of obstructive sleep apnoea (OSA) in syndromic craniosynostosis is multifactorial, with contributory factors located along the entire respiratory tract. The management protocol at the Australian Craniofacial Unit (ACFU) involves utilising temporary measures to alleviate OSA until such time that it is safer to perform midface advancement procedures. The palatal split with uvulopalatoplasty aims to increase the nasopharyngeal space.

#### Methods

Retrospective review of all patients with syndromic craniosynostosis who have undergone palatal split using the ACFU database.

#### Results

Forty four patients (Aperts n=19; Pfeiffers n=11; Crouzons n=10; Antley Bixler n=3; other n=1) underwent palatal split after evidence of severe OSA following sleep studies between 1987 and 2014. Median age of surgery was eight months. Mean follow up was 14.4 years (range seven months to 17 years). Post-operatively, 40 patients (93%) demonstrated improvement in OSA. Four patients (9%) required midfacial procedures in the first decade to further alleviate OSA, whereas 31 midface procedures were performed or will be performed in teenage years. Velopharyngeal insufficiency (VPI) was demonstrated in six (13%) patients when speech could be assessed although only four (9%) ultimately required VPI surgery to help normalise speech. In none case, the palate needed to be split again.

#### Conclusions

The ACFU management philosophy dictates that following calvarial expansion procedures in the first year of life, any midface procedure is delayed until completion of skeletal maturity, unless a pressing need arises. The palatal split is a useful, quick and effective procedure with acceptable morbidity that can defer midface advancement for airway improvement.

# Sequential fabricated chimeric free flaps for reconstruction of complex lower limb defects

Mr K Asaad, Miss A Crick  
Odstock Hospital

## Introduction

Reconstruction of the complex and often extensive lower limb defects following severe trauma or the complications of trauma are difficult surgical problems. Occasionally, these defects will deserve use of more than one free flap in order to achieve the optimal functional and aesthetic outcome. Using the anterolateral thigh (ALT) flap as the basis of a sequential fabricated chimeric free flap requires use of only one recipient site while allowing the resurfacing of large areas of skin loss and greater freedom of inset of a second flap anastomosed to the ALT flap pedicle.

## Methods

Between September 2011 and June 2014, six patients underwent reconstruction of complex lower limb defects with sequential fabricated chimeric flaps undertaken by the senior author. Three patients had sustained high-energy transfer injuries involving bone loss or exposed fracture and metalwork. Two patients had chronic osteomyelitis. One patient had a recurrent non-union. All defects were entirely resurfaced with the ALT flap, the largest measuring 37x17cm, with the second flap buried. The second flap used was the gracilis muscle in five patients and the medial femoral condyle corticoperiosteal flap in one patient.

## Results

All wounds healed without delay. One patient later required a third free flap to resurface the tibia following 11cm bone transport. One patient required thinning of the ALT flap.

## Discussion

Use of sequential fabricated chimeric free flaps is well described for breast and for head and neck reconstruction but not for lower limb reconstruction. The anatomy of the ALT flap is particularly suited as the basis of this technique for complex lower limb defects that require more than one flap and where recipient sites need to be spared.

# Characteristic gram-negative bacteria infecting burn wounds: epidemiological and biochemical profiling

Dr E Azzopardi, Professor I Whitaker, Dr L Camilleri, Mr J Villapalos, Mr D Boyce, Professor P Dziewulski, Mr W Dickson, Dr K Hill, Dr E Ferguson, Professor D Thomas

Swansea University

Gram negative infection is a major determinant of morbidity and survival. Traditional teaching suggests that burn wound infections in different centres are caused by differing sets of causative organisms. We established whether there is a characteristic spectrum of Gram-negative bacteria that infect burn wounds, and clinically relevant commonalities in biochemical profiling.

## Methods

Metanalysis of standardised bacterial incidence rates from studies published (limits: 2000-2010, adult, civilian patients) was performed.

## Primary Findings

Gram-negative infections predominate in burn surgery. *Pseudomonas aeruginosa*, *Klebsiella pneumoniae*, *Acinetobacter baumannii*, *Enterobacter* spp, *Escherichia coli* and *Proteus* spp; emerged as the characteristic Gram-negative burn wound pathogens, sharing biochemical commonalities. Their incidence did not differ significantly between burn centres across four continents (two-way ANOVA:  $F(4, 20) = 1.1$ ,  $p = 0.3797$ ;  $r^2 = 9.84$ ).

## Interpretation

This study is the first to establish the pathogens responsible for the majority of Gram-negative burn wound infections, which facilitates initial antibiotic prescribing, and directs research into drug development and targeting.

# A comparison of patient-reported outcome measures of three commonly performed breast reconstructions following mastectomy at a single oncoplastic breast unit

Miss S Bagirathan, Mr A Halka, Mr S McCulley, Mr D Macmillan

City Hospital Campus, Nottingham University Hospitals NHS Trust

## Introduction

Patient-reported outcome measures (PROMs) emphasize patient experience and encourage service improvement. We compare PROMs following three commonly used oncoplastic breast reconstruction techniques, which has not previously been reported.

## Methods

The Hopwood Body Image Scale (BIS) was employed to collect retrospective PROMs data from patients

twelve months following completion of breast reconstruction. There were 100 patients in each cohort: implant-based, latissimus dorsi (LD) flap, and DIEP/TRAM flap. All procedures were completed by one of two experienced oncoplastic breast surgeons at a single centre.

### **Results**

BIS Hopwood was below 10 in most patients. Median BIS Hopwood was two following DIEP reconstruction, and three and four in LD and implant cohorts respectively. Comparing primary and secondary reconstruction, BIS Hopwood was not significantly different in all cohorts. The BMI of DIEP/TRAM patients was significantly higher,  $P < 0.001$ , than those reconstructed with LD's (95% CI 1.134 to 3.868) and implants (95% CI 2.018 to 5.092). LD-based reconstruction was complete after a median of one procedure, whilst DIEP/TRAMs and implants required a median of two procedures. LD patients reported more donor pain; patients with implants resumed normal activity sooner.

### **Conclusion**

All three reconstructive procedures provide satisfactory BIS Hopwood scores. In all cohorts, BIS Hopwood does not correlate with BMI. Patients undergoing implant-based reconstructions returned to normal activity quicker.

## **The Manchester Burn Simulation Framework: a set of tools for multidisciplinary training, assessment and service improvement on the burns unit**

**Mr J Bedford, Ms J Edwards, Mr N Khwaja**

University Hospital of South Manchester

### **Introduction**

Burn services should be built around a culture of continued learning and reflection on working practices. However, the incidence of major burns is declining, reducing the experiential learning needed to ensure we are effective, safe clinicians. Simulating burns encourages development of clinical, procedural and non-technical skills in team environments.

We present a framework for education, evaluation and service analysis, based around accepted best practices for simulation.

### **Methods**

**Training.** Curriculum-referenced scenarios were developed, including major burns, airway complications, theatre scenarios. Manikins were used in a simulation suite in-situ on the burns unit. Video recording and immediate debriefing enhanced the learning experience.

**Assessment.** Formative and summative assessment are possible. Part-task trainers evaluate procedural skills (burn size and depth assessment). Team interactions are assessed in complex scenarios using custom, activity-tracking software.

Service Improvement. Practices are scrutinised to identify latent threats. Pathways are mapped and refined using evidence and best practice principles. Activity tracking and consumable use may be analysed to identify cost savings.

## **Results**

Participant surveys were scored positively: team working and openness were encouraged, providing a safe opportunity for learning and development. Immersive scenarios were realistic, challenging and useful for developing and maintaining skills.

## **Conclusion**

Simulation has a variety of applications within the burn service: it can contribute to training the whole burn team, and to evaluating and improving our services for the benefit of our patients.

# **Paediatric orbitopalpebral surgery: an evidence based philosophy**

**Mr J Britto, Professor J R O Collin, Mr D J Dunaway, Mr Y Abou Rayyah**

Great Ormond Street Hospital for Children

## **Introduction**

Paediatric orbitopalpebral reconstruction provides for ocular surface and globe protection, stereoscopic ocular motility, and aesthetic balance; requiring to remain stable in time.

## **Materials and Methods**

The craniofacial database was interrogated to review indication and outcome in cases involving congenital orbito-palpebral malformation. The casemix included facial clefting, hemifacial microsomia, Treacher Collins syndrome, neurofibromatosis, hypertelorism syndromes and the complex craniosynostoses. Skeletal surgery outcome was assessed against an age-matched control group.

## **Results**

Normalisation of oculo-orbital disproportion and eyelid function is achieved in 29 Crouzon patients by monobloc distraction, but is relatively non-durable in infancy. Facial bipartition normalises orbito-palpebral shape and function for stable ocular surface protection in 15 Apert patients. Orbital translocation approaches skeletal normality in the correction of 22 hypertelorism and orbital dystopia patients, however soft tissue change is quantifiably less predictable. Visual risk and potential for recovery is greatest when preoperative binocularity exists. Operative risk increases with distraction in which group functional gain is greatest. Paediatric eyelid reconstruction approaches are optimal when repeatable, and facilitated by tissue expansion and 'component separation' of the face.

## **Conclusions**

Paediatric orbito-palpebral surgery can provide risk-reduced, stable and clinically favourable outcomes against control. Soft tissue outcome is less reliably predictable, however eyelid function and aesthetic balance are achievable despite congenital tissue deficiency/excess.

# Supermicrosurgery for chronic lymphoedema: early experience from St Andrew's Centre for Plastic Surgery

Miss W Chow, Ms A Palmer, Mr M Griffiths

St Andrews' Centre for Plastic Surgery and Burns

## Background

Lymphoedema is a challenging condition. The St Andrew's experience in this technically demanding field includes a multidisciplinary service for the management of lymphoedema patients, with the use of near-infrared fluorescence photodynamic eye (PDE) with indocyanine green (ICG) pre-operatively, axillary/inguinal scar release, and reverse mapping in free lymph node transfer surgery.

## Method

A prospective analysis of all patients who underwent lymphatic-venous anastomosis (LVA) and free vascularised lymph node transfer (FVLNT) with or without breast reconstruction in our unit. Patient demographics, limb circumference, donor site complications and patient reported outcomes using the LYMPH-Q questionnaire were examined.

## Results

Thirteen patients were identified for the study, which included five LVA, four FVLNT without DIEP breast reconstruction and four FVLNT with DIEP breast reconstruction. Mean follow up was eight months. In the LVA group one patient had a 25% reduction in limb volume, but this was temporary. In the FVLNT group, the mean pre-operative percentage excess limb volume was 25% (range = 1 – 66) more than normal limb, and the post-operative excess limb volume was 18% (range = 3 – 57). The mean volume reduction for each patient was 623ml. Donor lymph nodes for FVLNT were taken from the axilla, groin or neck. 25% (two out of eight patients) reported recurrent seroma but no donor site lymphoedema or other complications were noted. Post-operative questionnaires showed that all patients were satisfied with the outcomes of their surgery.

## Conclusion

We have shown that in our unit, supermicrosurgery for the treatment of lymphoedema is effective in reducing limb volume and all patients were highly satisfied with their treatment.

**The use of abdominal binders in deep inferior epigastric perforator flap breast reconstruction surgery**

**Miss W Chow, Mr A Favaro, Miss D Kulendren, Mr V Ramakrishnan, Mr M Griffiths**  
St Andrews' Centre for Plastic Surgery and Burns

### **Background**

Deep inferior epigastric perforator flap (DIEP) is the gold standard method for autologous breast reconstruction. However, post-operative donor-site complications from this surgery can be problematic and result in delayed recovery. The purpose of this study was to investigate whether the use of abdominal compression binders in the post-operative period affects complications rates following DIEP surgery.

### **Methods**

A retrospective analysis was performed of all patients who underwent DIEP flap breast reconstruction in the St Andrew's Centre for Plastic Surgery between July 2012 to September 2013. Medical records were reviewed to acquire data including patient demographics, time to drain removal, total drainage output, seroma rate and other complications.

### **Results**

Eighty nine patients used abdominal compression binders and 101 patients did not use binders immediately post-operatively. Significantly lower donor site complications were observed in the binder group compared to the non-binder group (17% versus 31%,  $p=0.007$ ). Mean total drain output and mean number of days until the removal of all drains were similar in both binder and non-binder groups (396 versus 430 ml and 6.3 versus seven days respectively).

### **Conclusion**

Our results suggest that the use of abdominal compression binders reduces post-operative donor site complications following DIEP flap breast reconstruction. As a result of these findings, compression binders are now routinely provided following DIEP reconstruction in our unit.

## **Should nerve conduction studies be performed prior to carpal tunnel surgery?**

**Dr C Shiong Chuah, Mr R Almasharqah, Mr A Jawad**  
Royal Infirmary of Edinburgh

### **Background**

The use of nerve conduction studies (NCS) in carpal tunnel syndrome remains controversial. Some argue that nerve conduction studies should be performed prior to surgery whereas others criticize it as a step which causes unnecessary delay to surgery. This study was performed to analyse the clinical usefulness of NCS in the context of patients at a tertiary plastic surgery unit for the East of Scotland.

### **Methods**

Retrospective analysis of 249 surgical cases over a three year period from 2009-2012 was carried out. All cases were performed by the same plastic surgeon and NCS by the same consultant neurophysiologist.

Data on demographics, symptoms, NCS results and related complications were collected. Outcome was defined as either complete or incomplete relief of pre-operative symptoms. Statistical analyses were performed using chi-square tests.

## **Results**

Patients with severe compression on NCS were more likely to report incomplete relief of symptoms,  $\chi^2$  (4, n=186) =11.79, p=0.019. Patients with muscle wasting pre-operatively were more likely to report incomplete symptom relief,  $\chi^2$  (4, n=207) =15.40, p<0.001.

## **Conclusion**

NCS are helpful for most patients undergoing surgery as they provide useful information regarding post-operative outcomes as well as providing a baseline reference if patients present in the future with recurrence. The exception is in patients who present with muscle wasting, in which NCS are less useful and these patients should be counseled about the high likelihood of incomplete symptom relief.

# **Nasal support using tissue engineered cartilage: a potential exemplar for a 3D bioprinted solution**

**Dr E Combellack, Dr S Morgan, Miss Z Jessop, Mr M Javed, Associate Professor I Khan, Professor I Whitaker**  
Reconstructive Surgery and Regenerative Medicine Research Unit (ReconRegen)

## **Introduction**

Tissue engineering and regenerative medicine is a growing multidisciplinary research field seeking to repair or replace injured tissues and organs. Durable tissue engineered nasal cartilage for support during nasal reconstruction offers the opportunity to reduce the donor site morbidity associated with contemporary approaches. A new paradigm for recreating lost tissues is 3D bioprinting using a material transfer process for patterning and assembly of biologically relevant components in a layer-by-layer fashion with a prescribed organisation. Generating a 3D construct involves (1) Image acquisition (2) Image post-processing (convert the data to a format recognised by the printer) and (3) Additive biofabrication of the construct.

## **Methods**

We used open source databases e.g. Slicer to obtain 3D structural data corresponding to areas of interest to the reconstructive surgeon. We then manipulated this image data to generate stereo lithography file formats suitable for 3D printing using a Bioplotter.

## **Results**

We discuss our experience with prototyping using a standard 3D printer and the evolution towards fabrication using our lab based syringe-driven 3D bioprinter to generate tissue engineered constructs. As an exemplar, we used 3D structural data to biofabricate septal, upper lateral and alar cartilages for nasal reconstruction. Techniques to culture tissue engineered solutions in bioreactors and assurance of their functional competence post-implantation will also be discussed.

## **Conclusion**

3D printing is increasingly recognised as a useful technique in rapid prototyping of implants and prosthesis. Our experience demonstrates an evolution towards bioprinting tissue constructs for reconstructive surgery.

## **Synchronous and metachronous melanomas: incidence, risk factors and attributes**

**Ms E Concannon, Ms N Mahon, Mr A Hussey, Ms D Jones, Mr J Kelly, Mr P Regan**  
Galway University Hospital

### **Introduction and Aim**

Multiple primary cutaneous malignant melanoma (MPCMM) has been reported to occur in 0.05% - 5% of the population. The aim of this study was to analyse a cohort of patients with synchronous and metachronous melanomas to establish their incidence, risk factors and histological characteristics. This analysis has implications for frequency and duration of clinical follow up.

### **Methods**

A prospectively maintained melanoma database at a single tertiary referral centre was analysed to identify all patients diagnosed with MPCMM between 2010 and 2014. Medical chart review and patient interview was conducted to obtain detailed background information for patients with MPCMM identified in this study. Data collected included age at first presentation, gender, risk factors, time between 1<sup>st</sup> and subsequent melanomas, histological subtype, breslow thickness and metastases. Data was analysed using a standard statistical software package (SPSS<sup>®</sup> v20.0).

### **Results**

A total of 62 patients with MPCMM were identified from a database of 548 patients diagnosed with melanoma between 2010 and 2014, a cumulative incidence of 11.3%. Mean age at first presentation was 66.7 years (Range 34 - 88). Second melanomas were identified synchronously in 11 patients (18%) and 52 patients (83%) had metachronous melanomas. Forty two patients (71%) had multiple naevi. Only five patients (8%) had a known family history of melanoma. The majority of second melanomas (63% or n = 39) were clinically detected by a physician at routine melanoma follow-up by general practitioners (n = 18), dermatologists (n = 8) and plastic surgeons (n = 13). Mean time between histological diagnosis of 1<sup>st</sup> and 2<sup>nd</sup> melanomas was 5.4 years or 65 months (Range 0 - 240). Thirty five patients (6.4% of patients) developed a second primary melanoma within 5 years of the first. Overall mean breslow thickness was 1.38mm (Range 0.15 - 8mm).

### **Conclusion**

A higher incidence of MPCMM was detected in this Irish patient cohort than previously reported rates. Our results support the importance of long term clinical follow-up, patient education and self-examination with metachronous melanomas being diagnosed as long as 20 years following initial melanoma diagnosis. Complete skin examination is also warranted with 18% of this cohort presenting with synchronous melanomas. Further genetic studies may be worthwhile to further investigate MPM in Irish populations.

# **Photoacoustic tomography for pre-operative assessment of cutaneous melanoma and other pigmented cutaneous lesions**

**Ms E Concannon, Mr K Joyce, Mr A Hussey, Ms D Jones, Mr P Regan, Professor M Leahy, Mr J Kelly**  
Galway University Hospital

## **Introduction**

Photoacoustic tomography is a novel, non-invasive diagnostic imaging modality. Experimental in-vitro and in-vivo studies have demonstrated promising clinical applications for photoacoustic tomography, including detection of cutaneous melanoma and metastatic melanoma. Potential benefits include increasing the accuracy of clinical diagnosis of melanoma and reducing potential risks for mortality or morbidity from undue or excessive surgical resections, in addition to controlling costs by avoiding unnecessary procedures. However the role of photoacoustic tomography in a clinical setting has not yet been established.

## **Aim**

We designed a prospective observational study, aiming to investigate the usefulness of photoacoustic tomography in pre-operative assessment of pigmented skin lesions, including lesions suspicious for melanoma.

## **Methods**

All patients attending the Plastic Surgery service with pigmented lesions warranting excision or suspicious for melanoma were offered pre-operative photoacoustic imaging using Vevo® 2100 LAZR Photoacoustic Tomography System (VISUALSONICS). A comparison of pre-operative information obtained from in-vivo photoacoustic imaging with the gold standard of histological examination of resected surgical specimens was carried out.

## **Results**

We report the accuracy of pre-operative information obtained from photoacoustic imaging when correlated with histological findings from resected cutaneous specimens including histological diagnosis, tumour thickness and level of invasion.

## **Conclusion**

Our result show that photoacoustic tomography has potential as a non-invasive imaging modality in accurate pre-operative assessment of pigmented cutaneous lesions. Information obtained using this imaging modality, in conjunction with clinical judgement, may guide clinicians in differentiating between benign and malignant pigmented cutaneous lesions in the future.

# **The use of the daVinci® surgical robotic system for posterior pharyngeal wall and palate surgery in the cleft patient is feasible: a pilot study**

**Mr T Dobbs, Mr K Khan, Mr M Swan, Mr T Goodacre**  
Oxford University Hospitals

## **Aims**

Robot-assisted surgery has been increasingly replacing open and laparoscopic techniques, with recent extension to trans-oral access for use in head and neck surgery. Advantages of robot-assisted surgery include the ability to access confined spaces, enhanced dexterity, motion scaling, tremor elimination, and 3-D endoscopes with true depth perception. The aim of this study was to investigate the technical feasibility of trans-oral robotic surgery to access the posterior pharyngeal wall and palate for potential use in the cleft population, and if feasible to simulate surgery.

## **Methods**

A variety of positions were used with the daVinci® Surgical System (Intuitive Surgical, USA) 0 and 30-degree 3D endoscopes and 8mm training instruments to determine optimal visualization and surgical access of the palate and posterior pharynx in a paediatric airway mannequin. The optimal positions were used to simulate posterior pharyngeal wall surgery, and were recorded with still and video photography.

## **Results**

Trans-oral robot assisted surgery is technically feasible in the paediatric cleft population.

## **Conclusions**

This as yet unreported use of robotic-assisted cleft palate surgery might considerably enhance a surgeon's ability to perform difficult palate and posterior pharyngeal procedures in selected patients with limited access. It may also lay the foundation for potential novel surgical techniques in the treatment of the cleft palate and posterior pharynx.

# **Health-related quality of life and functional outcomes following nerve transfers for complete traumatic brachial plexus avulsion injuries**

**Dr R T Dolan, Mr J S Butler, Ms S Murphy, Mr D Hynes, Mr K Cronin**

Mater Misericordiae University Hospital

## **Introduction**

Complete brachial plexus avulsion injuries are devastating and debilitating. Whilst reconstructive surgery can achieve partial functional recovery, we explore whether patient-reported outcomes match physician-reported surgical outcomes. The aim of this study was, firstly, to assess motor functional outcomes following nerve transfer surgery to restore shoulder and elbow function and, secondly, to use statistically validated scales to quantify health-related quality of life (HRQoL), upper extremity function, and pain following nerve transfer surgery.

## **Patients & Methods**

We performed a retrospective analysis of 10 consecutive patients who underwent nerve transfer procedures for complete brachial plexus avulsion injuries by a single-surgeon over a seven year period. Outcomes were

assessed using the British Medical Research Council power grading system, Short-Form 36, Disability of Arm, Shoulder and Hand questionnaire, and Pain Visual Analogue Scale (PVAS).

## **Results**

The mean age of our cohort was 30.1 years (range 18–49 years), with a mean follow-up period of 53.9 months. At follow-up, the mean DASH score for this cohort was 66.1 (SD 17.5) (range 51.1–98.2). The mean PVAS score was 30.0 mm (SD 37.0) (range 0–73 mm). Delayed surgical repair >six months from initial injury correlated negatively with HRQoL outcomes. Smoking was associated with higher PVAS scores.

## **Conclusion**

These findings provide key prognostic information for patients and peripheral nerve surgeons embarking upon this intensive pathway to potential recovery.

# **Vascular anatomy of the medial sural artery perforator flap: a new classification system of intra-muscular branching patterns**

Dr J Dusseldorp, Mr Q Pham, Dr Q Ngo, Associate Professor M Gianoutsos, Dr Moradi  
Prince of Wales Hospital

## **Introduction and Aims**

The medial sural artery perforator (MSAP) flap is a versatile fasciocutaneous flap. The main difficulty encountered when raising the MSAP flap is in obtaining adequate pedicle length during intra-muscular dissection. The objective of this study was to determine the pattern of intra-muscular course of the MSAP flap pedicle.

## **Materials and Methods**

Fourteen cadaveric specimens were dissected and CT angiograms of 84 legs were examined. The intra-muscular branching pattern and depths of the medial sural artery branches were analysed.

## **Results**

Three types of arterial branching pattern were identified within the medial gastrocnemius, demonstrating one (31%), two (59%) or three or more (10%) main branches. A dominant perforator from the medial sural artery was present in 92% of anatomical specimens (13/14). Vertically, the location of the perforator from the popliteal crease was on average 13cm (+/-2cm). Transversely, the perforator originated 2.5cm (+/-1cm) from the posterior midline. Using CT angiography it was possible in 10 consecutive patients to identify a more superficial intra-muscular branch and determine the leg with the optimal branching pattern type for flap harvest.

## **Conclusions**

This study is the first to describe the variability of the intra-muscular arterial anatomy of the medial head of gastrocnemius muscle. Surgeons utilizing the MSAP flap option should be aware of the possible branching pattern types and consequently the differing perforator distribution and depths of intra-muscular

branches. Routine use of pre-operative CT angiogram may help determine which leg has the most favorable branching pattern type and intra-muscular course for flap harvest.

## **The history of Tessier's skulls: an account of the inaugural Tessier skull exhibition, University of Paris Descartes, Paris, France**

**Dr J Dusseldorp, Dr F Firmin**  
Clinique Georges Bizet

Dr Paul Tessier is widely regarded as the father of modern cranio-facial surgery. Upon his passing in 2008, his private collection of human skulls was purchased by the Association Française des Chirugiens de la Face to ensure that the collection would remain in France. The first public exhibition of the skulls was held in the medical museum of the University of Paris Descartes in April 2014. From this collection of skulls and the imagination of Dr Tessier an entirely new specialty was created. Before his pioneering work, the interface between the cranium and the face was widely regarded as tiger country. To expose the brain to the facial sinuses posed too great a risk of infection for the patient. Surgery was reserved for patients with severe deformities and raised intra-cranial pressure. Cranio-facial surgery, as we now know it, is an integral part of any paediatric plastic surgery department. Cranial and facial osteotomies have also become commonplace in both traumatic and aesthetic surgery. The goals for cranio-facial deformity are now a return to completely normal appearance and function, as Dr Tessier always believed they should be.

## **Clinical considerations regarding auricular reconstruction in Treacher Collins-Franceschetti Syndrome: a personal series of 82 patients**

**Dr J Dusseldorp, Dr F Firmin**  
Clinique Georges Bizet

### **Introduction and Aims**

The patient born with Treacher Collins-Franceschetti syndrome has unique maxillofacial concerns and a treatment paradigm that is usually highly individualised. Auricular reconstruction can be more challenging due in part to anatomical features of the auricular region in this condition including thickness of the local skin, weak and insufficiently vascularised temporal fascia, and low position of the hairline.

### **Material and Methods**

Retrospective analysis of a personal series of 82 consecutive cases was performed. Results and supportive statistical analysis: Bilaterality, lobular type and a correlation between the extent of upper third dysmorphology and severity of auricular dysplasia were discovered. The course of the superficial temporal artery was also found to be ectopic in over 65% of the cases. Teenage patients were more likely to desire auricular reconstruction as their first major reconstructive procedure.

## Conclusions

Though possible to achieve excellent results, there can be a tendency towards low positioning of the ears and a lack of definition of the auricular features. This series demonstrates our approach and outlines the challenges faced in combining orbital, bi-maxillary and auricular reconstruction in this difficult patient group.

## The application of photochemical tissue bonding and acellular nerve allograft for large gap nerve injury

Mr N Fairbairn, Dr J Ng-Glazier, Miss A Meppelink, Mr M Randolph, Dr I Valerio, Dr M Fleming, Dr R Redmond, Dr J Winograd

Massachusetts General Hospital

## Introduction

Photochemical tissue bonding (PTB) uses visible light to create sutureless, watertight bonds between two apposed tissue surfaces stained with photoactive dye. When applied to nerve grafting, PTB can result in superior outcomes compared to conventional suture fixation. Following major trauma, demand for autogenous nerve graft may exceed supply. Acellular nerve allograft (ANA) is an alternative option although outcomes are typically inferior to autograft. It is the aim of this study to assess the efficacy of PTB when used with ANA.

## Methods

Twenty Lewis rats were randomised into two groups (n=10). All rats had 15mm left sciatic nerve defects created and repaired with ANA. ANAs were secured using either epineurial suture (group one) or PTB (group two). Outcomes were assessed using monthly sciatic function index (SFI), gastrocnemius muscle mass retention and nerve histomorphometry. Statistical analysis was performed using the unpaired t-test.

## Results

SFI did not differ significantly between suture and PTB groups after 5-months follow up (-80.3±4.2 vs. -78.3±5.0 respectively; p=0.3). Following sacrifice, all nerves were in continuity and showed evidence of regeneration. PTB repairs had less extraneural scar tissue formation in comparison to suture repair. Muscle mass retention did not differ significantly between suture and PTB groups (53.3%±6.9 vs. 55.2%±5.5 respectively; p=0.5). Histomorphometry is in progress.

## Conclusion

The advantage of PTB appears to be lost when applied to ANA. This may be related to the lack of schwann cells. These findings are important for the evolving experience with PTB and provide additional support for the technique as an efficacious, rapid alternative for sutureless nerve repair

## The surgical outcome of cleft lip and palate repair in Madagascar

**Mr M Fell, Miss E Farley**  
Ngwelezana Hospital

### **Introduction and Aims**

Operation Smile is an organisation providing free surgeries to repair cleft and/or palate (CLP) for children around the globe. A follow-up system has been designed to recognise and manage post-operative complications. This study aimed to assess the surgical outcome of the Operation Smile model when a large number of patients were treated in a resource poor setting.

### **Materials and Methods**

A prospective study was performed during a surgical mission in Antananarivo, Madagascar, April 2014 with Operation Smile South Africa. Patients with CLP were initially invited for screening then nominated for surgical treatment. All operated patients were asked to attend follow-up one week after their surgery where wound complications were recorded. Results were analysed via the non-parametric Chi Squared test.

### **Results**

783 patients came for screening and of these, 151 with CLP received surgical treatment. Ninetyone patients were male with a mean age of 2.5 years. All operations were primary closures comprising 116 cleft lips (87 unilateral and 29 bilateral) and 35 cleft palates. At 1 week follow-up, 140 out of 151 patients attended. There was one case of wound dehiscence in a cleft lip repair and five cases in the cleft palate repairs. The relative risk of a wound dehiscence in a palate repair was 13.3 compared to a lip repair at one week ( $p=0.012$ , 95%CI 1.47-355.84).

### **Conclusion**

The considerable demand for the provision of cleft lip and palate care was evident in Madagascar. Whilst cleft lip repairs had fewer complications than cleft palate repairs it can be argued that both operations should be offered to this patient cohort. Further work should be aimed at improving the outcome of palate repairs in this setting.

## **Microbiology of diabetic burn wound infections**

**Ms N Fennell, Mr T Dobbs, Mr I Goutos, Dr D Waghorn, Dr J O'Driscoll, Mr P Stephens, Mr M Tyler**  
Stoke Mandeville Hospital

## **Aim**

To review the microbiology of burn wound infections in diabetic patients and create an antimicrobial guideline to cover perioperative prophylaxis and treatment of established infections.

## **Introduction**

Diabetes mellitus is a worldwide epidemic, and the number of patients presenting to burns facilities with the disease is rising. This patient group has an increased risk of morbidity, particularly infections, associated with burn wounds.

## **Method**

Case note review of diabetic burn patients between 01/01/06 - 31/12/13 identifying cases with infections and the culture results from all relevant microbiology samples. Results were analysed and collaboration established between microbiology, plastic surgery and pharmacy to create the guideline.

## **Results**

Sixty seven diabetic patients were treated at the unit over the period of study, there was an infection rate of 39% (50% *Staphylococcus aureus*, 19% *Pseudomonas aeruginosa*, 15% *coliforms*). *Staph. aureus* infections occurred 5.7 days after burn injury whereas *coliforms* and *Pseud, aeruginosa* infections occurred at 9.6 days. There was one *streptococcal* infection and four cases of mixed bacterial growth.

## **Conclusion**

Current evidence suggests that burn wound infections in diabetic patients results from organisms including *MRSA*, *Streptococcus* and *Acinetobacter* or a mixed bacterial growth picture.

In contrast, our findings revealed the two classical pathogens in 70% of cases. This enabled us to produce a guideline with appropriate antimicrobial cover for prophylaxis and treatment based on local pathogen incidence and sensitivity patterns, taking into account appropriate dosing for diabetic burns patients where altered metabolism and distribution need to be considered.

## **Update on skin camouflage**

Ms N Fennell, Mr T Dobbs, Mrs S Kirby

Stoke Mandeville Hospital

## **Aims**

To provide a review of the most successful methods of skin camouflage in common skin conditions and to review patient satisfaction in those currently using skin camouflage.

## **Methods**

We collaborated with Changing Faces, the leading skin camouflage service in the UK to collate up to date photographs of successful skin camouflage together with details of methods of application used. We assessed whether these provided an acceptable aesthetic result in a panel of patients, therapists, doctors and members of the public. We distributed a patient satisfaction survey to those using skin camouflage

across the UK to assess accessibility of clinics, satisfaction with results and likelihood of recommendation of the service.

### **Results**

We have collated photography and details of application for camouflage of vitiligo, surgical scars, psoriasis, haemangiomas and burns scars. On average all were deemed an acceptable aesthetic result. Our 50 patient survey showed over 50% of patients had difficulty accessing a skin camouflage clinic. 82% of those using skin camouflage felt it had improved their confidence to deal with their skin condition and 95% would recommend the service to others.

### **Conclusion**

Successful skin camouflage in terms of an acceptable aesthetic result is achievable for several common skin complaints. Of equal if not more importance is the successful use of skin camouflage to improve a patient's confidence in dealing with their skin complaint. An important problem highlighted by our survey is the difficulty in accessing camouflage services; we present a schematic representation of the path of referral and for establishing a skin camouflage clinic as a start to improving accessibility of this valuable service.

## **The Emergency Management of Severe Burns (EMSB) Course: a 16-year experience in the UK**

**Miss Lyndsey Highton, Mr Kian Tan, Mr Nadeem Khwaja**  
Wythenshawe Hospital

### **Introduction and Aims**

The EMSB course was introduced to train healthcare professionals in the emergency management of major burns. The purpose of this study was to evaluate the experience over 16 years of running the course in the UK.

### **Material and Method**

We evaluated data collected prospectively between 1997 and 2013; specifically looking at which healthcare professionals were completing the course and which specialty they were from. In addition, we evaluated participant feedback data on general and specific course elements collected between 2004 and 2009.

### **Key Results**

A total of 4024 participants attended EMSB courses between 1997 and 2013. 176 (160 candidate and 16 instructor) courses were conducted (mean 10/year) in 16 locations across the British Isles. A mean of 24 participants took part in each candidate course and seven in each instructor course. The course fees started at £125; increased to £175 in 2003; and £295 in 2012.

The majority of participants were doctors (50%) and nurses (47%) followed by paramedics (2%) and other healthcare professionals (1%). Participants' specialty backgrounds consisted of burns and plastic surgery (53%), emergency medicine (18%), armed forces (12%), anaesthetics/intensive care (10%) and others (7%). The mean pass rate of the courses was 90%.

Participant evaluation data collected 2004-2009 showed that for each of the 17 elements of the course, at least 97% of candidates gave positive feedback (rated either Excellent (47%), Good (47%) or Satisfactory (8%).

### **Conclusion**

The EMSB course remains accessible to different healthcare professionals across the UK. However, an increase in participation by emergency medicine and paramedic staff should be encouraged as the course was originally designed for them.

## **3D morphometric analysis: an objective tool for understanding craniofacial development and planning reconstruction in congenital mid-face deformities**

**Ms A Ibrahim, Dr P Ferretti, Mr M Suttie, Mr N Bulstrode, Mr J Britto, Professor P Hammond**  
UCL Institute of Child Health and Great Ormond Street Hospital

### **Introduction**

1:1000 children are born with a craniofacial defect and may require multiple invasive surgeries. Hemifacial Microsomia (HM), an asymmetric cluster of anomalies, is the second most common cause of congenital craniofacial deformity. Treacher Collins Syndrome (TCS) is characterized by zygomatic hypoplasia. We focus on these conditions initially as they have wide phenotypic variation, overlap and are due to errors in patterning rather than bone differentiation.

Morphometric Analysis (MA) is a technique for quantifying variation in shape and size. We use it to construct an objective model of midface development in control, HM and TCS children aiming to improve reconstructive accuracy.

### **Methods**

Midface skeletal and soft tissue surfaces were extracted from 91 CT scans of children (72 control, 13 TCS and 6 HM) aged 0-16 years. Fifty one skeletal and 23 soft tissue landmarks were used to induce a dense surface correspondence of 25k points enabling calculation of mean and Principal Components (PCs). PCs accounting for 99% of variation were used to build a 3D Dense Surface Model (DSM) for synthesis of midface structures.

### **Results**

Growth, variation, symmetry and relationship between bone and soft tissue were quantified. Soft and hard

tissue midface shapes of affected children were normalized against age-sex matched controls and visualised as heat maps of differences.

### **Conclusion**

MA of routine CT scans was used to construct an objective model of normal midface development for comparison with TCS and HM patients. This approach can also be used as a postoperative monitoring tool. In future, the model will be used to calculate a more normal midface shape for individual TCS and HM patients thus providing a more accurate tool for planning reconstruction.

## **The correlation between magnetic resonance imaging and intraoperative findings in traumatic preganglionic nerve root (avulsions) of the brachial plexus**

Mr V Itte, Mr M Kolar, Dr J Rankine, Miss G Bourke  
Pindersfield Hospital

### **Introduction**

Adult traumatic brachial plexus injuries(TBPI) is a common occurrence in polytrauma which results in severe impairment in upper limb function. The diagnosis between nerve root avulsions and rupture is vital as treatment strategy and prognosis vary considerably.

### **Aims**

To correlate the accuracy of MRI in detection of nerve root avulsions in TBPI against intra operative findings.

### **Material and Methods**

Sixty six patients with polytrauma were referred or directly admitted to the plastic and reconstructive surgery unit in Leeds General Infirmary with closed brachial plexus injuries over eight years. MRI cervical spine and brachial plexus was performed on 22 patients presenting with closed traumatic brachial plexus injuries. The results were compared with intraoperative findings and subsequent clinical recovery.

### **Results**

Of 75 Nerve roots studied by MRI, 35 avulsions were found. Surgical exploration detected 23 true-positive avulsions (66%), 12 false-positives (34%), 35 true-negatives (87.5%) and five false-negatives (12.5%). These findings demonstrate a sensitivity of 82.14%, specificity of 74.47%, positive predictive value 65.7% and negative predictive value of 87.5%.

### **Conclusion**

This study suggests that early MR imaging in brachial plexus injuries provides vital information in detection of level of nerve root avulsions and identification of extra spinal injuries.

# **A novel barbed suture tie-over dressing for skin grafts: a comparison with traditional techniques**

**Mr C W Joyce, Mr K M Joyce, Miss N Mahon, Mr J Chan, Mr C Sugrue, Professor P Dockery, Mr S M Carroll, Mr J L Kelly**

University Hospital Galway

## **Introduction**

Barbed suture devices have a widespread application in plastic surgery. The unidirectional nature of the barbs facilitates a strong grip on tissues and reduces the need to constantly tension the suture manually. We hypothesized that a barbed suture tie-over suture to secure skin grafts would be quicker to perform than traditional tie-overs and would also exert a greater downward pressure on the skin graft.

## **Methods**

Thirty uniform areas of skin were excised from a cadaver. A pressure transducer was placed on the wound bed and covered with the excised skin along with a mineral oil-soaked wool dressing to act as a bolster. Three different sutures were used to secure the graft in place and the pressure was recorded. The tie-over techniques used were the classic silk tie-over, a running Vicryl Rapide™ tie-over and a running barbed tie-over.

## **Results**

The differences between the groups were found to be extremely significant ( $p < 0.0001$ ). The running barbed tie-over exerted the most downward pressure ( $82.8 \pm 7.3$  mmHg) compared to the silk ( $46 \pm 4.85$  mmHg) and the Vicryl Rapide™ ( $18.6 \pm 2.4$  mmHg). Furthermore, the barbed tie-over was the quickest to perform ( $1:45 \pm 22$  seconds) when compared to the Vicryl Rapide™ ( $02:57 \pm 27$  seconds) and the silk tie-overs ( $04:26 \pm 39$  seconds).

## **Conclusion**

Barbed sutures are a viable option for securing skin grafts. They are quick to perform and provide significantly improved downward pressure on the skin graft. We feel that this technique would be especially suited to the sole operator as it can be carried out without the need of an assistant.

# **Craniometric analysis of posterior versus transverse cranial vault distraction**

**Miss P Karunakaran, Dr E Laffan, Mr D Murray, Mr J Caird**

National Paediatric Craniofacial Centre, Temple Street Children's University Hospital

## **Aim**

Surgery in craniosynostosis is aimed at expanding intracranial volume (ICV) to prevent/alleviate raised intracranial pressure (ICP) and for cosmetic improvement. Cranial vault distraction (CVD) which induces osteogenesis by providing traction on bone fragments has recently replaced more radical craniectomies. The purpose of this study was to determine the efficacy of posterior and transverse CVD in increasing ICV.

## **Method**

Patients who underwent CVD in our unit from 2010-2014 were stratified into two groups according to the type of distraction; transverse (TCVD) or posterior (PCVD). Osirix® software was used to derive volume changes from pre-and post-operative CT scans. Data was analysed using paired Student's t-test.

## **Result**

TCVD: n=13, mean age at surgery was 2.9 years. Twelve patients had non-syndromic sagittal synostosis and one patient had Pfeiffer's. Mean ICV increase was 15.8% ( $p < 0.0001$ ). Cranial indices normalized with a mean change of 6.8% ( $p < 0.0001$ ). Mean distraction distance was 22mm.

PCVD: n=10, mean age at surgery was 2.4 years. All patients had syndromic synostosis (Apert syndrome or Crouzon/Pfeiffer spectrum). Mean ICV increase was 35.5% ( $p < 0.0001$ ). Cranial indices normalized with a mean change of 9.1% ( $p < 0.0552$ ). Mean distraction distance was 22mm.

No major complications recorded.

## **Conclusion**

This is the first study to quantify craniometric changes in CVD-treated non-syndromic sagittal synostosis, revealing statistically significant ICV expansion and cephalic index normalisation. Our analysis highlighted an important advantage of PCVD; it achieved 19.7% greater expansion in ICV per millimetre distraction compared to TCVD and is therefore preferable where primary aim of treatment is to correct raised ICP.

## **A five-year follow-up study of 633 cutaneous SCC excisions: rates of local recurrence and nodal metastasis**

Mr K Khan, Mr R Mykula, Mr R Kerstein, Mr N Rabey, Mr T Bragg, Mr W Bestwick, Miss A Crick, Mr S Heppell, Mr P Budny, Mr M Potter  
Oxford Deanery

## **Introduction**

A five year follow-up study of 633 cutaneous SCC excisions (JPRAS 2013, 66: 467-471) across four regional plastic surgical units was performed collecting data on rates of local recurrence and nodal metastasis.

## **Methods**

A retrospective analysis of patients was performed across four regional plastic surgery centres (Stoke Mandeville Hospital, Aylesbury, John Radcliffe Hospital, Oxford, Salisbury District Hospital, Salisbury, and Queen Alexandra Hospital, Portsmouth) assessing rates of local recurrence and nodal metastasis.

## **Results**

The previously published study had identified 633 eligible SCC excisions with an overall incomplete excision rate of 7.6%. Ninety-four percent (45/48) of incomplete excisions involved the deep margin. We were able to follow up 542 of the original 633 SCCs (86% follow-up rate) across the four units. The total recurrence rate (local recurrence and nodal metastasis) was 6.1% (n=29) at five years, with 91% of these occurring within two years (1-22 months). Median time to local recurrence was 7.2 months (1-57), with 58% undergoing further wide local excision. Median time to lymph node metastasis was 6.6 months (2-9) with 30% demonstrating perineural invasion on original histopathology. Overall only 17% of the incomplete excisions of the original study recurred, 83% of these locally.

## **Conclusions**

This study is one of the largest studies to date following up 633 SCC excisions at 5 years with total recurrence rates comparable to current published literature. Of note, 91% of total recurrences occurred within two years in contrast to current guidelines (75% at two years, 95% at five years) suggesting shorter length of hospital follow up may be reasonable. We present further subset analysis of high and low lesions.

## **Surgical stump revision: the East Grinstead experience**

**Mr I King, Mr J Jeevaratnam, Mr W Cobb, Miss T Cubison**

Queen Victoria Hospital

We present a consecutive series of 100 amputees managed at the Queen Victoria Hospital in East Grinstead, over the five year period 2009-2013. Two-thirds of these amputees were Military patients. The majority of our cohort were male (86%) and ages ranged between two to 85 years old.

We discuss how our experience has developed over the last five years and compare our military and civilian populations. Conditions such as heterotopic ossification present in 44% of our trans-femoral military amputees, were very rare in our civilian population. Neuromas, though frequent in both groups, were more common in the trans-tibial amputee.

The management of these patients requires a full multidisciplinary approach, particularly in the challenging area of pain management. Post-operative complications are common and combining traditional principles,

such as delayed primary suture, with more modern techniques, such as topical negative pressure dressings, together with the development of strict peri-operative protocols, have led to improved outcomes.

## **Sensor-guided free flap surveillance in the acute post-operative period**

**Dr R Kwasnicki, Dr C Chen, Miss M Zegeye, Mr S Hettiaratchy, Professor G Yang, Professor A Darzi**  
Hamlyn Centre, Imperial College London

### **Introduction**

Free tissue transfer provides reconstructive options in the setting of trauma and cancer. Post-operatively flap complications have significant cost and patient implications. Technologies facilitating continuous flap monitoring have shown improved salvage rates, yet the size and associated costs may negate the advantages they deliver.

The aim of this study was to optimise the cost-effectiveness and accessibility to continuous flap monitoring through the development and validation of a wireless, wearable sensor.

### **Methods**

A flap failure model was designed using a brachial pressure cuff inflation protocol. Twenty healthy subjects were recruited. The forearm of each subject was monitored throughout the pressure cuff protocol using a bespoke optical sensor (Imperial College London), and the current gold standard equipment (O2C). Data were processed to allow quantitative deoxygenation episode comparisons between inflations, and sensor modalities.

### **Results**

The correlations between O2C and optical sensor oxygenation measurements were moderate to strong ( $R = 0.672$ ,  $p < 0.001$ ). Incremental increases in cuff inflation duration resulted in a linear increase in deoxygenation values with both O2C and optical sensors, with significant differences recorded on consecutive inflations ( $WSR, p < 0.005$ ). The presence or absence of pulsatile blood flow was correctly determined throughout.

### **Discussion**

This study demonstrates the ability of a wearable optical sensor to detect and quantify tissue oxygenation changes, and assess the presence of pulsatile blood flow. Early detection of flap failure and aetiology has the potential to improve salvage rates and therefore the cost-effectiveness of the reconstructive service.

## **Poly Implant Prosthèse™ (PIP) experience in the UK: the radiological and operative findings of 1029 implants**

**Mr J Leckenby, Mr J Chana, Mr D Harrison, Mr A Grobbelaar**  
The Royal Free Hospital

The Poly Implant Prosthèse™ (PIP) scandal has caused patients and surgeons anguish and is an example of poor policing of government regulatory bodies. This resulted in psychological and financial stress to both parties as a consequence of the non-standardised instructions issued by the regulatory bodies. This study presents the operative findings of three surgeons.

517 patients were identified retrospectively from the implant database as having received PIP implants with a total of 1029 implants. Sixty-two patients (124 implants) declined explantation after consultation and imaging. Explantation data was recorded prospectively. All patients had pre-operative screening radiologically and the operative findings were recorded at the time of surgery.

A total of 905 implants were removed of which 129 were found to be ruptured at the time of explantation (14.25%). Twenty-seven implants were found to be intact but the presence of liquid surrounding the prosthesis was noted. Radiologically 83 implants were reported as being ruptured resulting in a test sensitivity of 0.81 and a specificity of 0.93 yielding a false positive rate of 0.37 and a false negative rate of 0.03. Capsule formation was noted in 27 breasts (3%).

This study shows that PIP rupture rates are comparable to other manufacturers. Implant rupture rates predictably increased over time and the rate of abnormal capsule formation was similar to other manufacturers. The findings suggest that many patients underwent unnecessary surgery at great physical, psychological and financial costs. To avoid similar catastrophes in the future, it is imperative that instructions issued by regulatory bodies must be based on sound evidence.

## **Facial nerve regeneration through grafts: serial section electron microscopy analysis with clinical outcomes in rodents.**

**Mr J Leckenby, Dr K Rolfe, Professor J Lichtman, Mr A Grobbelaar**  
The Royal Free Hospital

### **Introduction**

Many methods exist which allow the regenerating nerve to be studied in detail, however, few studies have combined the results of axonal regeneration with a clinical outcome. Many factors affecting nerve regeneration are known but the role different autologous grafts play is poorly understood with relation to their axonal loads.

The aim of this research was to assess facial nerve regeneration through different autologous grafts.

### **Methods**

Three groups of wild-type mice had surgery performed on the posterior auricular nerve (PAN), a branch of the facial nerve: one) Direct nerve repair (DNR), two) Small nerve graft (SNG) and three) Large nerve graft (LNG). Each group was evaluated using stereo-imaging tracking of ear movement as a clinical measure of nerve recovery. Biopsies were taken proximal and distal to the nerve repair and from within the grafts.

Electron microscopy was used to image serial sections with RhoANA™ software to automatically segment axons.

## **Results**

Axon counts were significantly reduced after a direct nerve repair was performed. Within the nerve graft group, axon counts were significantly reduced within the graft and again after the graft. The LNG group had higher axonal counts and better clinical outcomes than the SNG group.

## **Conclusions**

A novel application of serial section imaging using electron microscopy is presented which allows each axon to be traced in detail previously not obtained. It is possible to reconstruct the process of an axon regenerating in 3-D using principles learned from 'connectomics' to try and understand which factors improve the chances an axon has at crossing a neuroorrhaphy. The results suggest that, where possible, a graft with the highest axonal count should be used to obtain the best results.

## **Management of the eye in facial palsy: an algorithmic approach based on over 35 years of experience**

**Mr J Leckenby, Mr S Ghali, Mr A Grobbelaar**

The Royal Free Hospital

Facial palsy patients suffer an array of functional and psychological problems. With regard to the eye, lacrimation, lagophthalmos and the inability to spontaneously blink are the main issues and if left untreated can compromise the cornea and vision. There are many treatments available and the surgeon has the challenging prospect of choosing the correct intervention to yield the best outcome. The treatment options and indications can be broken down into static and dynamic modalities. We propose a treatment algorithm for the brow and the eye.

A prospective chart review was performed for all patients with facial paralysis (complete or incomplete) those requiring treatment for their brow or eye were included. A total of 70 patients fulfilled the criteria and 74 operations were performed involving 13 different procedures. Four patients required revisions and the mean follow-up was 23 months (8-37 months). An additional 33 patients elected to have Botox® on a regular basis.

The management of the eye in facial paralysis is not only challenging from a decision-making perspective but also from a technical aspect. Care should be taken to assess the influence of the brow on eye closure and as a general principle this should be addressed first. For the eye, the upper lid should be addressed before the lower lid. Typically a combination of lid loading, lateral tarsorrhaphies and lower eyelid slings are the most frequently carried out procedures on the eyelids in facial paralysis patients.

We have developed algorithms based on more than 100 cases and 35 years' experience that aims to help guide the surgeon how best tailor the approach to a specific patient. Consequently all patients treated over the last 5 years were managed according to our algorithms.

## **Skin-specific immunobiology of vascularised composite allografts in tolerance and acute rejection**

**Mr D Leonard, Mr H Powell, Mr A Albritton, Mr C Mallard, Mr K Shanmugarajah, Dr J Kurtz, Dr C Cetrulo, Jr**  
Massachusetts General Hospital

### **Introduction and Aims**

We have previously reported vascularized composite allograft (VCA) tolerance in a large animal model. Tissue-specific mechanisms appear critical to VCA outcome. In this study we aimed to characterize the skin immune system in VCA tolerance and acute rejection.

### **Methods**

MGH miniature swine (n=2) underwent VCA and hematopoietic mixed chimerism-mediated tolerance induction. Control animals (n=2) received VCA alone. Serial VCA and host skin biopsies were analysed by immunohistology and flow cytometry. Leukocytes were isolated from epidermis and dermis and analysed for lineage (CD3, CD4, CD8, g/d T cells, MHC Class II, Langerin) and donor/host origin.

### **Key Results**

Mixed chimeras demonstrated VCA tolerance with no evidence of rejection. VCA dermis contained 20-30% host-derived T cells two weeks post-transplant. Epidermis contained 5-15% host-derived Langerhans' cells. Infiltration of host dermis and epidermis was also observed with equilibration of chimerism in VCA, host skin and peripheral blood by day 150. Control VCAs were rejected by day eight; donor-derived T cells and Langerhans' cells were rapidly replaced with host counterparts and MHC Class II<sup>+</sup> inflammatory cells.

### **Conclusions**

Establishment of chimerism in skin-resident immune cells correlates with VCA tolerance. Rapid infiltration of host T cells without rejection suggests that tolerance is induced rapidly by mixed chimerism.

## **Impact of vitamin D testing at a tertiary referral melanoma service**

**Dr M Lo, Miss J Maraka, Dr J Garioch, Professor G John, Mr M Moncrieff**  
Norfolk & Norwich University Hospital

## **Introduction**

Malignant melanoma patients are advised to avoid sun exposure to reduce further melanoma risk. However this can render patients vitamin D deficient with long term health consequences. We examined all melanoma patients undergoing vitamin D testing over a one year period to determine the effects of sun avoidance advice.

## **Methods**

A total of 307 melanoma patients who had undergone vitamin D testing from May 2013 to April 2014 at time of diagnosis or at routine follow up were reviewed. Patient demographics, histological characteristics and vitamin D levels were analysed.

## **Key Results**

102 patients underwent vitamin D testing at primary diagnosis, 189 at routine follow up and 16 at recurrence. Median age was 66 years (21-90 years); there was equal male to female distribution (153:154). Normal range of vitamin D level was 50-120 nmol/L. Analysis showed overall incidence of de novo vitamin D deficiency at 46%, compared to 55% of patients being vitamin D deficient at more than 24 months post primary diagnosis; this is statistically significant ( $p=0.017$ ). Age was also a significant contributing factor to vitamin D deficiency both in the primary and routine follow up groups; patients aged  $\geq 65$  years were more likely to be vitamin D deficient ( $p=0, P<0.001$ ).

## **Conclusion**

Vitamin D deficiency has long term implications not only to bone health; there is increasing evidence showing association with other diseases. Moreover, suboptimal vitamin D levels are linked to poorer survival following melanoma as shown in the Leeds Melanoma Cohort. Our study has shown that advising melanoma patients to avoid sunlight attributes to vitamin D deficiency and therefore it is imperative that we continue to monitor vitamin D levels and provide supplementation as required.

## **The use of Strattice® in implant-based breast reconstruction: the Manchester experience**

**Mr Y Loong Loo, Mr A Hussain, Mr J Murphy, Mr S Wilson**

University of Manchester

## **Introduction**

Porcine acellular dermal matrix (ADM) (Strattice®) has been in use since 2008 and revolutionised implant based breast reconstruction. ADM offers patients a one-staged reconstruction instead of the traditional two-staged reconstruction using a tissue expander. Use of ADM does however introduce additional cost and increased operating time. We designed this study to establish whether these justify the final results in terms of outcome and complication rate.

## **Method**

A retrospective cohort study review of patients who underwent implant based breast reconstruction using Strattice® between March 2009 and May 2014. Data were collected using a standardised study proforma.

## **Results**

A total of 269 breast reconstructions were carried out in 193 patients. 161 mastectomies were for invasive disease, 77 were risk-reducing procedures and 31 cases were revisional or delayed surgery. Complications were seen in 43 breasts (16.0%). These included infection in 25 breasts (9.3%) of which 15 were minor and 10 major infections leading to implant loss. Skin necrosis occurred in 11 breasts (4.1%), resulting in removal of implant in two breasts, and implant exposure in two breasts (0.7%). Hematoma were found in six breasts (2.2%), one of which had an implant loss. Overall implant loss in 13 breasts (4.8%). Seroma was present in 12 patients in this series (6.2%).

## **Conclusion**

Over a mean follow-up of 25.4 months (range 1-60 months), our experience with Strattice® resulted in a good outcome in the majority of patients. Our complication rates and cost effectiveness will be discussed, and compared to those from other published series.

# **Postoperative patency of lymphaticovenous side-to-end anastomosis and outcomes of combination of surgery and combined decongestive physiotherapy for treatment of breast cancer-related lymphoedema**

**Professor J Maegawa, Dr S Matsubara, Dr T Mikami, Dr K Hirotsuki, Dr S Kitayama**  
Yokohama City University School of Medicine

## **Introduction**

There are few reports on results of combination of combined decongestive physiotherapy (CDP) and lymphatico-microsurgery in upper limb lymphedema. We report patency of lymphaticovenous side-to-end anastomosis (LVSEA) by real-time lymphangiography and outcomes of combination of CDP and LVSEA in breast cancer -related lymphedema. The aim of this study is to evaluate volume changes of the affected limbs and patency of the anastomoses.

## **Methods**

Between 2006 and 2012 34 limbs of 34 patients with pre-and postoperative CDP by one institute and LVSEA by one surgeon were evaluated. All of them had breast cancer-related lymphedema. Volumes of the upper limb were calculated pre- and postoperatively. Patency of 114 anastomoses of the 28 patients was evaluated by real-time ICG fluorescence lymphangiography after surgery.

## **Results**

The mean volume of the affected limb was 1232ml at the initial visit, 1173ml before surgery, and 1146ml after surgery. There were statistical differences between the volumes at initial visit and before surgery, and before and after surgery. Out of 114 anastomoses 56(49%; 56/114) were detectable. Out of 56 detectable

sites 25 (38%; 25/56) were patent. At the sites where the anastomoses were not patent we observed three patterns of images by ICG fluorescence lymphangiography, stop of lymph flow, lymph flow through the anastomoses but not to the vein, and lymph collaterals. Regarding the compressive garments, about a half of the patients became freed from putting the garments after surgery.

### **Conclusions**

Combination of CDP and LVSEA is effective to improve lymphedema in the breast cancer related patients.

## **Immunohistochemistry staining for detecting BRAF mutations in metastatic melanoma patients; A UK feasibility and validation study**

**Miss J Maraka, Miss M Lo, Dr L Igali, Dr J Nobes, Dr J Garioch , Mr M Moncrieff**  
Norfolk and Norwich Univeristy Hospital

### **Introduction**

Detection of presence of the BRAF mutation in patients with melanoma is essential in order to assess the patients eligibility for BRAF inhibitors. Prior to this study all patients managed in our specialist skin MDT required samples to be sent away for genetic testing at one of the national molecular testing centres using the COBAS technique.

### **Methods**

All samples sent for genetic testing for detection of the BRAF mutation over a 26 month period were blindly tested using the VE1 monoclonal antibody immunohistochemistry (IHC) stain.

### **Results**

Samples from 129 patients were identified. This included 11 primary melanoma samples, nine sentinel lymph nodes, 65 metastatic lymph node samples, 11 distant metastatic samples, and 34 skin deposits. All of the patients were stage III or stage IV, except one. There was a 94.6% (122/129) concordance rate, with a sensitivity of 92.2% (47/51) and a specificity of 96.2% (75/78).

### **Conclusion**

This study demonstrates that the IHC staining has excellent sensitivity and specificity to detect the BRAF V600E mutation. Discrepancies between the two techniques are likely to result from the inability of the molecular technique to detect a mutation on small tumour deposits in sentinel node biopsies and an inability to distinguish between V600E & V600K mutations. We suggest that the IHC staining technique is an effective first line diagnostic tool in the assessment of BRAF status, with molecular testing necessary for the IHC negative cases only. It also has the major advantage of rapid availability for cancer centres diagnosing melanoma without local access to molecular testing.

## **Collagenase clostridium histolyticum outcomes in a single unit**

**Mr F Marlborough, Mr W Bhat, Mr A Al-Mousawi, Mr J Auyeung, Mr P Sugden, Mr M Erdmann**  
University Hospital North Durham

### **Introduction**

Collagenase clostridium histolyticum (CCH) is nonsurgical treatment for Dupuytren's. Our aim was to evaluate outcomes of CCH in our unit.

### **Materials & Methods**

Finger joint angulation was measured before, immediately after and six weeks following CCH in all patients since 2012. A validated, Dupuytren's specific patient reported outcome measure (Unite Rhumatologique des Affections de la Main, "URAM") was used before and six weeks after CCH. A higher URAM score represents greater functional impairment. Complications of treatment were recorded. A tenth question was added to the nine question URAM questionnaire to assess cold intolerance following CCH.

### **Results**

Seventy six patients were included (average age 66, male:female ratio 3.5:1). The cohort underwent 101 injections with CCH (66 right hands, 35 lefts). URAM responses were received from 49/76 (64%) patients. Mean pre-treatment URAM score (out of a maximum 45) was 20.2 vs 5.1 at six weeks. This difference was statistically significant ( $P < 0.001$ ) (paired two-tailed T Test). Mean pre-treatment joint angle was 54.2 degrees vs 11.1 degrees at six weeks. This difference was statistically significant ( $P < 0.001$ ) (sign test). Mean joint angulation improvement between pre CCH and six weeks was 42.9 degrees. Thirty three skin tears and three haematomas occurred, with all successfully managed conservatively. No patients reported any degree of cold intolerance and no "serious adverse effects" (e.g. tendon rupture) occurred.

### **Conclusions**

Significant improvements in joint angulation and URAMs occurred. Complication rates were low. No patient reported cold intolerance. CCH is a safe, effective treatment option for Dupuytren's contracture and we advocate it as first line in appropriate patients.

## **Epidemiology and the socio-economic factors associated with burn injury in a supraregional burn unit: a nine-year study**

**Mr N Marsden, Miss C Battle, Dr E Combellack, Dr K Morris, Professor I S Whitaker, Professor P A Evans**  
Welsh Centre for Burns & Plastic Surgery, Morriston Hospital

### **Introduction**

In recent years, prevention strategies have played a part in reducing the incidence of burns by 30%. Low socioeconomic status (SES) is thought to be associated with an increase risk of burn injury, however there have been limited large population longitudinal studies to validate these claims. We one) review the epidemiology of burns presenting to a supraregional burns unit over a 9-year period, two) investigate the

association between SES and burn injuries, and three) identify at risk groups to target with prevention strategies.

### **Methods**

A nine year retrospective study of all burn presentations to a supraregional burn unit (June 2005 - April 2014) was performed in order to investigate the correlation between SES and burn injuries. Demographic and injury data was collected via the trust 'Information portal'. The Welsh Index of Multiple Deprivation (WIMD) 2011 was used as our score for socio-economic status.

### **Results**

6441 burns were identified, with 705 (10.9%) requiring admission. Grouping the burns by socioeconomic status showed a clear trend, with the patients in the three lowest SES deciles accounted for twice as many burns when compared with the three highest SES deciles (40% vs. 20%). There was also a clear association between burn aetiology and SES.

### **Conclusion**

Geographical area and socioeconomic deprivation are risk factors for burn injuries in our supregional catchment area (n=10million). We discuss the reasons behind this and further refinements in prevention and education strategies.

## **A single centre cost-comparison analysis of collagenase injection versus surgical fasciectomy for Dupuytren's contracture of the hand**

**Mr S Mehta, Mr H Belcher**

Queen Victoria Hospital

### **Introduction and Aims**

The options for treating patients with Dupuytren's contracture have broadened with the introduction of collagenase. Although the literature would suggest that collagenase treatment is effective, has few complications and is popular with patients, it has not been widely commissioned by the National Health Services of the United Kingdom and other European countries due to concerns about cost. The aim of this study was to compare the cost of surgical fasciectomy to collagenase injections for the treatment of Dupuytren's contracture in a single centre.

### **Materials and Methods**

Prospective data on 40 patients undergoing fasciectomy or collagenase injection (20 patients in each group) was collected between January and March 2013. Financial data on the costs of the procedures, equipment, theatre time and follow-up appointments were calculated.

### **Results**

The average cost of an open partial fasciectomy pathway was £7115.34 and a collagenase pathway £2110.62. Eight collagenase patients had physician led follow-up appointments and only three had hand physiotherapy

appointments. In contrast, every fasciectomy patient had at least one physician and one physiotherapist follow up appointment routinely.

### **Conclusion**

The results of this study demonstrate that collagenase treatment for Dupuytren's contracture of a single-digit in selected patients is just over £5000 less than treatment for the same condition using surgical fasciectomy. Collagenase treated patients require much less physician and physiotherapist led post-operative follow-up.

## **Should AJCC stage III melanoma patients with ambiguous lymphatic drainage be offered sentinel lymph node biopsy?**

**Mr M Moncrieff**

Norfolk & Norwich University Hospital

### **Introduction**

The major of benefits of sentinel lymph node biopsy (SLNB) for melanoma patients include accurate prognostic information, excellent regional disease control and a survival advantage for those diagnosed with micrometastatic disease. It is routinely offered to clinically N0 patients. However there is a certain cohort of patients who, at primary diagnosis, present with palpable metastases in a nodal basin (N+) who could potentially be harbouring synchronous micrometastases due to the location of the primary and its ambiguous lymphatic drainage.

### **Methods**

Analysis of prospective databases for the period 2008-14 to assess the incidence of the scenario and the potential risk to our patients for the unmanaged micrometastatic disease.

### **Results**

436 cases between 2008-2014 were identified. 170 (39%) of centrally located primaries had more than one draining lymph node field. In a 12-month period (2012-3), seven cases were identified fitting the criteria of N+ with ambiguous lymphatic drainage. Five patients had primaries located on the torso and two on the head and neck. This represented 8% of the lymphadenectomy and 3% of the SLNB workloads for that period. Further analysis also demonstrated that patients with undiagnosed micrometastatic disease had a significantly increased risk of developing extracapsular spread ( $p=0.013$ ) and these patients relapsed more rapidly ( $p=0.011$ ).

### **Conclusions**

We suggest that SLNB should be extended to primary presenting AJCC stage III, N+ patients with ambiguous lymphatic drainage to improve regional control and disease-free survival rates and to prevent significant morbidity as a direct consequence of diagnostic delay and progression to palpable disease.

# Complete-margin real time frozen section histological examination of high-risk, recurrent and incompletely excised non-melanoma skin cancers

Mr M Nizamoglu, Miss H Douglas, Dr B Mathew, Mr P Matteucci, Mr C Vize  
Castle Hill Hospital

## Background

Primary excision rates of non-melanoma skin cancers (NMSC) form audit analysis in most plastic surgery units. Skin cancers that are incompletely excised, recurrent or high risk for incomplete excision are often offered Moh's micrographic surgery as gold standard. However, waiting times and geographical access for this service vary across the UK, impacting upon patient preference for other treatments. Our unit offers excision of such lesions under complete-margin real time frozen section histological examination, often with same day reconstruction.

## Methods

A retrospective review was performed of all NMSC excised using complete margin frozen section histological examination was performed from 2010-2014. Number of excisions required, complete excision rates and recurrences to date were analysed.

## Results

Sixty eight cases were reviewed and results are summarised in the tables below:

Mean age (years)	Mean number of excisions	Complete excision rate	Recurrence	Mean follow-up (months)
71	1.3 (range 1-2)	99%	0%	8.6 (range 1-31)

	In primary specimen	In 1 <sup>st</sup> FS margin	In 2 <sup>nd</sup> FS margin
Excision	56%	16%	28%

## Conclusion

Rates of excision and recurrence of high-risk NMSC's excised at our unit are comparable to those reported with Moh's micrographic surgery, though we fully concede longer follow-up is required to state this with certainty. 44% of patients examined would have had incomplete primary excision margins, justifying the use of this technique in this group. The real-time element allows surgeons to operate on other cases whilst histological examination is performed, returning the patient to theatre later in the list. We suggest this technique is a safe and useful alternative to Moh's in circumstances which may prohibit its use.

# Changing Faces practitioners, supporting patients with the psycho-social impact of disfigurement: outcomes for the first twelve months of a new NHS integrated post

Ms E Noble, Ms S Cheatele, Ms O Duncan, Dr F Mehendale

Changing Faces

## Introduction & Aims

Psychosocial support from Changing Faces(CF) complements multidisciplinary cleft/craniofacial services, including psychology. However, families given information about CF may hesitate to make contact by phone or online. This audit reports on a collaborative project to bring this support 'closer' to patients by setting up the first Changing Faces Practitioner(CFP) post within the NHS.

## Material & Methods

A 0.5wte CFP based in Paediatric Psychology, Royal Hospital for Sick Children, Edinburgh (managed jointly by Psychology and CF) worked with plastic surgery and cleft services from Aug 2012-Aug 2013.

Patients (63 cleft-service, 56 other facial disfigurements) received one-off interventions in outpatients or ongoing sessions/home visits where additional support was required.

Outcome measures were implemented before and after every session. Service evaluation questionnaires delivered 72 months post-session by independent assistant-psychologist. Qualitative feedback gathered from patients. Survey and interviews conducted with Multi-Disciplinary Team.

## Key Results

Patients' frequently identified goals were-

Managing questions/comments regarding appearance

Dealing with teasing/bullying

Support with treatment decisions

Patients/parents reported one-off interventions were very helpful/helpful (98%) and ongoing sessions were very helpful/ helpful (100%) in addressing these goals.

All clinicians reported CFP integration improved services. The CFP post has been funded for a further two years.

## Conclusions

Results suggest integration of a CFP into NHS pathways/services improves quality of care for patients with disfiguring conditions.

# The role and impact of reconstructive surgery in treating head and neck cancer: a national outcomes analysis of 11,841 reconstructions

Mr R Nouraei, Mr O Branford, Miss C Lau, Mr S Wood, Mr A Mace, Mr P Clarke, Mr N Jallali  
Imperial College Healthcare NHS Trust

## Introduction and Aims

Reconstructive surgery is frequently the most complex aspect of surgically treating head and neck cancer. Its quality may influence the overall outcome of treating patients with head and neck cancer. We undertook a national analysis of treating head and neck cancer requiring flap-based reconstruction.

## Material and Methods

A bespoke health informatics algorithm was constructed and validated against local data. It was used to query Hospital Episode Statistics (HES) dataset to ascertain cases.

## Results

The algorithm had a sensitivity of 92% and a specificity of 99% for identifying major head and neck cancer surgery including flap-based reconstruction. It identified 11,841 patients between 2003 and 2012. There were 7776 males and mean age at surgery was 62 years, with 37% of patients having high levels of pre-existing morbidities. There were 7,834 (66%) oromandibular resection and 2,849(24%) patients had reconstruction following pharyngo-laryngeal resections. Neck dissection was performed in 9,749 (82%) patients and 5,699 (48%) had a tracheostomy. Flap failure occurred in 496 (4.2%) patients. It increased major medical complications rate, doubled the length of stay to 42 days ( $p < 0.0001$ ), and more than doubled in-hospital mortality risk, especially if failure occurred after pharyngolaryngeal or extended oral resections.

## Conclusions

Reconstructive failure is an independent risk-factor for postoperative morbidity and in-hospital mortality. Mortality rate is particularly high in extended oromandibular and pharyngolaryngeal resections. It has a major impact on the overall outcome and quality of head and neck cancer treatment and should be quality-assured on an ongoing basis

# Perceptual analysis: what is a normal face?

Ms J O'Hara, Mr A Ponniah, Mr K Solanki, Mr J Booth, Professor D Dunaway  
Great Ormond Street Hospital for Children

## Introduction

In order to plan surgery it is important to understand what represents a normal face. Previously, normal mean values have been utilized to assess proportions. A new approach is described which uses principal component analysis to assess global face shape. This new technology aims to generate a computer model of normal variation. Warping along principal variation components away from the mean allows identification of the point where the global face shape stops being normal.

## **Methods**

12000 normal 3D photographs were taken of volunteers at the London Science Museum. Of this population 96 scans were used for analysis for this pilot. The age range was 18-21 with equal numbers of male and female subjects and different ethnicities represented. Fifty-three landmarks of each face were used to enable dense correspondence analysis. The first three principal components were warped away from the mean face shape. The warps were created to represent up to 10 standard deviations from the mean. These warps were in a movie format adjusted by the perceiver. Fifty craniofacial unit members from across the United Kingdom were surveyed with these ten movies and requested to determine the point at which the face appeared different.

## **Results**

There was degree of variation in the point at which individuals perceive the transition beyond normal. This means there is a range along a principal component where all agree the face is normal, then there is disagreement and a range beyond this where all agree the face is not normal. The magnitude of the range differs with different principal components. There was marked disagreement between the perceptual concept of normal and the statistical model of normal showing the importance of a perceptual model.

## **Conclusion**

This is a useful tool, which allows global face shape analysis and could be used to identify a normal range for face shape. The adaptation of this technology to assess outcomes of surgery and plan principle components important to address in future surgery.

# **Plastic surgeons and the portable high-frequency USS machine: applications for use at the patient's bedside**

**Miss G Oni, Miss L Khan, Miss W Chow, Mr M Griffiths**

Broomfield Hospital

## **Introduction**

Portable high-frequency ultrasound (US) is a useful adjunct to a plastic surgeon's practice. With a short learning curve, this patient friendly imaging modality has a variety of uses, which can help effectively and expediently shape patient management/treatment plans. We describe clinical cases in which US performed by the surgeon is feasible.

## **Method**

Clinical cases that ordinarily may have been referred to the radiology department were taken from the day-to-day practice of the senior author over a four-month period from April 2014 – July 2014 and are presented. The clinical scenarios ranged from acute presentations to planned elective settings. The Sonosite S-Nerve™ machine (SonoSite Ltd, Herts, UK), with the L25X transducer was used for all cases (depth 4.3cm).

## **Results**

US was found to be a useful adjunct in a variety of applications ranging from acute hand trauma visualising neurovascular bundles and tendons, to elements of reconstructive breast surgery such as fat grafting over

an implant and scar release. The USS machine was also used to determine depth and size of collections such as seromas to facilitate drainage, identification of lymph nodes prior to transfer, as well as acute presentations of conditions ranging from undiagnosed swellings to foreign body localisation.

### **Conclusion**

The portable USS machine has become an invaluable tool in the senior author's practice. In a short space of time we identified numerous applications for its use. From a patient perspective it is non-invasive/non painful, has no deleterious radiation effects and treatment plans can be enacted without delay. We would highly recommend surgeons become familiar with this imaging modality to assimilate into their daily practice.

## **An application of keystone perforator island flap for closure of myelomeningocele defects**

**Dr H Park, Dr E Morrison, Mr C Lo, Professor J Leong**  
Monash Medical Centre, Monash Health

### **Purpose**

The keystone perforator island flap is a random fasciocutaneous flap locally advanced in the axis of dermatome. In many ways it is ideally suited to the midline myelomeningocele defects. Myelomeningocele is a serious congenital defect affecting an estimated 1 in 2,500 newborns worldwide. Once diagnosed, urgent repair soon after birth is required in order to minimize neurological complications. Relatively small skin defects may be closed primarily but larger defects necessitate reconstruction. This paper evaluates the short-term and long-term outcomes of the keystone perforator island flap reconstruction performed on five patients with lumbosacral myelomeningocele at our institution between January 2008 and January 2014.

### **Method**

Retrospective review of all patients who underwent keystone perforator island flap (KPIF) reconstruction for myelomeningocele between January 2008 and January 2014 was performed. The average length of follow-up was 45 months (range of 3 to 66 months).

### **Results**

Out of five patients, three had lumbosacral myelomeningocele, and two had sacral myelomeningocele with a defect size ranging from 8-100cm<sup>2</sup> (mean of 33cm<sup>2</sup>). Four patients underwent surgical repair within 24 hours of birth, one patient at three days of age. Average operative time was 225 minutes (which includes neurosurgical repair). All five patients had uncomplicated postoperative recovery and encountered no early or late complications. Long-term follow-up demonstrated durability and sensibility of these flaps with stable, aesthetically acceptable scars.

## **Conclusion**

The keystone perforator island flap is an ideal choice of reconstruction for large lumbosacral myelomeningocele defects.

## **The origins and presentation of patients with midline Tessier 0, 14 and 0-14 clefts managed at a single craniofacial unit**

**Dr T Pidgeon, Mr W Flapper, Professor P Anderson, Professor David David**

Women's and Children's Hospital

## **Introduction**

The rare craniofacial clefts remain an understudied aspect of craniofacial surgery. To date, no large series of patients affected by a single type of cleft has been examined. We present and describe the largest reported case series of midline Tessier 0, 14 and 0-14 cleft patients, who attended our centre from 1973-2012.

## **Methods**

A database search was performed at our centre to identify applicable patients. A retrospective case note review was carried out to document patients' presenting anatomy, origins, demographics, neurodevelopment, speech, vision, and antenatal and family histories.

## **Results**

Sixty two patients were examined by this review, 14 (22.6%) with Tessier 0 clefts, 4 (8.1%) with Tessier 14 clefts, 28 (45.2%) with Tessier 0-14 clefts, and 16 patients (25.8%) with "other" diagnoses. Twenty eight (45.2%) were male and 34 (54.8%) female.

Nineteen patients (30.6%) had complicated antenatal histories, with 19 (30.6%) having complications at birth. Fourteen patients (22.6%) had a family history of clefting. Visual function was poor, 26 patients (41.9%) had an acuity defect and 30 (48.3%) had strabismus. The most common anatomic defects were, hypertelorism (87.1%), bifid nose (64.5%) and maxillary hypoplasia (51.6%).

## **Conclusions**

The anatomic features described in this case series will assist other centres in the diagnosis of new patients, and in surgical planning. The midline clefts can be difficult to diagnose and there is a high degree of variance in their presenting phenotype. Clinicians who encounter these patients should be wary of respiratory compromise at birth and a need for early ophthalmological input.

# **The use of the Synthes ProPlan CMF software in planning mandibular reconstruction using a free osseocutaneous fibula flap**

**Mr K Rahman, Mr M Kernohan, Mr O Ahmed, Mr J Adams, Mr M Ragbir**  
Newcastle University Hospitals NHS Foundation Trust

## **Introduction**

Mandibular reconstruction is regularly required following introral tumour resection. In Newcastle, our preference is for a free osseocutaneous fibula flap with osteotomies to contour the fibula. We present our preliminary experience with the Synthes ProPlan CMF Software.

## **Methods**

Eight consecutive patients having complex mandibular resections requiring osteotomised fibula reconstructions were planned with this software. Patients were assessed at a joint Head & Neck Oncology clinic and imaged. Pre-operative CT images were sent to Synthes for analysis who provided 3D planning images, osteotomy guides, anatomical models and specifically designed plates. Each case had specific issues requiring complex planning which would benefit from this aid.

## **Results**

During surgery, the guides indicate accurate segments of bone for harvesting, precise osteotomy sites and fixation points for the custom-made plate. In each case, the guides were simple and quick to use with no intra-operative or post-operative complications.

## **Conclusions**

This software provides a simple, reproducible method to aid mandibular reconstruction. It allows the execution of pre-planned procedures in theatre, simplifies the osteotomy stage, reduces the risk of surgical error and reduces the operative time.

# **Primary perforator flap thinning in a caucasian population: experience of over one hundred cases and fifteen perforator flap types**

**Mr T Reekie, Professor A Hart, Mr S Watson**  
Canniesburn Plastic Surgery Unit

Standard skin flap donor sites commonly provide tissue that is too bulky for many defects, and may require secondary thinning procedures in up to 86% of cases. Raising a perforator flap in the sub-dermal plane provides a thin flap with dependable vasculature, improves functional and cosmetic outcomes, and reduces the need for secondary procedures. Despite these benefits, primary thinning of perforator flaps remains controversial. Some conclude that it is detrimental to the blood supply and causes a higher incidence of flap loss, with one literature review stating that it is "inadvisable to primarily thin large ALT flaps in the Western population ... primary thinning must be avoided to keep linking vessels intact"<sup>1</sup>.

Seventy-three free and thirty-three pedicled thinned perforator flaps were identified in patients who had undergone primary or secondary reconstruction after trauma, burn injury, cancer excision or complications of orthopaedic treatment. The perforator flap type used for the reconstructions are given in the reconstruction sites shown below, all thinned under loupe magnification by the senior authors prior to transfer.

Limb recipient site: 81 flaps in 77 patients

Indication:

Trauma – 46 flaps

Burn injury – 16 flaps

Orthopaedic complication – 4 flaps

Axillary hidradenitis – 7 flaps one patient same as previous

Sarcoma – 5 flap

Merckel's cell carcinoma- 1 flap

SCC- 1 flap

Melanoma- 1 flap

Flaps

54 free and 27 pedicled

26 LAF, 25 ALT, 5 dorsal scapular, 13 CSAP-s, 1 FAP-m, 1 BAP-s, 3 UAP-s, 1 latissimus dorsi musculocutaneous flap with thinned TDAP component, 1 DMCA, 1 PTAP, 3 freestyle perforator flaps, 1 PAP skin paddle thinned on fibula flap.

Head & neck recipient site:

21 flaps in 21 patients

Indication:

Intra-oral SCC (f.o.m. / tongue onto f.o.m; tonsil / palate) – 10 flaps

Burn contracture – 2 flaps

Extra-oral tumour (recurrent BCC, auriculomastoid SCC/MM, salivary tumour, nasal BCC) – 6 flaps

Infected cranioplasty – 1 flap

Osseo-cutaneous ear reconstruction – 1 flap

Contour defect- 1 flap

Flaps

19 free, 2 pedicled

2 LAF, 11 ALT, 3 CSAP-s, 1 fibula paddle, 1 DIEAP, 1 SCIAP, 2 FAP

Chest Wall:

4 flaps in 4 patients

Melanoma: 1 flap

Basosquamous cancer: 1 flap

BCC: 2 flaps

Flaps

4 pedicled

1 TDAP, 3 IMAP

Surgeon's score and patient satisfaction was high reflecting the low donor-site morbidity, and quality of recipient site outcome. Operative time was not significantly increased, flap survival was 100% with no marginal necrosis, inpatient stay was unaffected, and the primary reconstructive objectives were achieved in all cases. Six peri-operative complications occurred (venous congestion in a pedicled LAF requiring pedicle decompression and in a free LAF requiring suture removal, venous re-anastomosis required in one of the BAP flaps; salvaged venous anastomotic thrombosis in two ALT flaps and IJV thrombosis secondary to central line sepsis in a pedicled CSAP flap). Nine flaps underwent minor secondary thinning (3xLAF, 4xALT, 1xCSAP, 1xSCIAP; two were incidental to planned secondary procedures and not otherwise indicated). One scar, and one donor site were revised. Elective secondary reconstructive procedures were performed in five cases (three tendon grafts, one free toe pulp transfer, two syndactyly divisions).

The optimal perforator flap should be selected to suit recipient defect requirements, operative logistics, and patient preference. Raising flaps in the sub-dermal plane is faster, and minimises donor site nerve injury whilst providing a broadened range of applications. The wide range of flaps being used for a variety of indications, all with a low complication rate, suggest that perforator flaps can safely thinned primarily, even in Caucasians.

Reference:

1. Sharabi SE, Hatf DA, Koshy JC, Jain A, Cole PD, Hollier LH. Is Primary Thinning of the Anterolateral Thigh Flap Recommended? *Annals of Plastic Surgery*. 2010; 65:555-559

## **A pilot study of the safety and morbidity of laparoscopic versus open ilio-inguinal lymphadenectomy for the treatment of malignant melanoma at a tertiary oncological centre**

**Mr S Rimouche, Mr T Bullen, Mr C Selvasekar , Mr D Oudit**  
Christie Hospital NHS Foundation NHS Trust

### **Introduction**

Treatment of malignant melanoma (MM) includes ilio-inguinal lymphadenectomy (ILD) which may be performed laparoscopically or open. We have begun performing ILD using a laparoscopic technique. We present an audit of our practice.

### **Method**

We have performed a retrospective case-note review of twenty-four consecutive patients (eight male; 33-92 years –median 54 years) who had ILD for MM in the last three years performed by the senior author. Eight cases were laparoscopic and sixteen were open.

### **Results**

There was no statistical significance in the number of harvested lymph nodes between the laparoscopic group ( 3-9 lymph nodes, median five) and the open group (2-30 lymph nodes, median eight) (P=0.12). The median length of stay (LoS) for the laparoscopic group was two days (2-28days) with one readmission versus

LoS of 7.5 days (3-27 days) and two readmissions for the open group. There was no mortality in either group and there was no significant difference in morbidity (Laparoscopic versus open: haematoma0 versus 1, infection1 versus5 and PE 0 versus 1). There were no conversions to open in the laparoscopic group.

### **Conclusion**

This study shows that there is a decrease in post-operative hospital stay with the laparoscopic technique compared to open ILD. Laparoscopic ILD for MM is safe and short terms results are comparable to open surgery.

## **The role of intravelar veloplasty in the von Langenbeck palatoplasty**

Mr D Sainsbury, Dr E Henkelman, Mr T Dunn, Mrs S Fischbach, Mrs P Klaiman, Mrs E Ho, Professor H Clarke, Dr D Fisher

Hospital for Sick Children

### **Introduction and Aims**

Debate continues regarding the benefits of intravelar veloplasty in cleft palate repair. This study aimed to compare outcomes in patients undergoing repair of clefts of the secondary palate using either a von Langenbeck technique alone or a von Langenbeck technique with intravelar veloplasty.

### **Methods**

A retrospective chart review of consecutive patients undergoing repair of clefts of the secondary palate from 2004-2008 at the Hospital for Sick Children, Toronto by two surgeons (surgeon one: von Langenbeck technique alone; surgeon two: von Langenbeck technique with intravelar veloplasty). Demographic details, operative duration, length of hospital admission and complications were recorded. Speech outcomes were determined including a five year review.

Fifty nine patients underwent von Langenbeck repair alone and 103 patients underwent von Langenbeck repair with intravelar veloplasty. There was no difference in demographics, syndromal presence, cleft type, weight, ASA grade, operative time, post-operative length of stay or complication between the groups. Each group had one fistula. Hypernasality rates were not statistically different between the two groups. 27.1% patients in the von Langenbeck alone group underwent secondary speech surgery compared to 14.5% in the von Langenbeck and intravelar veloplasty group ( $p=0.025$ ).

### **Conclusions**

The von Langenbeck palatoplasty when combined with an intravelar veloplasty did not increase operative duration, length of stay or complications. There was no difference in hypernasality between those undergoing palatoplasty with and without an intravelar veloplasty. Those who had an intravelar veloplasty had lower rates of secondary speech surgery.

# Simultaneous contralateral breast augmentation using contralateral SIEA flap in unilateral DIEP flap breast reconstruction

Mr T Satake, Miss M Muto, Mrs Y Sujishi, Miss M Ogawa, Mrs M Shibuya, Mr S Ko, Mr K Yasumura, Professor T Ishikawa, Professor J Maegawa  
Yokohama City University Medical Center

## Introduction

For the women with small-size breast, contralateral breast augmentation during unilateral breast reconstruction is one of the good options. In selected patients who have adequate lower abdominal tissues, the DIEP flap is often the first choice for unilateral autologous breast reconstruction and we use zone IV which is usually excised for insufficient blood circulation as the SIEA flap for simultaneous contralateral breast augmentation. As we have had satisfactory results of unilateral DIEP flap breast reconstruction and contralateral SIEA flap breast augmentation, we present our surgical techniques and outcomes.

## Methods

Between October of 2004 and present, 21 patients with a mean age of 48.4 underwent unilateral breast reconstruction using the DIEP flap and simultaneous contralateral breast augmentation with the SIEA flap. After the lower abdominal flap with both unilateral DIEP flap and contralateral SIEA flap was elevated, the flap perfusion was evaluated with intraoperative ICG angiography. The entire lower abdominal flap was then split into two separate flaps.

In all patients, ipsilateral internal mammary vessels were used as the recipient vessels for the DIEP flap breast reconstruction. The pedicle of SIEA flap was anastomosed to several branches of deep inferior epigastric vessels. The SIEA flap was inset beneath the contralateral breast tissue through the midline. During the secondary revision or the nipple-areola reconstruction, liposuction above the sternum was required to repair iatrogenic symmastia.

## Results

All DIEP flaps survived and partial fat necrosis has occurred in two SIEA flaps. Mean flap weight final inset for the DIEP flap reconstruction and the SIEA augmentation was 414 g (range, 228 to 762 g), and 109 g (range, 46 to 196g), respectively. The average operative time in this series was 9 hours 14 minutes.

## Conclusions

Unilateral DIEP flap breast reconstruction and simultaneous contralateral SIEA flap breast augmentation may be performed safely with satisfactory outcomes.

# Midline and non-midline craniofacial dermoids: the Liverpool experience

Mr A Scrimshire, Mr P Vaiude, Miss K Nelson, Dr A Cleator, Mr C Duncan

Alder Hey Children's Hospital

## Aims

To review imaging, surgical findings and complications of craniofacial dermoids based on our experience in a supra-regional craniofacial centre.

## Methods

Retrospective review of all patients undergoing craniofacial dermoid excision between 2006-2012.

## Results

Ninety five patients with mean age of 29.6 months were reviewed. Thirty two were midline, 63 non-midline. In the non-midline cohort 52 were external angular, nine temporal and two occipital.

On imaging three temporal dermoids were found to have intracranial extension, requiring transcranial excision.

In the midline cohort 16 were nasal, 12 glabellar, three anterior fontanelle and one occipital. Eleven had intracranial extension needing transcranial excision; all were identified using CT, MRI or both.

Sensitivity and specificity for MRI to identify intracranial extension were 80% and 94% respectively with positive and negative predictive values of 89% and 88%. For CT sensitivity and specificity were 100% and 83% with positive and negative predictive values of 80% and 100%.

Two of 14 developed CSF leaks requiring lumbar drainage and washout following a fall and plate fracture two weeks post op.

There was one death from a brain abscess following excision of a midline extracranial dermoid.

## Conclusions

The salient findings of this study included the significant number of transcranial extensions of non-midline, temporal dermoids, that multiple imaging modalities may be required to identify intracranial extension and the lack of clinical usefulness of a punctum to predict intracranial extension. Finally, we discuss the usefulness of lumbar drains in association with transcranial excision of dermoids.

The mortality is a reminder of the risk profile in any midline pathology, irrespective of transcranial extension.

# Gluteal sling perineal reconstruction: a novel technique for perineal floor restoration after eLAPR

Ms J Smith, Mr G Laitung, Mr N Scott  
Lancashire Teaching Hospitals

## Introduction

Extralevator abdomino-perineal excision of the rectum (eLAPR) produces a large perineal defect. Various reconstructive techniques, depending on defect size and complexity, usually result in extra scarring in the abdomen, buttocks or thighs. Standard gluteus muscle flaps require division from their distal insertion. By contrast, the technique of gluteal sling perineal reconstruction, performed in the prone position, is less traumatic and leaves a single midline perineal scar.

## Methods

Between 2008 and 2013, 15 patients have undergone perineal reconstruction after eLAPR using the gluteal sling technique. The lower third of the gluteus maximus is freed bilaterally off its sacrococcygeal attachment and transposed caudally to fill the upper part of the defect. Bilateral gluteal fat flaps are then raised in continuity and advanced medially into the lower part of the defect. Both components are sutured in a continuous, invaginating manner to form a sling, filling the perineal defect.

## Results

eLAPR was indicated for anal cancer in seven patients and low rectal cancer in eight patients (median age 59 ; M:F 10:5) . All but five had preoperative chemo-radiotherapy. Pelvic clearance was combined with eLAPR and eLAPR was performed alone in 12 patients (five open, seven laparoscopic). Median length of stay was 14 days. All patients were ambulant within a week of surgery. At 10 months median followup, two patients (15%) required surgical revision, one for partial flap dehiscence and the other perineal hernia.

## Conclusion

Gluteal sling perineal reconstruction provides satisfactory perineal closure with no obvious functional morbidity and is especially suitable after laparoscopic eLAPR.

# Open lower limb fractures in the elderly: a management challenge

Ms K Wallis, Mr M Fernandez, Mr J Young, Mr M Costa, Mr M Venus, Miss J Skillman  
University Hospitals Coventry and Warwickshire

## Introduction

A bimodal distribution of open lower limb fractures exists with a second peak in incidence in the over 70s. Older patients are a challenging group to manage as their comorbidities and poor soft tissue quality reduce the available reconstructive options. The aim of this study was to review compliance with BOAST4 standards for timing of soft tissue coverage in those aged 70 or over. The secondary aim was to review type of surgery and complications in this complex group.

## Methods

A prospective study was undertaken of the 15 patients aged over 70 years with open lower limb fractures managed between June 2013 and June 2014 (age range 70-92 years).

## Key Results

The male to female ratio of patients was 2:13. Eleven were sustained in low energy falls from <2m; four from RTA. The results are summarised below:

		Method of Closure						Complications	
Time to closure	Number of Patients	Primary Closure	Skin graft	Local flap	Free Flap	Primary Amputation	VAC therapy	Secondary Amputation	Death within 30 days
<72 hours	5 (33%)	2	1	1	0	1	0	0	1
3-7 days	3 (20%)	0	1	2	0	0	0	0	1
>7 days	7 (47%)	0	1	3	0	1	2	2	0

## Conclusion

BOAST4 guidelines were met in one third of patients aged 70 years and over, compared to 73% of patients aged under 70 years during the same period. Poor quality soft tissues and high risk of death from comorbidities make the elderly a challenging group to manage, with a high risk of amputation (27%). Multidisciplinary discussion with the patient and their family should occur within 48 hours of admission and a management plan formulated.

## Streamlining emergency plastic surgery referrals to improve patient journey, trainee workload and training opportunities

Mr G Wheble, Dr N Warner, Mr P Budny

MoD (RAF) / Stoke Mandeville Hospital

## Introduction

Referrals from the emergency department (ED) are frequent and emergency department practitioners (ENP) see a large proportion of minor injuries that present to hospital. Trainees perceived that many emergency referrals could be managed in ED or did not need immediate review, and this was negatively impacting on access to other departmental training opportunities.

## **Method**

We identified all acute referrals to the on-call team over two weeks. Referrals made by ENPs within the Trust were identified from this set. The cases were analysed by two independent reviewers who, using patient notes and xrays, comparing these data with the Trust-published ENP competencies to assess the referrals and whether they could have been managed appropriately in ED without emergency referral.

## **Results**

222 referrals were made over a two week period, of which 171 were from ENPs. Burn injuries were excluded leaving 112 cases for analysis. Sixty one cases (54%) could have been managed in ED, whilst 51 (46%) needed plastics input at time of presentation. The majority of ED-appropriate cases were simple hand fractures (n=28), soft tissue injuries (n=15), and facial lacerations (n=14).

## **Conclusion**

EWTD has curtailed training time, and thus training opportunities must be maximised. 54% of referrals from ENPs did not need immediate review. Nonetheless trainees were expected to review these patients immediately they were referred. A daily plastics trauma clinic was set up to expectantly review non-emergency cases and a training programme was instituted to empower ENPs to initially manage injuries within their described competences. Subsequent reaudit showed fewer inappropriate referrals and trainees engaging with more appropriate cases and training opportunities.