LIVERPOOL 2022

30th Scientific Congress of the IMPT

21st – 23rd September 2022

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IMPT Chairman's Welcome

Dear Delegates,

Thank you for attending the IMPT's 30th Scientific Congress. After a 3 year wait we all needed an opportunity to meet up with our professional colleagues. This network is vital to us as individuals but also for our patients. The ability to share ideas directly with our peers, have our views challenged to stimulate discussion only enhances us as professionals and the care we provide.

I am excited about this Liverpool based Congress, it is a city steeped in tradition and heritage. I for one, wish I had been born to this place. Many cultural icons of music and sport have emerged from here, everyone can identify a person born of this place. They have an accent that I can't help but smile at, it has an infectious enthusiasm about it.

In terms of Maxillofacial surgery the city has long produced pioneers in our field; Professor James Brown, Mr David Richardson and our newly appointed President Miss Anne Begley. When I trained in the early 1990's in Sheffield the names of those ground breaking Maxillofacial units at Aintree, Broad Green and Alder Hey were often mentioned. Current innovations in head and neck reconstruction continue to be explored and developed by the teams and we are very lucky to have been able to listen to the group as part of our key note series.

The programme team have tried to balance the new, with established speakers. The ethos of this Congress from Anthony Simpson and his team was that they wanted to encourage new speakers in a welcoming environment. We want to support and encourage the next generation to continue to share their ideas and create a platform for the future of the profession. Thank you Anthony, Sarah, Nina, Gina, Lily and Taran and the IMPT Congress team for all the hard work.

I have always placed a huge importance on these events. We are such a small specialism, I hope those newly qualified scientists use this opportunity to start their *'work family'*. This group will have a huge impact on your working life, throughout your career. Truly, in our job, YNWA. Our profession continues to evolve, contribute, embrace the change. Welcome to the city of optimism, Liverpudlians, scousers and dare to dream in Red...or maybe a little Blue.

Best wishes to you all.

Jason

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Miss Taranjit Malhotra MIMPT
Mr Charles Fraser Macnamara Hon.MIMPT
Mr Fraser Walker FIMPT (Retired)

Welcome to Liverpool.....

We are delighted to welcome you to this years event. The 30th IMPT scientific congress is being held in the historic city of Liverpool at the Albert Dock.

King John founded the port of Liverpool in 1207, and in its early days, Liverpool consisted of just seven streets which are all still here today. These original streets are Bank Street (now Water street), Castle Street, Chapel Street, Dale Street, Juggler Street (now High Street), Moore Street (now Tithebarn Street) and Whiteacre Street (now Old Hall Street). Liverpool would remain a relatively small city until its rise to prominence in the 18th century as part of the transatlantic trade.

The Port of Liverpool is the enclosed 7.5 miles dock system that runs from Brunswick Dock in Liverpool to Seaforth Dock on the east side of the River Mersey and the Birkenhead Docks between Birkenhead and Wallasey on the west side of the river.
Liverpool is the home city of many famous faces including of course all of the fab four, William Gladstone, Kim Cattrall, Jodie Comer and Cilla Black to name but a few.

The Cavern club remains open today to visit, dubbed the most famous club in the world due to its eventful seven decades of life and the Mathew Street area of the city is bustling with venues for all kinds of music lovers.
Of course we must mention football....a passion of nearly all Liverpudlians either blue or red. Everywhere you go in this city you will see proud supporters displaying their allegiance to Liverpool or Everton FC.

Enjoy the city, and most of all enjoy the congress, we hope to have a friendly, entertaining and informative few days with you all.

IMPT Congress Awards

The Win de Ruiter Delft Plate

Awarded for the best research presentation. Mr Win de Ruiter from Ridderkirk near Rotterdam provided a Maxillofacial Prosthetic service for the Rotterdam area and donated this award in 1985. This award reflects significant contribution to academic scientific research in the field.

The Mount Vernon Award

Awarded for the best clinical case study presentation. Acknowledging technical skill, clinical excellence and beneficial patient outcomes. This award was first put forward by Chief Maxillofacial Prosthetist Mr John Hayward at Mount Vernon Hospital, and was first presented at the 1981 IMPT congress.

The President's Award

Awarded for the best poster display. This award was inaugurated at the 1983 IMPT congress.

The Kidd Award

Awarded for the best innovation or service development reflecting achievement in leadership, service development, clinical treatment, academic breakthrough or evidence-based change in work practice with beneficial outcome. The award can also reflect outstanding work undertaken outside of Congress.This award was donated by Mr Norman Kidd, who began making sub-periosteal implants in 1956 and upon his retirement instigated the Kidd Award plaque in 1977.

The Ian MacLeod Alumno Award

Awarded to the most outstanding oral contribution from a Member in Training or recently qualified Member. This award has been dedicated in honour of Ian MacLeod; a member of the IMPT who had a positive influence on many young MfPs.

The Rising Star Award

Awarded to the most outstanding contribution from an IMPT Member (MIMPT) who has developed their clinical and scientific practice, shown professional leadership and is emerging as a future leader in the profession within 6 years of gaining the MSc qualification and presented at congress as an oral presentation.

The IMPT Travel Award

£2500 is awarded to the successful applicant to provide the means for study and research.

The Brian Conroy Award

Awarded for outstanding service to maxillofacial prosthetics. Donated by Brian Conroy MBE FIMPT (Hon) in 1969, the award was commissioned "for those who have given significant service for advancement in technology, prosthetics, surgery and other activities that relate to maxillofacial prosthetics and technology"

2022 Congress Assessors

Prof Trevor Coward, Muhanad Hatamleh, Nick Connolly, Steven Hollisey-McLean, Karen Boyd, Keith Winwood, Heidi Silk, Adrian Kearns and Matt Pilley

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Wednesday 21st September 2022

Session 1

Session chair opening Tony Simpson & Jason Watson

09.30-10.40	**Registration - Coffee & Trade**
10.40	**Chairman's welcome - Jason Watson**
11.00	**Opening Ceremony** ***Ann Marr OBE*** *- Chief Executive St Helens and Knowsley NHS Trust*
11.10	**Presidential Handover** ***Mr Adrian Sugar*** *- current IMPT President handing over to the incoming President Mrs Anne Begley.*
11.20	**Keynote - New President Lecture** ***Anne Begley*** *- Aintree University Hospital, UK* Facial Deformity Disfigurement and Beauty.
11.50	**Keynote** ***Parneet Gill*** *- St Helens and Knowsley NHS Trust, UK* Complex keloid management: laser ablation and intralesional cryotherapy as alternatives to conventional treatment
12.10	**Questions and Discussion**
12.20-13.30	**Lunch and Trade Stands**

Congress Lunch Club

(in the main hall)

Higher Specialist Scientist Training (HSST) - Equivalence

Stefan Edmondson, Muhanad Hatamleh, Jason Watson

This session is an informative discussion on the accredited scientific practice requirements of the HSST to become a registered Consultant. The panel will share their experiences and have an open discussion with the group. The panel have been through the process and are now assessors across multiple disciplines. Aimed at senior Maxillofacial Prosthetist's going through STP Equivalence, and current registered Reconstructive Scientists.

Session 2

Session chairs Adrian Kearns & Tony Simpson

13.30	**Keynote** **Peter Evans -** *Morriston Hospital, UK* ISO 13485- Our Journey
13.55	**Keynote** **Colin Johnson and Brendan McPhillips -** *East Lancashire NHS Trust, UK* Back to the future
14.20	**Sara Guerrero -** *Guys Hospital, UK* Exploring a practical and economically feasible workflow for customisable movable digit prostheses
14.40	**Keynote** **Erin Stevens -** *Medical Art Resources Inc, Wisconsin, USA* Midfacial & Nasal Prostheses: Design limitations, compromises and solutions
15.10	**Questions and discussion**
15.20-15.40	**Coffee & Trade Stands**

Session 3

Session chairs Gina Jordan & Jim Dimond

15.40 via Zoom link
Julie Brown - *Consultant Clinical Anaplastologist, USA*
Orbital and Upper Facial Prostheses–Every Detail Matters

16.10 **Keynote**
Eduardo Arias - *The University of Illinois at Chicago Department of Plastic, Cosmetic and Reconstructive Surgery, USA*
Virtual Reality Planning in Reconstructive Surgery and Facial Prosthetics

16.30 **Ramin Dalili -** *University Hospital Crosshouse, UK*
Provision of Indwelling Ocular Prosthesis for a unique patient with Cat Eye Syndrome

16.50 **Keynote**
Dilnath Gurusinghe and Lisa Chapple - *St Helens and Knowsley NHS Trust, UK*
Burns in three dimensions

17.10 **Jorn Brom -** *Brom Epithetik, Heidelberg, Germany*
Craniofacial Implant Systems: An Overview

17.30 **Questions and discussion**

19.30

Reunion Dinner at Viva Brazil

Viva Brazil
36 Castle Street,
Liverpool
L2 0NR

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Thursday 22nd September

Session 4

Session Chair Nick Connolly & Sian Campbell

9.00-9.15	**Coffee and trade stands**
9.15	**Yordanka Ihtimanliyska -** *Whiston Hospital, UK* The Effect of Primers on Peel Bond Strength between Titanium substrate and Maxillofacial Silicone
9.30	**Stephanie Ramsurrun -** *Aintree University Hospital, UK* Influence of Pore Geometry on Mechanical Properties for Polylactic Acid and Polycaprolactone 3D Scaffolds: Potential for Bone Tissue Regeneration Applications in the Mandible.
9.45	**Liam Curtis -** *Queen Elizabeth Hospital, UK* Fabrication of the 'Glove' ear prosthesis for a patient with microtia
10.00	**Lawrence Dovgalski -** *Morriston Hospital, UK* Digital Design and Manufacture of Auricular Keloid splints
10.15	**Questions and Discussion**
10.30-10.50	**Coffee and Trade Stands**

Session 5

Session chairs Fraser Walker & Nina Sykes

10.50 **Dan Shaw -** *Chesterfield Royal Hospital NHS Foundation Trust, UK*
Getting to the bottom of it

11.05 **Marios Philippou** - *University Hospital Coventry and Warwickshire, UK*
A comparison of the mechanical properties of a 3D printed polymer to a conventional polymer used for the production of occlusal splints

11.20 **Lauren Johnson-Cree** - *University Hospitals Leicester, UK*
3D Analysis of Dega Osteotomies

11.35 **Charlotte Heath** - *University Hospital Coventry and Warwickshire, UK*
Wafer-less Orthognathic Surgery for Maxillary Repositioning: The University Hospitals Coventry and Warwickshire (UHCW) Technique.

11.45 **Jamie Stover** - *Senior Manager of Dental Laboratory Applications Carbon, USA*
Blueprint Dental - New Additive Technology in Oral Health

12.30 **Questions and Discussion**

12.40-13.50 **Lunch and Trade Stands**

Congress Lunch Club

(in the main hall)

Research & Publication Collaboration Network

Taran Malhotra, Keith Winwood, Trevor Coward, Muhanad Hatamleh, Sian Campbell

This session is an informative discussion on establishing a research network for all levels of MfP and RS staff. Focused on building a supportive group for newly qualified post graduates and those middle grade STP/DL graduates who have undertaken research projects as part of their studies or within their unit.

Session 6

Session chairs Sarah Fleming & Jason Watson

13.50 **Keynote**
Peter Metherall - *Sheffield Teaching Hospitals NHS Trust, UK*
Automating 3D workflows using Mimics Python Scripting

14.15 **Materialise**
A Digital Workflow Demonstration covering: segmentation, surgical planning and cutting guide design, using Materialise Solutions.

Followed by a Q & A panel session for software users regardless of experience, hosted by Materialise CMF specialists and IMPT members (Matt Pilley, Taran Malhotra, Hitesh Koria)

(Please note: Materialise have requested that no trade representatives are present during this lecture)

16.30

Session 7

Poster Session with Cheese & Wine Reception

(Crowne Plaza Hotel)

Jermaine Jones - *Queen Elizabeth Hospital, UK*
Neesha Sharma - *St. George's University Hospitals NHS Foundation Trust*, UK
Katie Spooner - *University Hospitals Leicester, UK*
Jordan Abassi - *Queen's Medical Centre, UK*
Steven Hollisey-Mclean - *Morriston Hospital, UK*
Naomi Sweeney - *Queen Victoria Hospital, UK*
Jason Watson - *Queen's Medical Centre, UK*
Muhanad Hatamleh - *Consultant Clinical Scientist, UK*

All posters to be size A1.

Presenters must be present at their poster during the whole session to answer any questions from the assessors.

Free Evening

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Friday 23rd September 2022

Session 8

Session chairs Edward Malton & Hitesh Koria

09.30	**Keynote - Prof Chris Butterworth** - *Liverpool Head and Neck Centre, UK* Accelerating Prosthetic Rehabilitation for patients with maxillary and mid-facial malignancy.
10.20	**Anna Veli** - *Portsmouth Hospitals University NHS Trust, UK* The power of coaching and mentoring
10.35	**Jim Dimond** - *University Hospital Coventry and Warwickshire, UK* Managing to lead?
10.55	**Questions and Discussion**
11.00-11.30	**Coffee and Trade Stands**

Session 9

Session chairs Stephanie Ramsurrun & Stefan Edmondson

11.30	**Matt Pilley -** *University Hospitals Leicester, UK* The Perpetual Challenge
11.40	**Adrian Kearns -** *Addenbrookes Hospital, UK* Can't you just open a window?
11.50	**Taran Malhotra -** *Aintree University Hospital, UK* Research Proposal: To explore the predictors of appearance-related adjustment and barriers/facilitators of prosthetic acceptance
12.00	**Jordan Abbasi -** *Queens Medical Centre, UK* The Value of Interprofessional Relationships in Healthcare Science
12.10	**Questions and Discussion**
12.20-13.30	**Lunch & Trade Stands**

Session 10

Session chairs Tony Simpson & Nina Sykes

13.30 **Keynote**
Catrin Pugh
'From Surviving to Thriving – the personal account of a 96% burns Survivor'

14.30 **Tjitske Bannink** - *Antoni van Leeuwenhoek, Netherlands*
Computer-aided design and manufacturing of nasal prostheses: a novel method using a 3D morphable model

14.40 **Rowland Gardner** - *Queen Mary's Hospital, UK*
Back from the future – "50 not out"

15.00 **IMPT Business meeting**

15.30 **Close of Congress**

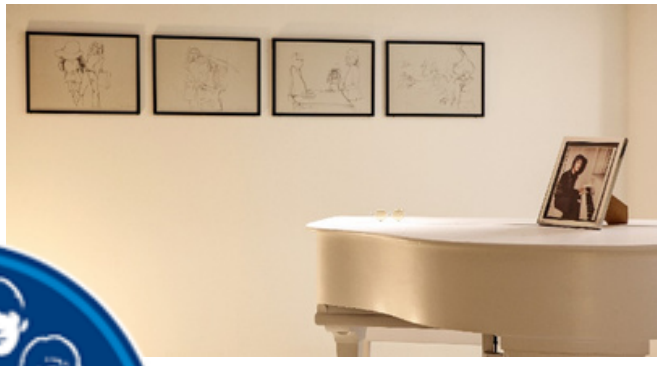
18.45

30th IMPT Congress Awards Dinner

The Beatles Story
Britannia Vaults,
Royal Albert Dock,
Liverpool
L3 4AD

The Beatles Story is approximately a 0.7 mile walk from the Mercure Hotel for those who wish to walk. For those who don't the first coach will depart at 18.15 and the second approximately 18.30 from the Crowne Plaza

Congress Awards Dinner



THE BEATLES STORY LIVERPOOL

The Friday night Congress awards dinner is taking place at the Beatles Story on Liverpool dock front.

Be transported on an incredible immersive journey of how four young lads from Liverpool were propelled to the dizzy heights of fame and fortune from their humble childhood beginnings.

Replicas of Mathew Street, Abbey Road Studios and The Cavern authentically capture the early 60s, allowing you to personally experience the very places that helped make The Beatles the greatest band in the world.

The Beatles Story
Britannia Vaults,
Royal Albert Dock,
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Keynote Speakers

Opening Congress Dignitary

Ann Marr OBE

Ann has served the NHS in Merseyside for many years and for the past 20 years she has been Chief Executive at St Helens and Knowsley Teaching Hospitals NHS Trust.

The Trust has achieved many accolades over the years, and is consistently the highest scoring of all acute hospitals in the Patient Led Assessments of the Care Environment (PLACE) assessments, and regularly receives extremely positive staff survey results, achieving the top scores nationally for the past three consecutive years.

The Trust is rated as Outstanding by the CQC, one of only a very small number of Acute Trusts in the entire country to achieve this. In November 2019, the Trust was named "Trust of the Year" at the Health Service Journal Awards, which capped a truly exceptional year in the Trust's history.

Ann was awarded a prestigious honorary fellowship of Liverpool John Moores University in 2016 and the OBE in the New Year's Honours List 2020 for services to the NHS.

New IMPT president

Miss Anne Begley

FDS RCPS FFD RCSI FRCS(OMFS)
Consultant Oral and Maxillofacial Surgeon
Associate Dental Dean for Dental Core Training HEE NW
TPD for OMFS HEE North West

Anne Begley is a consultant in oral and maxillofacial surgery working in Aintree University Hospital in Liverpool. The focus of her practice is orthognathic, TMJ and trauma surgery, all of which require close working with the excellent team of Liverpool maxillofacial prosthetists. As Clinical Director of the Regional Maxillofacial Unit serving Cheshire and Merseyside, she has supported and been part of the transition to virtual planning for deformity and oncology surgery.
Anne qualified and trained in Belfast her home city as well as in London as a Registrar and Trent taking in Nottingham, Derby and Sheffield as a Senior Registrar, with an additional spell as Craniofacial Fellow in Liverpool's Alder Hey Hospital.
Training occupies a significant part of Anne's time, she recently demitted after 6 years as Training Programme Director for specialty training in OMFS for Health Education England North West and also works as Associate Postgraduate Dental Dean mainly looking after dental core trainees.
Anne was re-elected to BAOMS Council in 2021 where her role is to contribute to workforce planning for the OMFS team, which includes an understanding of professions allied to the specialty.
Her husband Patrick is also an OMFS consultant in the Regional Maxillofacial Unit. They live in Waterloo looking out over the Mersey estuary on the northern edge of the city along with their two university age children Tom and Catherine.

Catrin Pugh

Catrin Pugh was a young girl with her dreams and life in front of her, until in an instant everything changed forever. In 2013 she sustained horrific burn injuries (96%) but has beaten all the odds to not to only astonish medical staff, her family and her friends with her resilience but to deliver some of the most inspirational speeches you will ever hear. She has gone from being a victim to a survivor and is now is a thriver. A qualified physiotherapist, she uses her own experiences and survival techniques to help others. Whether that be to inspire, improve motivation, deal with trauma or self-image and everything in between. She is an ambassador for The Katie Piper Foundation, Changing Faces and The British Association of Skin Camouflage, all charities that help make the World a better place for people living with disfigurements.

Professor Chris Butterworth

BDS(Hons), MPhil, FDSRCS (Eng.), FDS (Rest Dent) RCS (Eng.)
Consultant in Maxillofacial Prosthodontics Liverpool Head & Neck Centre, UK

Professor Chris Butterworth is a UK-based Maxillofacial Surgical Prosthodontist who has worked at University Hospital Aintree since his appointment in 2003. He has built an international reputation for innovative care in the field of oral & facial rehabilitation following head & neck cancer and has won several national and international awards for his work on implant-based prosthetic rehabilitation. He has pioneered the combination of skeletally anchored zygomatic implants in combination with microvascular free flap reconstruction for patients with maxillary and mid-facial malignant diseases (the ZIP Flap technique). He is actively involved in research within the Head & Neck Centre and regularly lectures at national and international meetings. He was the youngest ever national president of the British Society of Prosthodontics in 2011/12. Chris has authored over 60 scientific papers, several textbook chapters and is the lead author on the current restorative guidelines for UK based head & neck cancer patients.

Mr Colin J Johnston

BBDS, MBChB, MSc, FDSRCS, FRCS, FRCS(OMFS)

Mr Johnston is a consultant in Oral and Maxillofacial Surgery with specialist interest in head and neck skin cancer and facial plastic reconstructive surgery. He also has interests in facial trauma and oral medicine.
He is dual qualified with dental (BDS N'cle) and medical (MBChB Birm) degrees. He has a Masters degree in Oral Medicine. He undertook specialist surgical training in the West Midlands acquiring Fellowship of the Royal College of Surgeons (FDSRCS, FRCS(OMFS)).
He is dual registered with both General Dental and Medical Councils, and on the UK Specialist Register for Oral and Maxillofacial Surgery.

Erin O'Fiel Stevens

MS, CFm

Erin is a clinical anaplastologist who has practiced in the United States Midwest, in both hospital and private practice anaplastology clinics in Chicago, Minneapolis, and Milwaukee.
She earned a Master of Science in Biomedical Visualization from the University of Illinois at Chicago in 2010, where she trained in clinical anaplastology at the UI Health Craniofacial Center. In the past decade, she has presented at local and international conferences about digital applications in anaplastology, as well as topics related to education and training.
Erin is the immediate past President of the International Anaplastology Association. She is also the Vice President of the Walter Spohn Trust, a nonprofit organization that administers grants and supports educational research in anaplastology. Since 2017, Erin has expanded the scope of her practice's anaplastology services to include breast prostheses and has a special interest in improving access to breast prostheses for gender confirming care.

Parneet Gill

MBChB MRCS (Eng) MSc FRCS(Plast)

Parneet Gill is a plastic surgery consultant at STHK with a specialist interest in Skin cancer, Mohs surgery, periocular reconstruction and laser. She is one of three consultants at STHK that offer laser CO2 ablation and intralesional cryotherapy as alternative treatment options for complex keloid scars

Eduardo Arias

BFA, MSc, CCA

Eduardo Arias is a Board-Certified Clinical Anaplastologist who specialises in facial and ocular prosthetics rehabilitation, digital technologies, and innovation in medicine. He received his Bachelor of Fine Arts degree from the Pontificia Universidad Javeriana in Bogotá, Colombia. His education was followed by graduate clinical training in facial prosthetics at The Johns Hopkins University School of Medicine, Department of Art as Applied to Medicine in Baltimore, Maryland.
Eduardo has a Master of Science (MSc) in Maxillofacial Rehabilitation at King's College London in London, England, UK. He received clinical experience at the JHU Facial Prosthetics Clinic, The Johns Hopkins Hospital and has worked in private practice at WCBL in Tampa, FL. He currently practices as a Clinical Anaplastologist and Ocularist at Craniofacial Center, University of Illinois at Chicago Department of Plastic, Cosmetic and Reconstructive Surgery, and is the director of the 3D Printing Lab at CFC and the Surgical Innovation Training Lab (SITL). Eduardo has been a member of the International Anaplastology Association since 2013.

Dilnath Gurusinghe

MBBS(Lond), MRCS(Eng), FRCS(Plast)

Mr Dilnath Gurusinghe joined the Mersey Regional Burn, Laser & Plastic Surgery Centre at Whiston Hospital as a Consultant in 2019, specialising in all aspects of burn injury management and surgery. Dilnath qualified in 2000 from St George's University, London and undertook higher surgical training in Plastic Surgery through the Yorkshire and Mersey training schemes, being awarded FRCS(Plast) in 2016.
He completed two years' international higher training in Perth, Western Australia, gaining extensive experience as fellow for the prestigious WA State Burns Service for adults and children and as a fellow in general plastic surgery and microsurgery at Fiona Stanley Hospital.
Including the world of burns, his areas of clinical interest involve the multidisciplinary management of conditions with extensive skin loss and necrosis such as necrotizing fasciitis and toxic epidermal necrolysis, with the ultimate desire to strive for the best scar outcomes for those affected by scars of any aetiology.
Mr Gurusinghe is a member of the British Burn Association and the International Society for Burn Injuries; has presented at national and international conferences and continues to publish in the Burns and Plastic Surgery literature.

Peter Metherall

BEng, MMedSci, PhD

Peter Metherall is a Clinical Scientist at Sheffield Teaching Hospitals NHS Trust with 23 years experience as a Nuclear Medicine Imaging Physicist and 12 years as the lead scientist in the 3D Imaging Lab. He has received several awards for innovation including the NHS Chief Scientific Officer award and Global Winner of the Materialise Mimics innovation award in 2017. He studied at Lancaster University for a BEng in Physical Electronic Engineering and at the University of Sheffield for a MMedSci in Medical Physics and a PhD in Medical Imaging. The Sheffield 3D Imaging Lab provides routine quantitative imaging and 3D modelling services to many departments in the Trust and is also actively involved in a number of research projects.

Peter Ll. Evans

FIMPT ANSHCS

Peters career started studying Maxillofacial Prosthetics in London in 1987 he moved to South Wales to join the Welsh Craniofacial Implant Team in 1989, team that pioneered the use of Craniofacial Implants in at St Lawrence Hospital, Chepstow. The Unit relocated Morriston Hospital, Swansea in 1998 where he is the manager of the Maxillofacial Laboratory Services.
His main areas of interest include facial prosthetics for children, craniofacial implantology and 3D modelling and imaging. He has published extensively the use of digital technology in Maxillofacial surgery and technology and in particular on the integration of digital technologies into facial prosthetics and lectured in the UK and worldwide.
Peter is a fellow of the IMPT, founder member of the British Facial and Audiological Implant Group (BFAIG) a founder member and secretary of the Centre for Applied Technology in Surgery (CARTIS) and Secretary to the Advanced Digital Technologies (ADT) Foundation.

Abstracts

Session 2

ISO 13485- our Journey

Peter Evans , Morriston Hospital, Swansea, UK

In 2019 we became aware of the impending Medical Devices Regulations that would impact on our Laboratory Services. 3 years later we have just completed our second external audit for our Quality Management System. The presentation describes our journey, what worked and what didn't in the process.

Exploring a practical and economically feasible workflow for customisable movable digit prostheses

Sara Guerrero, Guys Hospital, London, UK

In healthcare there is always an interest in improving efficiency of clinical services and enhancing patient experiences whilst maintaining standards and even improving outcomes for patients. The area of maxillofacial prosthetics is no exception. CAD/CAM in maxillofacial prosthetics is, over time, presenting a potential way of achieving this. It aims to reduce appointment times (or the need for so many appointments) and to eradicate the need or minimise time taken, for certain conventional clinical and laboratory steps, in producing a well-fitting and aesthetic prosthesis. Digit prostheses are generally viewed as purely aesthetic, with the main purpose of masking the loss of a digit or digits to improve patient acceptance and avoid attention from others. They are viewed as offering minimal support to remaining fingers for activities requiring grip or dexterity. Indeed, it is the lack of movement that typically results in lack of acceptance of digit prostheses for both aesthetic and functional reasons. As such there is a rationale for introducing a replicable, quick, easy and economically feasible way of producing prostheses that can offer some form of functional result for patients, in addition to aesthetic and psychological. This presentation showcases a simple method for producing consistent, functional and patient specific movable prostheses by exploiting open source CAD and free CAD-customising software. Furthermore, methods of producing custom made aesthetic sleeves are explored and presented, with a view to strike a balance between an acceptable aesthetic outcome and dextrous functionality.

Midfacial & Nasal Prostheses: Design limitations, compromises, and solutions

Erin O'Fiel Stevens, Medical Art Resources, Inc., Milwaukee, Wisconsin, USA

Creating a convincing prosthetic restoration of the nose can be deceivingly difficult. In contrast to ears and eyes, the nose is an independent structure without a mirrored partner for reference. Although this offers some freedom from scrutinizing comparison, the solitary position of the nose at the center of one's face makes it a focal point with nothing to hide behind. There are few features or accessories to help disguise the margins of a nasal prosthesis, such as eyeglasses or sideburns. This presentation will feature a variety of cases to highlight design challenges, such as asymmetrical underlying anatomy, tissue movement, and the presence of post-surgical remnants, as well as the significance people often attach to the shape and size of the nose. Design limitations, compromises, and solutions will be discussed as they relate to sculpture development, mold design, prosthetic materials, and retentive elements. Comprehensive assessment of each patient's needs, and goals will inform these important design decisions to ensure a successful prosthetic restoration is achieved.

Session 3

Orbital and Upper Facial Prostheses–Every Detail Matters

Julie Brown, Consultant Clinical Anaplastologist, USA

The eyes are a focal point during interpersonal communication and are expressive of emotion. When a patient undergoes an orbital exenteration she must adapt not only to monocular vision, but also to dramatic change to self-image. The anaplastologist must use every technique at their disposal to make a composite of acrylic and silicone, which does not have the capability of movement appear to be alive. This in-depth presentation will cover specific techniques beginning with design of the custom ocular and tips for an accurate moulage and positioning the ocular. Methods for achieving a convincing gaze and facial expression will be described. An initial gestural sculpting approach will be suggested with tips for finalizing the sculpture. Mould design including design of the intaglio surface and mould-making strategies will be detailed. Ways of combining silicones to achieve a durable and clear edge will be reviewed as well as tips for building an eyebrow intrinsically. Three methods for application of eyelashes will be demonstrated. As time allows challenging cases will be shown with a focus on working with facial asymmetry, shallow defects, and cases with an intact lower eyelid.

Virtual Reality Planning in Reconstructive Surgery and Facial Prosthetics

Eduardo Arias-Amezquita, MSc(c), CCA UI Health, The University of Illinois at Chicago Department of Plastic, Cosmetic and Reconstructive Surgery, USA

Background/Purpose: Virtual reality (VR) is emerging as an effective and intuitive surgical planning and 3D visualization tool. Digital surgical planning is the gold standard for planning the placement of implants in maxillofacial prosthetics. However, our field lacks a platform exclusively designed to perform the task. Virtual reality planning (VRP) specific for maxillofacial prosthetics offers the clinician improved control of the presurgical planning and the potential to limit the need to adapt other advanced segmentation software. Furthermore, the virtual plan can be directly translated to the patient via custom 3D printed (3DP) surgical guides and visual aids. This study outlines the development of an original platform and workflow for segmentation, pre-op planning, and digital design within a VR environment for clinical use in reconstructive surgery and anaplastology.

Method: The workflow was applied to the management of 3 patients: two presenting with a total exenteration and one showing type IV microtia of the right face (n=3). A cone-beam CT was acquired for each patient, and their dataset was directly imported into the ImmersiveView® VR environment (ImmersiveTouch Inc, Chicago, IL). The clinicians virtually selected appropriately sized craniofacial implants and placed the implants in the desired orientation. Various measurement tools are available to aid in clinical decision-making. The ideal location of craniofacial implants was set according to an orbital and auricular prosthetic reconstruction. The resultant VR plan was exported for 3DP. The workflow's data accuracy was validated post-operatively by comparing post-op CT data and the proposed VRP. Analysis was performed using Mimics software (Materialise, Leuven, Belgium).

Conclusion: It takes, on average, 10 minutes to place four implants in the virtual reality space. The 3DP files resulting from VRP take approximately 2 hours to print and are constructed with a biocompatible resin appropriate for clinical use as surgical guides. Our innovative VRP platform allows for an accurate simulation of surgical and non-surgical procedures with an average displacement in XYZ of .6mm with a standard deviation of .3mm. In addition, VRP is an excellent tool to simulate craniofacial procedures and improves unsupervised self-learning teaching.

Provision of Indwelling Ocular Prosthesis for a unique patient with Cat Eye Syndrome

Ramin Dalili, University Hospital Crosshouse, Kilmarnock, UK

The eye is the specialized sensory organ that helps us to perceive the world around us.
Loss of an eye or sight due to disease, trauma, genetic or congenital defects not only effects facial appearance and loss of function, it has a detrimental psychological effect on the patient.
Many patients present with low self-esteem and providing them with an artificial eye/scleral shell can help tremendously to restore their confidence.
The history of the artificial eye, from antiquity to the present day is briefly described.
This presentation will detail the step by step fabrication of an indwelling ocular prostheses provided for a patient with the unique cat eye syndrome. I will discuss challenges encountered with this particular case and how these were overcome to restore function and aesthetics.
I will also discuss other case studies for ocular prostheses.

Session 4

The Effect of Primers on Peel Bond Strength between Titanium substrate and Maxillofacial Silicone

Yordanka Ihtimanliyska, Whiston Hospital, Whiston, UK

To investigate the effect of surface treatment of three different primers and two surface modifications on peel bond stress between maxillofacial silicone and titanium alloy.
The Peel bond strength of Technovent Z004 silicone elastomer to Ti6AL4V alloy using three adhesive primers (A304, A330-G, G611) was assessed for four weeks post-manufacturing. Data were collected and statistically analyzed by One-way ANOVA, and Bonferroni post hoc test ($p=0.05$) for the normally distributed data. And Independent-Samples Kruskal-Wallis Test for the nonparametric data. In addition, a series of Mann-Whitney U tests were performed ($p=0.05$).
Modes of failure were visually analyzed and categorized as adhesive and cohesive. Then, a further assessment was undertaken using Scanning Electron Microscopy and energy dispersive X-ray spectrometry (SEM/EDX) using a Tabletop TM4000Plus microscope (Hitachi High-Tech Co., Tokyo, Japan).
G611surface treatment showed significant superiority with average peel bond strength in N/mm in all surface modifications: unmodified (5.68N/mm), sandblasted (1.51N/mm) and polished (4.66N/mm). For the Control group (no primer) polished surface was significantly superior to the unmodified group ($p<0.07$) and for the A330 surface treatment ($p<0.02$). However, shown no effect in the G611 group ($p<1.000$). The unmodified surface produced the lowest average value with A304 (0.27 N/mm).
Significance: A strong enough bond can be achieved between Silicone/ Ti6Al4V mitigated by surface modification and surface treatment. The affinity of primer to the silicone and metal oxides is paramount and may affect clinical performance.

Influence of Pore Geometry on Mechanical Properties for 3D Polymer Tissue Engineering Scaffolds

Stephanie Ramsurrun, Aintree University Hospital, Liverpool, UK

An introduction to my final year research project: Biomimetic scaffolds that emulate mechanical properties of the native bone are pivotal to the success of bone tissue engineering. This enables effective amalgamation with bone architecture at macroscopic level, therefore inhibiting bone atrophy instigated by stress shielding. Scaffolds should be bioactive, biocompatible, biodegradable, maintain temporary mechanical support during implantation and regeneration, influence osseointergration and preserve stability for angiogenesis.

Scaffold internal architecture (pore shape, size, and porosity) determines the mechanical strength of the scaffold, which can be predetermined through controllable parameters and additive manufacturing technologies such as Fused Deposition Modelling (FDM). To evaluate the influence of pore geometry on mechanical properties, this research project will investigate hexagonal and triangular infill geometries designed through CAD software and 3D printed via FDM for polylactic acid (PLA) and polycaprolactone (PCL) scaffold materials.

For each geometry, pore size and strut thickness will be adjusted corresponding to porosity values of 20% and 80% relative to cortical and trabecular bone retrospectively. Specimens will be subjected to compression and tension testing determining young's modulus, compressive strength, and tensile strength values. Through direct comparisons of PLA, PCL, and the average mechanical properties for mandibular bone, superior or inferior configurations may prevail, and hence suitability for mandibular reconstruction applications.

Fabrication of the 'Glove' ear prosthesis for a patient with microtia

Liam Curtis, Queen Elizabeth Hospital, Birmingham, UK

Microtia is the malformation of the pinna and affects about 1 in 6000 babies worldwide. Patients with microtia typically have conductive hearing loss due to a lack of an auditory canal or cochlear organ. Concerned parents often have many unanswered questions and seek advice or solutions to care for their child correctly.

The adhesive 'glove' ear prosthesis involves positioning the prosthesis over the remnant and disguising the microtic ear. It offers the patient an opportunity to wear a prosthesis and see how they would look with two fully formed ears without the commitment of needing surgery to remove the remnant and have implants inserted or opt for autologous reconstruction.

The remnant's size, shape and location can often compromise the prostheses overall aesthetics and success. Furthermore, if the remnant is considered too large (grade I or II), or the patient reacts to the adhesives, then it is likely that the 'glove' ear prosthesis will not be successful. However, this presentation includes a case which involved fabricating a 'glove' ear prosthesis for a young patient with grade II microtia. It will demonstrate how the prosthesis was fabricated for a young microtic patient and that a good aesthetic result can be achieved.

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Digital Design and Manufacture of Auricular Keloid splints

Lawrence Dovgalski, Morriston Hospital, Swansea, UK

Digital keloid splints for the treatment of keloid scarring have been described in the literature for many years, with varying complexity in manufacturer and methods of retention. We describe a method of digitally designing and manufacturing the splint by light scanning a plaster model of the ear and using the resulting data in conjunction with Freeform Plus software (3D Systems) and a SLA Resin 3D Printer (Formlabs Ltd) to manufacture a device that is both quick to create, light and easy for the patient to use.

Session 5

Getting to the bottom of it

Daniel Shaw, Chesterfield Royal Hospital NHS Foundation Trust, Chesterfield, UK

As a team we receive referrals for patients that present us with a real challenge. On occasion we often receive very interesting and surprising referrals too. In this particular case, the patient had been born with a sacrococcygeal teratoma tumour of significant weight at the base of her coccyx. She was operated on immediately following her C section delivery and then her life began with the monitoring of the area and strict medication and personal hygiene regimes. At the age of eleven, she was referred to Daniel at Chesterfield Royal for some form of prosthetic filler/camouflage. This presentation explains the patient's condition and treatment but focuses on the Laboratory procedure, in order to attempt to give the patient a sense of confidence in her appearance.

An evaluation of the mechanical properties and effect of artificial saliva storage on a 3D-Printed material: A Pilot Study

Marios Philippou, University Hospital Coventry and Warwickshire, Coventry, UK

Statement of Problem: Empirical evidence surrounding the behavior and properties of SLA resins used for the production of occlusal splints is very limited at present, suggesting the need for further investigation prior to clinical implementation.
Purpose: To compare the flexural properties and hardness of a 3D-Printed resin against a conventional heat cured PMMA resin and to evaluate the effect of artificial saliva storage.

Material and Methods: The materials used in this study were a methacrylate based resin (Dental LT Clear V1) and a heat-cured polymethyl methacrylate acrylic resin (CentriTM Base), which was used as a control. The samples were divided into two groups and then further divided into three experimental groups: (i) dry, (ii) stored in artificial saliva for 50h and (iii) stored in artificial saliva for 14 days in an incubator at 37 ± 1 °C. Flexural strength, flexural modulus and Shore D hardness was measured. Scanning Electron Macroscopy analysis was undertaken to inspect the surface and cross-sectional area of the specimens. A variance analysis was performed using a 2-way ANOVA to determine the main effects of material and storage as well as the interaction effects. Independent t-tests and a one-way ANOVA followed by the Tukey post hoc test were used to establish the locations of the differences (a=.05).

Result: The flexural strength results for the 3D-Printed material were dry 156.9±15.6, 50h 134.4±7.9, 2w 113.6±8.3 and control dry 123.1±9.4, 50h 130±5.0, 2w 124.4±8.9. The flexural moduli for the 3D-Printed material were dry 2.6±0.4, 50h 1.7±0.3, 2w 2.1±0.1 and control dry 2.9±0.4, 50h 2.1±0.3, 2w 2.7±0.3. The

shore D Hardness for the 3D-Printed material dry 86.3±0.5, 50h 83.9±0.9, 2w 83.7±0.6 and for the control dry 89.0±0.4, 50h 88.1±0.5, 2w 88.8±0.6. When the two materials were compared there was no statistically significant differences in flexural strength at all water storage groups (P>0.05) whilst there were statistically significant differences in both hardness and flexural modulus. All the properties of the 3DP specimens were significantly affected (P<00.5) by the effect of water storage where a gradual decline in properties was observed. SEM analysis revealed in increase in delamination and formation of pits after a 2-week artificial saliva storage in the 3D-Printed resin

Conclusions: This study revealed that Dental LT Clear V1 has comparable flexural strength with a traditionally used resin but statistically significantly lower flexural modulus and hardness. Furthermore, artificial saliva storage had a stronger effect on the physical and mechanical properties in the 3DP material in comparison to the traditionally used resin.

3D Analysis of Dega Osteotomies

Lauren Johnston-Cree, University Hospitals Leicester, Leicester, UK

Leicester's maxillofacial laboratory utilised and applied their CAD knowledge to provide a research service for paediatric orthopaedics, please see below.

Background: The Dega Transiliac osteotomy is one of the gold-standard techniques for treating developmental hip dysplasia. However, confusion surrounding the surgical methodology in the current literature limits the performance.

Objectives: The objective of this study is to use 3D software (Materialise) to illustrate dimensions of the Dega osteotomy. By evaluating the angles of inclination and translation lengths in coronal, axial and sagittal planes, dimensions of the distraction can be observed and surgical techniques can be improved.

Methods: Twenty-two patients, with a mean age of 3.5 years (range 1.5-7.5 years) underwent an open hip reduction with both Dega and femoral osteotomies. Post-operative computed tomography (CT) scans were imported and segmented in Materialise software (Mimics Medical & 3Matics). The final volume of space created by the Dega was recorded as a percentage of the pre-operative pelvis volume.

Results: The total volume increase of the pelvis following Dega osteotomies was 16.3%±5.6% compared with the pre-operative pelvis. Greater lateral translation compared to anteroposterior translation was observed in 77% of cases.

Conclusion: We observed repeatability in the pelvic dimensions performed over a range of ages and disease severity. 3D software should be considered as a fundamental tool for research in hospital settings. The presentation will discuss the research, with the CAD applications in more detail, highlighting how we can contribute with our service, not only providing medical devices but providing our knowledge to further research in difference disciplines.

Wafer-less Orthognathic Surgery for Maxillary Repositioning: The University Hospitals Coventry and Warwickshire (UHCW) Technique

Charlotte Heath, University Hospital Coventry and Warwickshire, Coventry, UK

This presentation will discuss why wafer-less orthognathic surgery can lead to more predictable and accurate patient outcomes as well as outlining the in-house method developed at UHCW.

Session 8

Accelerating Prosthetic Rehabilitation for patients with maxillary and mid-facial malignancy

Professor Chris Butterworth BDS(Hons), MPhil, FDSRCS (Eng.), FDS (Rest Dent) RCS (Eng.) Aintree University Hospital, Liverpool, UK

Malignant tumours of the maxilla and midface provide a significant challenge to the multi-disciplinary head & neck cancer team seeking to provide curative as well as reconstructive and rehabilitative treatments. Resections in this region create complex oral and facial defects with loss of important structures such as the eye, the nose as well as the maxillary dentition. Microvascular free tissue transfer is an important surgical modality in this patient group but many diverse treatment approaches have been presented in the literature and often prosthetic rehabilitation is compromised, delayed or lacking. In addition, this patient cohort has reported overall worse survival rates than other head and neck sites and together with the frequent use of radiotherapy, prosthetic rehabilitation is highly complex.

The advent of zygomatic implant therapy with both conventional and oncology-modified zygomatic implants (ZIs) has provided many possibilities for early prosthetic rehabilitation using the remote anchorage available in the facial skeleton. Placement of ZIs at the time of primary surgery with or without microvascular flap reconstruction has allowed the development of treatment protocols to provide support and retention for a wide range of facial and dental prostheses.

This lecture will focus on the presenter's experience over the past 18 years in one of Europe's largest head & neck cancer centres, during which time he has surgically placed and restored over 400 ZI's in patients with maxillary & midfacial malignancy. He has developed innovative techniques such as the Zygomatic Implant Perforated (ZIP) Flap procedure which combines the use of immediately placed skeletally anchored zygomatic implants with microvascular soft tissue flap reconstruction for rapid fixed dental rehabilitation even in cases requiring post-operative radiotherapy. Data will be presented from several published studies from the Liverpool Unit as well as illustrative cases to demonstrate the treatment approaches employed.

Coaching and mentoring. The way to professional excellence

Anna Veli, Portsmouth Hospitals University NHS Trust, Portsmouth, UK

When you think about it, coaching and mentoring have been around forever. We learn from listening to and talking with others. Athletics and high performers have known this for a long time. If you want to improve parts of your life (work, parenting, leadership, money, relationships, etc.) a good coach will not be there to tell you what to do. They will help you transform. Unfortunately, only some professions are acceptable for coaches. A sportsperson will always have a coach. Lawyers, doctors, engineers, won't.

There's a lot of confusion about the differences between coaching and mentoring. Depending on whom you talk to, you'll get different interpretations of what exactly is coaching and what's mentoring. Nevertheless, coaching and mentoring have become integrated into many organisations. Rather than being only for exceptional performers or underperformers, coaching and mentoring are now increasingly widely available and seen as part of the culture in many organisations.
Recognition of the value of coaching has given a strong message that successful leaders and managers are also coaches and mentors. Coaching others and experiencing compassion serves to balance at a physiological level the effects of the stresses of the leadership role. Some people suggest that coaching has raised the levels of confidence of senior leaders. And in other instances, coaching is the reason for people leaving organisations to pursue a different career.

Becoming a coach or a mentor can be beneficial not only for the others but also for the coaches and mentors. One of the most important things that you bring to coaching and mentoring is yourself. The person you are, with your own style and strengths and qualities. Your clients learn from you, your experiences, knowledge and insights, with you, during the conversation, and through you, from the way you are.

Sometimes the right path is not the easiest one. We need to accept we won't always make the right decisions. Understanding that failure is not the opposite of success, but it's part of success, can be transformative. Having a coach made me realise that coaches were into something profoundly important. People with great passion can make the impossible happen, and we all have a duty to help them to achieve this.

Managing to lead?

James Dimond, University Hospital Coventry and Warwickshire , Coventry, UK

The head of service for a maxillofacial laboratory has to wear many hats: clinician, manager and leader. As prosthetists we are well trained in the patient care aspect of the role but formal training in management duties is varied. As NHS employees we can avail of many opportunities to receive suitable training in leading a team, ranging from in-house workshops through to Masters level education.
Having recently completed a Master's in Business Administration (MBA Healthcare) I would like to share a few insights and business models that have helped me to develop the unit at University Hospital Coventry. I reflect on my own development, the difference between a manager and a leader, what drives us, and the pros and cons of leading a service in the NHS.

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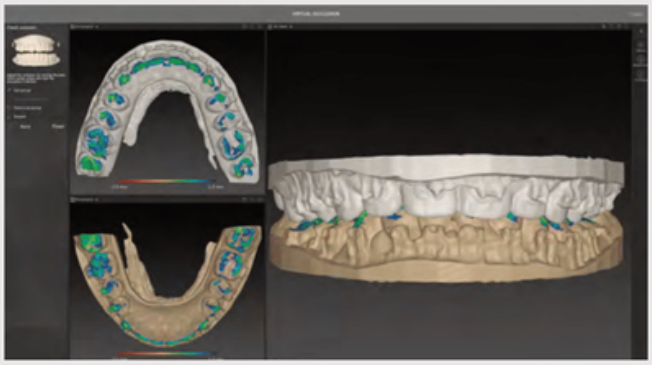

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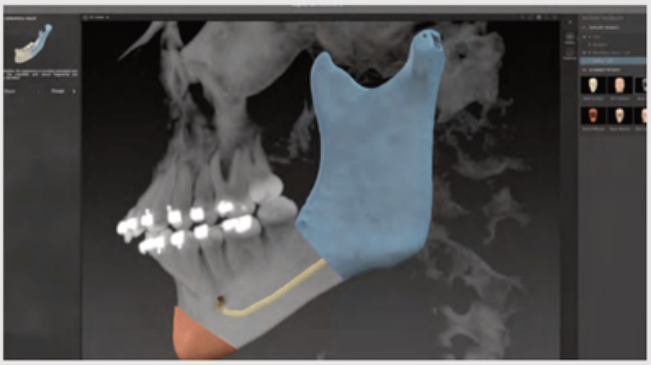

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Session 9

The Perpetual Challenge

Matt Pilley, University Hospitals Leicester, Leicester, UK

We have all been faced with a complex case that requires a little lateral thinking, or a more nonconformist approach to achieve a functional and cosmetically acceptable prosthesis. This lecture will discuss such a case, outlining the constant changing soft tissue profile, the patients declining health and associated issues that have arisen. Reflecting on the highs and lows of accepting such challenges. Methodology, materials and techniques to construct them and the positive and negative outcomes of such treatments.

Can't you just open a window?

Adrian Kearns, Addenbrookes Hospital, Cambridge, UK

The basic responsibility of a hospital with a maxillofacial laboratory is to provide a safe working environment. Within that, the role of a lead Maxillofacial Prosthetist is to inform and provide expert guidance and evidence to ensure their Trust is able to fulfil their role, and that staff can work in a safe environment.
Toxic chemistry, flammable liquid, corrosives, gases, nuisance dusts, consumables, gypsum, general waste and housekeeping. Managing health and safety, manufacturing processes and occupational exposure extends beyond local exhaust ventilation, flammable storage, ongoing management and opening a window when something smells strong. This presentation gives the processes of research, independent research and evidence, proposal and finance, through to installation of a bespoke environmental extraction and ventilation system for the Maxillofacial Laboratory at Addenbrooke's Hospital, Cambridge.

Research Proposal: To explore the predictors of appearance-related adjustment and barriers/facilitators of prosthetic acceptance

Taran Malhotra, Aintree University Hospital, Liverpool, UK

On average there are 12,500 new Head and Neck Cancer cases each year in the UK. Following diagnosis, one half will undergo major surgery to remove a facial part i.e. nose or eye which results in severe altered appearance. Many patients will then have some form of reconstruction, with an intra/extra oral prosthesis.
My preliminary PPIE (Patient and Public Involvement and Engagement) work has demonstrated unmet supportive care needs in this vulnerable group. My long-term plan in this under-researched area is to develop an effective intervention to i) facilitate acceptance of prostheses ii) improve quality of life outcomes. This will form the basis of my NIHR doctoral application.
I aim to present my study proposal to gain feedback from other prosthetists, and to obtain a broader picture of the current national service provision and existing regional guidelines within maxillofacial prosthetic rehabilitation.

The Value of Interprofessional Relationships in Healthcare Science

Jordan Abbasi, Queens Medical Centre, Nottingham, UK

As Reconstructive Scientists and Maxillofacial Prosthetists, our roles within Healthcare Science are divided between working on clinic and in the laboratory – the latter accounting for most of our time spent in the workplace. Considering this, it can be easy to justify that our professional relationships remain confined to our fellow colleagues, neglecting others in our local Oral and Maxillofacial Departments.
As a trainee in Nottingham, I was actively encouraged to network and develop interprofessional relationships with all members of the Oral and Maxillofacial team, ranging form the Office-based secretaries, to the Surgical Consultants, and every single person in between. Time spent developing strong and trusting working relationships, not only improves patient outcomes, but also leads to increased job satisfaction.
In my experience, the professional relationships that were forged throughout my training were invaluable, enabling a seamless transition into my current role, and continually assisting with the provision of excellent patient-centred care.

The aim of this presentation is to explore interprofessional relationships, from the perspective that appreciates the unique roles and skills of everyone involved in patient care. It is anticipated that on highlighting the personal and professional benefits, that those within our professional cohort will invest more energy into their working relationships moving forward.

Session 10

Computer-aided design and manufacturing of nasal prostheses: a novel method using a 3D morphable model

Tjitske Bannink, Antoni van Leeuwenhoek - Netherlands Cancer Institute, Netherlands

Objectives: The conventional workflow for the fabrication of nasal prostheses is complex, consisting of multiple manual operations. Therefore, it is time-consuming and highly dependent on the skills of the anaplastologist. We developed an innovative computer-aided method of designing and fabricating nasal prostheses to reduce these limitations.

Methods: The prosthesis design is computed using an in-house developed algorithm. This algorithm is based on Scalismo, a library for statistical shape modelling, developed by the Graphics and Vision Research Group at the University of Basel. The shape of the nasal prosthesis is created by morphing a 3D face model (Basel Face Model 2019 [1]) towards a 3D scan of the patient. The resulting prosthesis design is converted to a mould and fabricated by 3D printing. Packing the mould with silicone results in the prosthesis.

Results: Nasal prosthesis designs are computed for multiple clinical cases. The resulting prostheses showed a case-specific shape, size, and fit based on the patient's 3D scan. By packing the mould with silicone, the dependency on the skills of the anaplastologist is greatly reduced by completely bypassing the modelling process.

Conclusions: The novel computer-aided method for nasal prosthesis fabrication has shown preliminary positive results. The algorithm computes a patient-specific prosthesis model, replacing conventional wax modelling by the anaplastologist. However, the 3D-printed mould can also be filled with modelling wax, allowing the anaplastologist to adjust the model. Future research should quantify the reduction in fabrication time compared to the conventional workflow.

Back from the future "50 not out"

Rowland Gardner, Queen Mary's Hospital, Sidcup, UK

A reflective look back on past training and skills, techniques and materials. Are contemporary methods of manufacture and outcomes an improvement in form function and aesthetics?

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Poster Abstracts

Session 7

Inhouse Planning of Wafer-less Orthognathic Surgery: A Novel Surgical Guide Design

Jordan Abbasi, Jessica Jones, Queens Medical Centre, Nottingham, UK

Introduction: Digital software has replaced traditional methods when planning orthognathic surgery at NUH. We have developed a technique to transfer the digital plan to the patient without the use of wafers. Surgical guides allow the screw holes to be predrilled before osteotomies are performed and corresponding preadapted plates are provided to determine the post operative bone position.

Method: Orthognathic surgery is planned using IPS CaseDesigner (KLS Martin). The STLs of the patient's maxilla and mandible are exported in their pre and post op positions and then imported into FreeForm Software (Geomagic).
Our unique mandibular surgical guides have been highly successful in transferring BSSO plans. Orthognathic plates (Synthes) are positioned virtually on the post operative STLs, and the screwholes are 'drilled' into the mandible. The post op mandible is registered with the pre op mandible, and the screw hole positions are transferred to the surgical guide.
The surgical guide incorporates the occlusal surfaces of the teeth and extends into the lingual sulcus. This attaches to the screwhole portion of the guide with an extension of material which bypasses the gingiva. This design results in positive and stable guides which ensures correct transfer of the drilling holes and contributes to our successful outcomes.

Conclusion: Since May 2021, we have successfully treated 41 patients using the above method of waferless surgery planning. The ability to undertake this inhouse has saved intraoperative time and has reduced the potential cost to the Hospital.

Big Mac's and Lollipops: Optimising scar management intervention in a neck and face burn for a patient with a learning disability

Katie Spooner, University Hospitals Leicester, Leicester, UK

An innovative case presentation demonstrating collaborative working between Occupational Therapy and Maxillofacial Prosthetists. This case presentation shows the innovative treatment used by the burns MDT in optimising patient care. The scar therapy, prevention of microstomia and neck contracture in a 52-year-old female are illustrated. Patient care was delivered to address the additional needs of the individual by use of an unconventional oral splint to enhance patient adherence to treatment, leading to an optimal outcome.

A collaborative approach to the management of post-burn microstomia at a regional burns centre

Claire Poole, Janine Evans, Nia Porte, Steven Hollisey-McLean, Mr. James Owens, Morriston Hospital, Swansea, UK

This poster describes our collaborative, non-operative pathway for patients with post-burn microstomia.
Methods: This case study for a male patient (aged 44) with a 66% flame burn injury demonstrates (a) the pathway, (b) management techniques and (c) outcomes achieved.

Results/ Discussion: Deep, perioral facial burns have a high propensity for scar contracture, and the resultant reduction of the oral aperture is known as microstomia.
microstomia is a condition which has a severe impact on quality of life.
Given the face's ability to heal, non-operative management is preferred, and common techniques include oral exercises, massage, and splints designed to stretch the peri-oral soft tissues. However, splinting devices are often not well tolerated by patients, leading to poor compliance and outcomes.

At our burns service, the restorative dentistry and maxillo-facial teams collaborated to produce custom-made, intra-oral dental blanks to support and stretch the peri-oral soft tissues. The TheraBite® Jaw Motion Rehabilitation System is also provided to those who require additional support in their exercise regime.
The following results were recorded:
January 2020: vertical mouth opening = <13 mm
horizontal mouth opening = not measured
(splint introduced)
March 2020: vertical mouth opening = 30mm
horizontal mouth opening = 50mm
(TheraBite introduced)
May 2020: vertical mouth opening = 35mm
horizontal mouth opening = 76mm

Conclusion: This paper highlights the lack of guidance about post-burn microstomia, and suggests that an early, collaborative, multi-specialty approach can be effective in achieving optimal patient outcomes.

Augmented Patient Assessment in Trauma Reconstruction

Jason Watson, Jessica Jones, Jordan Abbasi, Rory Oconnor, Arsham Khayatpoor, Josh Wright, Prof Phillip Breedon
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Introduction: The treatment of maxillofacial trauma is particularly challenging. The impact of the deformity is difficult to hide for the patient, which can present with associated physical (visual) and psychological impairment. Picture Archiving Communication Systems (PACS) allow exploration of 3 dimensional (3D) CT images. NUH developed in house 3D printing as an emerging technology, in collaboration with University, commercial, and DTi partners (i4i project 2007). 3D printed models are now common place, they are useful as an adjunct to PACS imaging in planning and surgical guidance.

What is the next emerging tool in diagnostic assessment and treatment planning? Virtual reality (VR) is visually appealing but is limited in only being accessible in a virtual, simulated environment. Augmented/Mixed Reality (AR/MR) enhances the environment in which it is used and allows interactions with data sets of images and objects not removing participants from the environment like VR. We hypothesise that this is the next technological step in surgical planning and assessment.

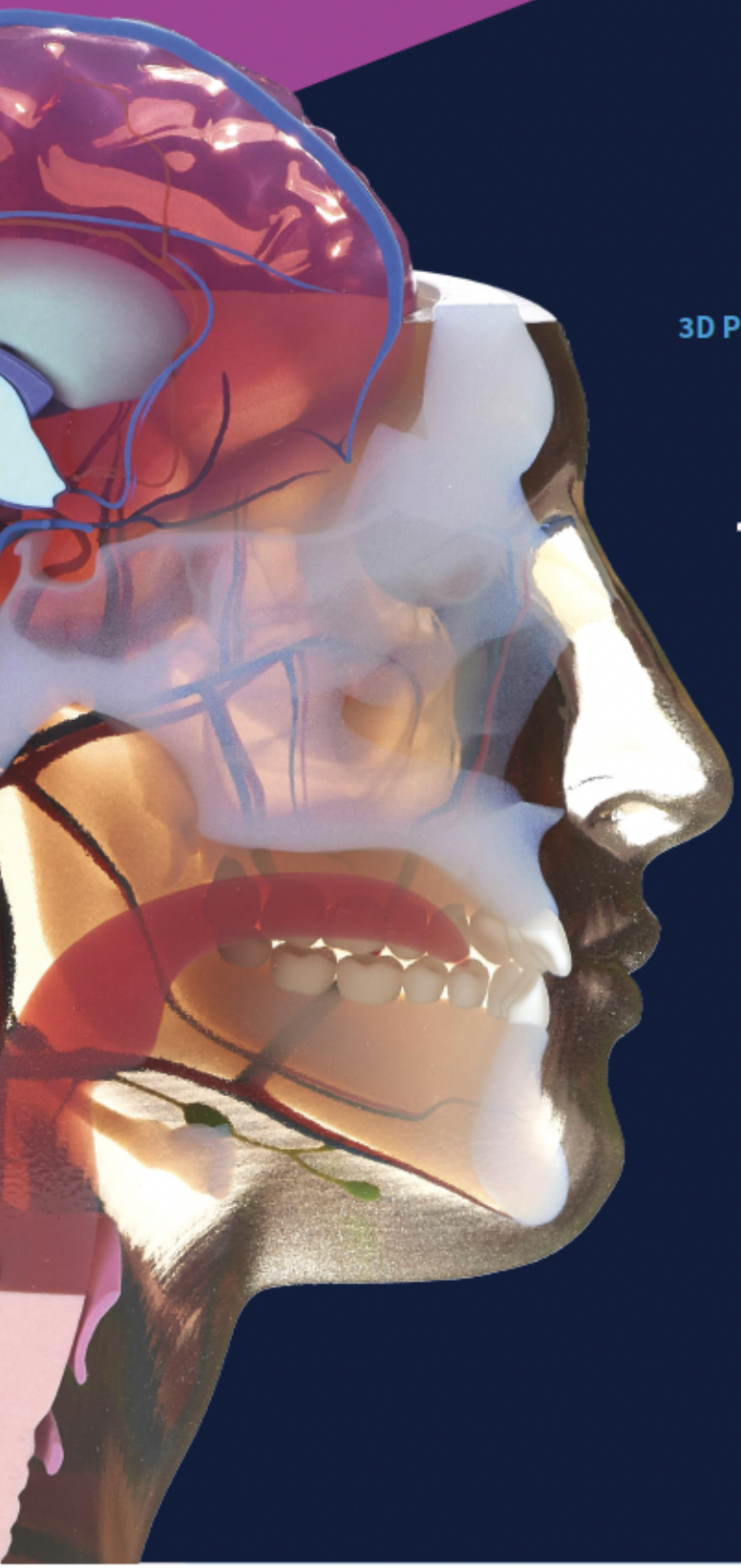
Method: A working group of academic, industry and NHS partners was established to share ideas, experiences and technology for potential funding for clinical research. A proof of concept study was designed to assess the use of existing AR technology in an elective trauma setting to assess its clinical efficacy from an academic, scientist, surgeon and patient perspective. A 3D analogue was printed and used to determine the direction of the research. Interface and multiple data set registration and visualisation with AR were the primary challenges. Feedback was obtained and fed into the working group.

Discussion: Current technology has changed the way we assess and plan reconstruction, the challenge is to see how that integrates with new technologies to improve understanding and create innovation in patient specific treatment. This pilot highlighted potential areas for research and AR applications in clinical and operating theatre environments. Most importantly it highlights the need for Reconstructive Scientists to form collaboration networks for any innovation to develop into clinical practice.

The use of Finite Element Analysis in Reconstructive Science

Neesha Sharma, St Georges' University Hospital, London, UK

Finite Element Analysis is a way of simulating the behaviour of a part under given conditions (e.g. a load). It is widely used by engineers, to design the most stable structure, eliminating some risk and material wastage. Similarly, Reconstructive Scientists/Maxillofacial Prosthetists (MPT's) could use it to further improve implant planning. It will enable the user to determine the best implant design and surgical depth/angle, for that particular patient, when subjected to a load. For example, the optimal position to place an orbital implant, for a magnet retained prosthesis, subjected to a "pull-out" force matching the average magnetic force. Or, a dental implant when subjected to masticatory forces.
This poster aims to educate the visitor on the areas within Reconstructive Science/Maxillofacial Technology that FEA can be utilised, now and for the future. It also aims to discuss the various software and methods that are available.



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An Individual's Quest for Anonymity and a Sense of Serenity

Jermaine Jones, Queen Elizabeth Hospital, Birmingham, UK

A 34 –year- old young man who has left – sided hemifacial macrosomia was referred to us by his GP following deterioration of his auricular prosthesis.
Upon referral we had no patient history or details in regards to the treatment pathway or implant system that had been utilised.
The patient presented to the Queen Elizabeth Birmingham maxillofacial Prosthetic department after last being seen in 2013 in another region. Upon presentation in clinic, the young man revealed he had been wearing the same prosthesis for over 9 years and wished for anonymity in everyday life that would enable him to feel a sense of serenity from having " A normal looking ear" without feeling inhibited.
On closer inspection the prosthetic was dilapidated, discoloured and clearly unwearable. It became apparent when he removed the prosthetic he had a bacterial infection of the soft tissues known as erythema.
As we continued we were taken aback when we came across the retention method being utilised. The abutments had been adapted as a mushroom shape consisting of a flat head screw. The patient disclosed he'd had the same abutments since childhood.
On a positive note the implants had no soft tissue overgrowth enabling us to place an old Vistafix 2 abutment on to see if the systems were compatible. Fortunately, the systems were compatible enabling us to continue with the treatment plan to achieving his quest for anonymity.

Additive Manufacturing of Retention Components for Maxillofacial Prostheses

Naomi Sweeney, Queen Victoria Hospital, East Grinstead, UK

Background: Many maxillofacial laboratories now have access to 3D printers capable of printing biocompatible materials, which could be utilised to produce highly effective prosthetic abutments and laboratory components at a fraction of the cost of handmade or commercially available systems. A proven method of retention, in particular with auricular prosthetics are mushroom shaped abutments (Edwards and Farnell, 2004). Maxillofacial departments could make huge cost and time savings by producing prosthetic abutments with additive manufacturing (AM). This project demonstrates the potential of using AM to produce a retention system for maxillofacial prostheses. By custom making each abutment, individual patient needs can be met by altering the size and shape of the abutment.

Methods: As this type of abutment is already in use and has been documented, it was primarily reverse engineered from an existing cast gold version. 3D CAD software was used to model the abutments which were analysed using finite element analysis (FEA) software ANSYS. The abutments were then manufactured using the Formlabs Form 2 SLA desktop printer, in BioMed Amber resin and physically tested.

Results: ANSYS shows the maximum stress on the mushroom abutments to be 34.972 MPa. The safety factor for the ANSYS model was calculated as 2. The recommended safety factor for plastic parts is 1.5. After removing and replacing the abutments by hand 30 times, the abutments were still intact.

Conclusion: To further asses the viability of the AM mushroom shaped abutments, supplementary testing to evaluate the lifespan in comparison to their cast gold counterparts should be performed.

Innovative uses of 3D Technologies in Orthognathic Surgery Planning

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Introduction: The use of digital technologies in head and neck reconstruction is well established practice in maxillofacial surgery. It is based on segmenting patient's digital impression into 3D virtual reconstruction of their hard and soft tissues, to execute or verify treatment protocol with aid of specialised biomedical software. Orthognathic surgery 3D planning depends on the use of patient digital scan such as CBCT or CT data. Incorrect scan data cannot be fixed and need to be redone, incurring extra cost along with exposing patients to unnecessary radiation.
Aim: Current work present two cases of advanced use of 3D technologies in performing 3D Orthognathic Surgery planning. The first case involved successful correction of an erroneous skeletal jaw relations of a CBCT scan of a patient scheduled for BSSO orthognathic surgery and mandibular hyperplasia correction. The second case described a technique for orthognathic 3D planning without the need to have patient CBCT or CT.

Case report.

Methods: Case 1: A patient presented with a Class II division 1 malocclusion with pan facial asymmetry of and mandibular hyperplasia (right side). She was scheduled for BSSO and hyperplasia correct simultaneously. A CBCT scan was performed and segmented using CMF Pro Plan. A scanned casts of patient's maxillary and mandibular jaws were superimposed to create composite 3D models of the maxilla and mandible for the 3D planning. The occlusion of the composite models was checked against the dental casts' occlusion and clinical measurements available. There was discrepancy in the occlusion as CBCT showed the patient wrongly protruding her lower jaw while having her scan recorded. However, we have managed to correct her CBCT occlusion and executed the treatment plan.

Case 2: A patient presented with a Class II division 1 malocclusion necessitating corrective BSSO. We planned her surgery without her CBCT. An Upper and lower impressions of patient's teeth were taken, cast, then digitized using 3Shape-scanner. The casts were scanned individually, then in presenting pre-surgical occlusion, and in planned post-surgical occlusion. They were imported using CMF software and BSSO was planned following the orthognathic module.

Conclusion: The two cases showed innovative and cost effective techniques in performing accurate 3D orthognathic planning.

Keywords: 3D technologies, BSSO, Orthognathic Surgery Planning.

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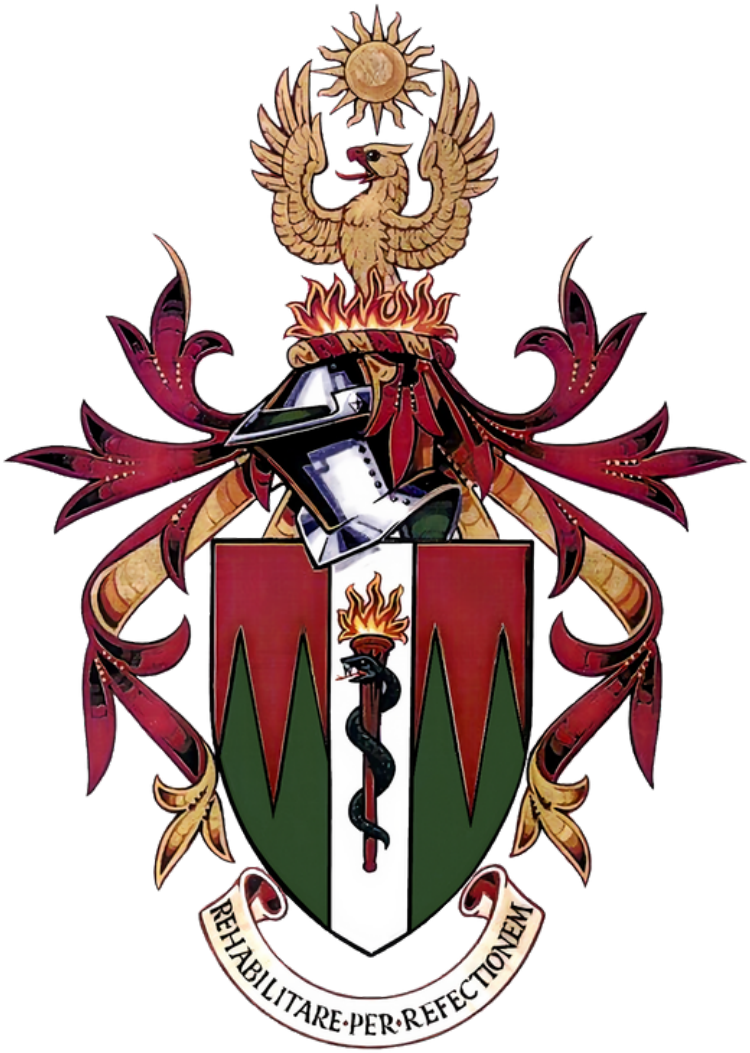

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