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IFSSH PATRON OF HAND SURGERY PROGRAM

To a peaceful and rewarding 2025

The International Federation of Societies for Surgery of the Hand (IFSSH) Executive Committee thanks all Delegates and Member Societies for their continued support and friendship throughout 2024.

We look forward to welcoming all to the 16th IFSSH-IFSHT Congress in Washington, D.C., in March 2025.

We wish hand surgeons throughout the world all the very best for 2025.

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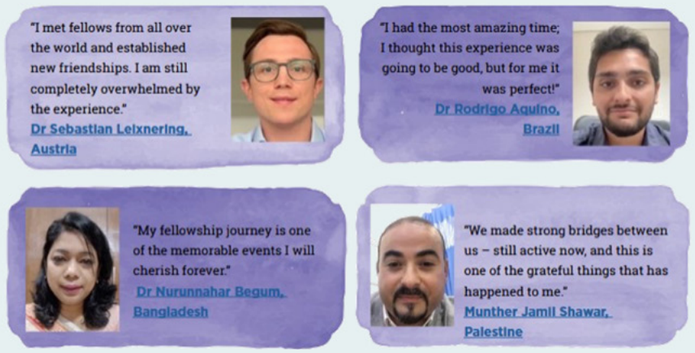

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Special Nerve issue from the Journal of Hand Surgery

(European Volume) June 2024

The Editor of the JHS(E) Wee Leon Lam has requested the IFSSH to announce that in collaboration with FESSH and the Publisher Sage, the June 2024 edition of the Journal of Hand Surgery (European Volume) will be free for anyone to download until June 2025. https://fessh.com/fessh-jhse-special-issue/

This special issue covers the entire breadth and depth of nerve surgery, including diagnostics, outcome measures, nerve compression, nerve transfers, tumours and the latest trends in prostheses and spasticity.

The articles are by authors who are experts in their fields, and we are very grateful for their valuable contribution.

The IFSSH is most appreciative for this generous offer which aligns with the Federation's mission of sharing and spreading knowledge about the hand internationally.

Happy hand surgery.

ULRICH MENNEN
Editor: IFSSH Ezine

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CONNECTING OUR GLOBAL HAND SURGERY FAMILY

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President's Message

David Warwick provided an excellent overview of our ongoing educational programs in his Secretary-General report.

I would, however, like to take this opportunity to highlight some recent advancements within the Hand Surgery Resource. Dr. Hurst, the creator of the Hand Surgery Resource, has released a new application titled "Anatomy at Risk". Developed with a grant from the State University of New York, this free app is available on the Apple App and Google Play Stores. It is an invaluable resource for students, trainees, and anyone seeking to understand hand and wrist anatomy.

The app features 40 concise educational videos covering dorsal and palmar hand/wrist anatomy and functional assessments. These videos are complemented by detailed explanatory text, high-quality images, diagrams, and references. Additionally, the app includes hyperlinks to relevant Hand Surgery Resource sections and an anatomical abbreviation list for quick reference. The IFSSH and the global hand surgery community owe Professor Hurst immense gratitude for his dedication to creating the Hand Surgery Resource and now the "Anatomy at Risk" app. This wealth of information, literally at one's fingertips, will undoubtedly benefit all those treating hand and wrist pathology. (see page 34)

Looking ahead, Professor Hurst continues to innovate. He is currently working on integrating artificial intelligence into the Hand Surgery Resource app, promising further advancements. We will share more updates as this project develops.

I would also like to echo the Secretary-General's gratitude to the Executive Committee for their invaluable guidance during these exciting times. It has been a privilege to work alongside them. My sincere thanks also go to Belinda Smith, our dedicated and tireless administrator, and Rama Sudakar, our newest team member, for their exceptional contributions. Without their efforts, the IFSSH could not function.

Special recognition is due to Professor Ulrich Mennen, our intrepid Ezine editor, for founding the IFSSH Ezine and serving as an outstanding Editor-in-Chief. His contributions have been instrumental in advancing our communication efforts. Finally, I extend heartfelt thanks to David Warwick for his exceptional leadership as Secretary-General. It has been a privilege and a pleasure to be his wingman.

In closing, serving as President of the International Federation of Societies for Surgery of the Hand has been one of the greatest honors of my life. It has been a privilege to collaborate with so many wonderful people who have unselfishly dedicated their time to shepherd this Federation forward through the 21st century.

I wish you a happy and healthy new year, and I look forward to seeing you in beautiful Washington, DC, March 24 -28 at the 16th Triennial IFSSH-IFSHT Congress.

DANIEL NAGLE
President: IFSSH

SECRETARY-GENERAL'S MESSAGE

Secretary-General's Message

Dear Colleagues,

On behalf of the International Federation of Societies for Surgery of the Hand (IFSSH), I extend my warmest wishes for a happy and prosperous New Year. As we reflect on 2024 and look forward to 2025, I am delighted to share some of our recent accomplishments and future initiatives.

Highlights from 2024

Launch of the IFSSH Patron of Hand Surgery program
Last year marked the introduction of the IFSSH Patrons of Hand Surgery program, which has already begun receiving donations. These contributions will transform our ability to advance hand surgery education globally. Donors are recognized on the IFSSH website, in the Ezine, and during events such as our Triennial Congresses and Mid-Term Courses. We encourage you to support this initiative. For more details, visit our donation program page.

Inaugural IFSSH Mid-Term Course in Hand Surgery: Ecuador, January 2024
2024 saw the successful completion of our first Mid-Term Course in Ecuador, providing vital educational opportunities to our members.

Educational Grants and New Resources
Under the leadership of Dr. Raja Sabapathy, the IFSSH Committee for Educational Sponsorship awarded various grants. We also acquired the Hand Surgery Resource, a comprehensive online tool designed to support practitioners worldwide. This is made available to all, free-of-charge, accessible through the IFSSH website.

Expanded Secretariat Team
Our secretariat welcomed Rama Sudakar, who has provided invaluable support to Belinda Smith. Rama will be present at the Washington, D.C., Congress, so please take the opportunity to meet her.

Looking Ahead to 2025

The upcoming year promises to be another milestone in the journey of IFSSH:

- **Washington, D.C., Congress – 24-28 March 2025:** We are now just weeks away from our Triennial Congress! We already have participants from 80 countries joining us for the 2025 IFSSH-IFSHT Congress - the 16th IFSSH triennial event. This is our opportunity to gather from all parts of the world under one roof in Washington, D.C., for an amazing week of science and socializing, in collaboration with our hand therapy colleagues. Jim Chang and his US host team have prepared a superb educational program, with over 50% of presentations being delivered by international registrants. Prof Fu Chan-Wei, the 2025 IFSSH Swanson Lecturer, will share his career in hand surgery and this highlight of the Congress should not be missed. The Congress textbook focuses on Trauma Reconstruction and belongs on every hand surgeon's bookshelf. We are thrilled that the local hosts have secured an evening in the National Portrait Gallery (Smithsonian American Art Museum) for the Gala Dinner, and the SPIN games night earlier in the week promises to give that much-needed time to unwind with colleagues and have fun. The city itself will be at its most beautiful with the conference timed to fall in cherry blossom season - make sure you allow yourself some extra days to see all of the sights while you're there. We can't wait to welcome you to the Congress, to honour our Pioneer of Hand Surgery inductees, to hear from our guest lecturers, to meet our 2025 IFSSH-AAHS/ASSH Travelling Fellows, to share knowledge and collegiality with you, to dine together and play ping pong, and to introduce you to Washington, D.C.. We eagerly anticipate the 2025 Delegates' Council Meeting within this Congress, where the 2025-2028 Executive Committee will be elected by the Delegates.

- **Future Planning:** Preparations will begin for the 2nd IFSSH Mid-Term Course in Hand Surgery and the 2031 IFSSH-IFSHT Congress, with our Delegates' Council again choosing the host Societies following presentation of the bids at the 2025 meeting. Progress will also continue for the 2028 Congress in Singapore.

- **Expanded Grants and Education:** We remain committed to delivering more grants and expanding educational opportunities for members across the globe.

- **Growing Secretariat:** As the IFSSH's scope widens, we will further expand our secretariat to meet the demands of our growing initiatives.

2025 IFSSH Delegates' Council Meeting

The 2025 IFSSH Delegates' Council Meeting will be held within the 2025 Triennial IFSSH-IFSHT Congress in Washington, D.C. All IFSSH Delegates are invited to attend this Council Meeting on Wednesday 26th March 2025, 12:30-2:30pm.

The 2025 Council Meeting will include voting items, such as selection of:

- the 2nd Mid-Term Course host
- the 2031 Triennial Congress host
- the 2025-2028 Executive Committee and Nominating Committee positions, where automatic succession does not occur.

Relevant documents will be emailed to all Delegates in February. If your society's official IFSSH Delegate (refer to https://ifssh.info/member_societies.php), a proxy may be appointed. This must be done prior to the meeting – full information will be provided to all IFSSH Delegates.

Please continue to encourage your society's membership to join the 2025 Triennial IFSSH-IFSHT Congress. It is sure to be a wonderful event, showcasing the international world of hand surgery - whilst the US are hosting this congress, over 50% of presentations are by surgeons from outside of the US to ensure diverse representation.

There are exciting social events planned and we are honoured that Prof Fu-Chan Wei will deliver the prestigious IFSSH Swanson Lecture, and the IFSSH Congress textbook will be given free of charge to the first 2500 registrants.. More information about the venue, program, events, hotels and visas can be found on the Congress website: www.ifssh-ifsht2025.org. Please make sure you and your colleagues register soon to ensure you gain your place before events sell out!

Committee for Educational Sponsorship (CES) call for submissions

The IFSSH now calls for submissions for general IFSSH educational funding and from societies wishing to host an IFSSH Harold Kleinert Visiting Professor.

General funding can support educational projects of varying size and cost, from a single society or a collaborative effort, for work occurring in your home country or as outreach. The recipient reports may provide your society with inspiration of what can be achieved with financial support from the IFSSH. Please review the application process within the IFSSH CES guidelines. If you have an idea and wish to discuss opportunities, please contact the IFSSH secretariat – administration@ifssh.info.

The IFSSH Harold Kleinert Visiting Professor scheme involves the IFSSH funding the travel and accommodation of a distinguished surgeon to an IFSSH member society's scientific and educational program. Dr Steven Moran was the inaugural Professor, travelling to Australia in 2020. Prof Jin Bo Tang then received this honour and undertook an intensive program of lectures, courses, workshops and teachings in Poland in 2023. If your society wishes to be a part of this Visiting Professorship program, please forward an application – the guidelines are available via https://ifssh.info/educational_sponsorship.php

Future Meetings

A detailed list of national and regional hand surgery meetings is available on the IFSSH website.
The triennial IFSSH Congresses are as follows:

XVIth IFSSH – XIIIth IFSHT Congress
Washington D.C., USA
24th - 28th March, 2025

XVIIth IFSSH – IVth IFSHT Congress
Singapore
23rd – 27th October, 2028

Email: administration@ifssh.info
Web: www.ifssh.info
X/Instagram: @IFSSHand

Meetings A Note of Gratitude

As this is my final message as Secretary General, I want to extend my heartfelt thanks to the IFSSH team:

Executive Team:

- Past President: Special thanks to Marc Garcia-Elias, whose dedication has greatly enriched IFSSH. Marc has given his time to the IFSSH Executive Committee since 2010, when selected as the IFSSH Secretary-General Elect. We are truly blessed to have had such a kind and talented person in our organisation.
- President-Elect: Raja Sabapathy continues to motivate engagement and has led the Committee for Educational Sponsorship through the 2022-2025 triennium, in which time more grants have been provided than in IFSSH history.
- Communications: Jin Bo Tang has enhanced our reach through his exceptional work as Communications Director.
- Our Members-at-Large - Aida Garcia, Jorge Clifton, Greg Bain, Paco del Pinal, and David Shewring - have ensured global representation, encouraging collegiality amongst the IFSSH Delegates from each region and bringing the IFSSH closer to our members.

Nominating Committee: Past-Presidents Marc Garcia-Elias and Zsolt Szabo, current President Daniel Nagle, and Nominating Committee Members-at-Large Peter Amadio and Ilse Degreef, have worked diligently to refine the IFSSH honours and committee processes, and reviewing Pioneer and Executive/Nominating Committee applications for 2025.

Ezine: Ulrich Mennen continues to produce each edition with care and precision, ensuring this vital resource remains a cornerstone of IFSSH's work.

Website: The IFSSH website is pivotal to our ability to share information and resources. We are indebted to our webmaster, Mr Santhosh Kumar, who has maintained and improved our website for over 10 years throughout periods of major growth.

Personal Thanks

I would like to personally thank Belinda Smith, whose tireless work, exceptional organizational skills, and dedication make the role of Secretary-General possible.

Finally, my deepest gratitude to Dan Nagle for his outstanding leadership as President and his unwavering partnership. Dan's commitment to IFSSH has been extraordinary, and I have been privileged to work alongside him. I look forward to the leadership of our incoming President, Dr. Raja Sabapathy, as he continues to guide IFSSH to new heights.

Wishing you all a successful 2025,

David

DAVID WARWICK
Secretary-General, IFSSH

The IFSSH Patron of Hand Surgery Program

We acknowledge the generous donations to date and thank the donors for their commitment to furthering the work of the IFSSH:

Super Platinum
Dr S. Raja Sabapathy - India
Platinum
Dr Francisco del Pinal – Spain
Dr Qing Zhong Chen – China
Prof David Warwick – United Kingdom
Dr Daniel Nagle – USA
Prof Gregory Bain - Australia
Gold
Dr Praveen Bhardwaj - India
Silver
-
Bronze
Name withheld – New Zealand

https://ifssh.info/hand_surgery_donation_program.php

NEWSLETTER IFSSH-IFSHT CONGRESS

2025 IFSSH/IFSHT Congress Update

Dear IFSSH/IFSHT Friends and Colleagues,

The time is near! We are now less than 3 months away from the upcoming IFSSH/IFSSH Triennial Congress, which will be held March 24-28, 2025. We hope that you are now making plans for what will be a phenomenal experience in the United States Capitol, Washington DC. March will be the perfect time of year to be in DC because of the Cherry Blossom Festival. Come see all of the best museums in the country for free and walk amongst gorgeous cherry blossoms.

1. The final program for both hand surgeons and hands therapist is all set. This includes:

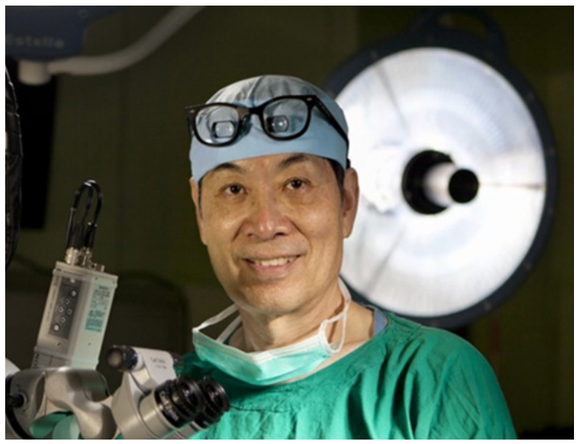
Surgeons
- 9 pre-courses, including IWAS and IBRA
- 76 Symposia
- 21 ICLs
- 70 paper sessions

Therapists
- 38 Symposia
- 22 ICLs
- 26 paper sessions

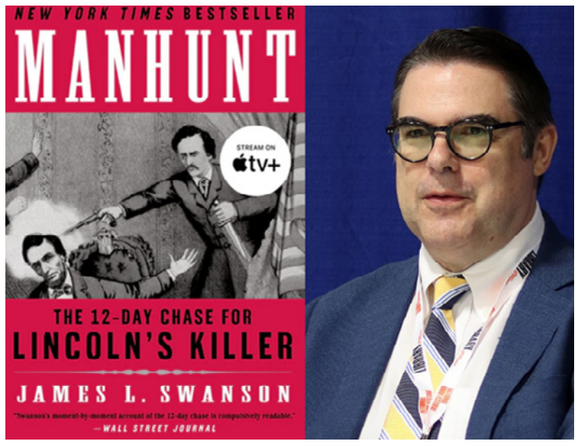
52 Countries will be represented in the program with at least 50% of the papers by our international colleagues. This will be the world's largest hand conference with the widest distribution of perspectives on hand reconstruction and therapy.

Keynote Speakers

Our keynote speakers will include Dr. Fu Chan Wei, who will give his career talk on complex microsurgical hand reconstruction, and James Swanson, the author of Manhunt: The 12 Day Chase for Lincoln's Killer, now an Apple TV mini-series. These will be two fascinating talks with wide appeal!



Swanson Lecture - Fu Chan Wei



Presidential Lecture - James Swanson

We anticipate that visa approvals into the United States may take time. Therefore, you can NOW obtain a personalized invitation letter from the ASSH for your visa application. Just email info@ifssh-ifsht2025.org with your full name and current address. Detailed information can be found at: https://www.ifssh2025.org/s/travel.

The Gala Dinner will be held at the National Portrait Gallery (see pictures below). This will be an incredible event with a cocktail reception at the Great Hall, which will allow us to view all of the presidential portraits. Following this, there will be a dinner and gala party in the rotunda for 900 guests. This event is selling out quickly, so make sure you get tickets early with your registration.

Please check the website www.ifssh2025.org for continually updated information about the program, registration, lodging, and festivities. All of American hand surgery and therapy are looking forward to welcoming you to Washington DC in March 2025!

JAMES CHANG MD
ASSH Congress Chair

DAVID RUCH MD
NASH NAAM MD
AAHS Congress Co-Chairs

Presidents Portrait Gallery open for us

Regional Update

REPORT OF THE IFSSH ASIAN-PACIFIC REGION

The concept of IFSSH Members-at-Large is new and no doubt will continue to evolve. The Asian-Pacific region has a progressive influence in the world of Hand Surgery.

We have been able to ensure that almost all of the Asian-Pacific IFSSH Member Societies have their histories documented on the IFSSH website. We look forward to seeing the grand ceremony at the 2025 IFSSH-IFSHT Congress at which new Pioneers of Hand Surgery will be honoured, including many from the Asian-Pacific region.

We welcome the Sri Lankan Society for Surgery of the Hand, our newest member society from the Asian-Pacific region. Dr Melanie Amarasooriya is their first IFSSH Delegate and attended the annual Delegates' Council Meeting in Rotterdam in 2024. There are now 18 IFSSH Member Societies from the Asian-Pacific region and this continues to grow, with more membership enquiries currently being considered.

The Asian-Pacific IFSSH Member Societies

- Australian Society for Surgery of the Hand
- Bangladesh Society for Surgery of the Hand
- Association of Chinese-speaking Hand Surgeons United
- Emirates Hand Surgery Society
- Hong Kong Society for Surgery of the Hand
- Indian Society for Surgery of the Hand
- Indonesian Society for Surgery of the Hand
- Iranian Society for Surgery of the Hand
- Japanese Society for Surgery of the Hand
- Korean Society for Surgery of the Hand
- Kuwait Society for Surgery of the Hand
- Malaysian Society for Surgery of the Hand
- New Zealand Society for Surgery of the Hand
- Association of Hand Surgeons of the Philippines
- Singapore Society for Hand Surgery
- Sri Lankan Society for Surgery of the Hand
- Taiwan Society for Surgery of the Hand
- Thai Society for Surgery of the Hand

The IFSSH has launched the Patron of Hand Surgery program in 2024. In my role as Chair of the Philanthropy Committee, I have led this project from concept to now being a key resource from which to build and further develop the educational opportunities of the IFSSH. I thank all of the Executive Committee for their support and guidance with this project.

A special thanks to Paco Pinal for his constant positive support, and Dan Nagle and David Warwick who helped frame the concepts and guide the agenda through the Executive Committee meetings. Belinda Smith has worked tirelessly to ensure the logistics of the website and the banking actually work, and in creating the November Ezine which paints a beautiful picture of what a donation to the IFSSH Patrons program can achieve. Without her input, this project would not have started. I am pleased to report that the Patrons program is now alive, and that 5 of the first 8 donations are from the Asia-Pacific region. I expect that in Washington DC, the other regions will have much better representation.

Please do consider donating to the IFSSH Patron of Hand Surgery program and help the IFSSH to advance education to all corners of the world of Hand Surgery.

The IFSSH Patron of Hand Surgery materials

https://ifssh.info/hand_surgery_donation_program.php

Raja Sabapathy chairs the Committee for Educational Sponsorship (CES), which receives requests for educational grants. I have served on this committee, and have been very surprised at how few applications are received. I anticipate that with donations to the Patron of Hand Surgery program, we will be able to create much more interest in IFSSH sponsorship of educational projects, events and opportunities.

At the 2025 IFSSH-IFSHT Congress (24-28 March, Washington DC), we will hold our annual Delegates' Council Meeting. We look forward to gathering with all our Asian-Pacific Delegates at this business meeting.

We are excited to see the representation of Asian-Pacific Hand Surgeons in the Congress' scientific program – we will be supporting their presentations and hope to meet many members during the Congress and its social events. The new IFSSH Pioneers in Hand Surgery will be announced and we will honour these special contributors to hand surgery from all countries, including in the Asian-Pacific Region.

One of the many zoom Executive Committee meetings, during which we discussed many topics of Hand Surgery.

Asian-Pacific IFSSH Member Society Delegates at the 2023 IFSSH Annual General Meeting, at the Toronto ASSH meeting. From left - Ahmad Bouskandar (Kuwait), Anil K. Bhat, (India), Margaret Fok (Hong Kong), Jin Bo Tang (Chinese speaking Association, IFSSH Communications Director), Satoshi Ichihara (Japan), Greg Bain (IFSSH Member-at-Large (Asian-Pacific), Belinda Smith (Chief Administrator), Bernice Heng (Singapore), Raja Sabapathy (IFSSH President Elect), Roland Hicks (Australia).

It has been an honour to serve the IFSSH and the Asian-Pacific region in this role. This has been the inaugural term for all regional Members-at-Large and future representatives will continue to bring regional perspective.

I would like to thank all of the Executive Committee for their support in this role. A special thanks to Belinda Smith (Chief Administrator) who has been of great support, for developing ideas and following them through.

GREG BAIN
IFSSH Member-at-Large (Asian-Pacific)
Adelaide, Australia.

Art Exibit #22

Cueva de las Manos (Cave of the Hands)

Pinturas River Canyon, Santa Cruz, Patagonia, Argentina Hunter-gatherer groups used animal bone pipes to spray-paint hundreds of stencilled hand paintings on the cave walls (829 left and 31 right hands).

ca. 12000-9000 BCE

IFSSH Scientific Committee on Congenital Hand Conditions

Chair: Wee Lam (UK, Singapore)
Committee:
Charles Goldfarb (USA)
Wiebke Huelsemann (Germany)
David McCombe (Australia)
Lindley Wall (USA)

Report submitted July 2024

ABSTRACT

The Oberg, Manske and Tonkin (OMT) Classification of Congenital Hand and Upper Limb Anomalies was adopted as the official IFSSH classification in 2014 with recommendations for 3-yearly reviews and updates. This report examined the evidence and feedback from the scientific community to see whether changes to the 2020 OMT should be made.

The Committee concluded that no current changes are required, but highlighted a number of areas where further research and discussions are needed. These areas include the conditions of symbrachydactyly vs transverse arrest, the ongoing challenge with classifying syndactyly, andthe nomenclature of arthrogrypotic conditions. The OMT Classification continues to enjoy high inter- and intra-rater reliability, thus establishing its central place as a robust classification system in various registries around the world.

INTRODUCTION

The sheer heterogeneity of congenital hand differences (CHD) makes it challenging to classify every condition, but various attempts have been made since the 1960s to design a universal classification that will facilitate global communication. In the 1970s, the International Federation of Societies for Surgery of the Hand (IFSSH) encouraged senior surgeons involved in the management of congenital hand differences to create a universal classification system. The Swanson classification (Swanson, 1976) was adopted by the IFSSH, which remained the preferred system for the next 50 years.

In 2014 a Scientific Committee on Congenital Hand Conditions commissioned by the IFSSH recommended the replacement of the Swanson classification with a new classification system. Developed by a group of surgeons and scientists in the United States and Australia led by Kerby Oberg, Paul Manske and Michael Tonkin (Tonkin et al., 2013), this system subsequently became known as the OMT classification and was adopted as the preferred IFSSH system (Ezaki et al., 2014). The endorsement of the OMT Classification system represented a move away from the eclectic mixture of dysmorphology and aetiology of the Swanson classification to one that was fundamentally based on knowledge about known errors in the major developmental axes or molecular/genetic pathways.

As with every new system, there were varying opinions about the usability of the OMT system as a universal classification. The 2014 IFSSH Committee recommended regular reviews of its use with 3-yearly updates as our knowledge of CHD advanced (Ezaki et al., 2014). Following these recommendations, the OMT Classification underwent various changes in 2015 (Tonkin and Oberg, 2015), 2017 (Tonkin, 2017) and 2020 (Goldfarb et al., 2020). Over the years, various authors reported its improved inter- and intra-rater reliability as compared to the Swanson system (Bae et al., 2018; Ekblom et al., 2010; Goldfarb et al., 2015). Others disagreed and considered it too non-specific and unlikely to aid collaboration with other disciplines, especially those concerned with prevalence and international data collection (Lowry et al., 2017). More recently, there have been reports about difficulties in classifying a small number of conditions as well as disagreements over the use of terminologies or groupings when using the latest 2020 OMT Classification version (Sait et al., 2022; Sletten et al., 2022; Wall et al., 2022).

A further IFSSH Scientific Committee on Congenital Hand Conditions was commissioned in 2022, tasked to review the 2020 OMT Classification for updates and to explore its adoption as an international classification system.

AREAS OF CONSIDERATIONS FOR UPDATES TO THE 2020 OMT

The OMT Classification is designed to accommodate changes based on improved understanding of limb development. The 2020 updated version and its various rationales for change can be found in the article by Goldfarb et al (2020) and the report on the IFSSH website https://www.ifssh.info/scientific_committee_reports.php. One example of change in the 2020 update is the cleft hand, which has been moved from an 'unspecified axis' to its rightful place under the 'proximal-distal' axis, following defining work by various groups (Duijf et al., 2003; Guero and Holder-Espinasse, 2019; Kantaputra and Carlson, 2019). Between 2020 and 2023, the current Committee considered various feedback from the literature, discussions during international meetings, comments from various groups which had raised concerns as well as drawing from their own experience in clinical practice and national databases. We examined updates from our scientific colleagues to consider any modification of the 2020 OMT Classification (Appendix 1) based on new knowledge in developmental biology and genetics. Every update to the OMT Classification must be accompanied by scientific evidence and international consensus. The OMT Classification is embedded in various national registries and any change would result in disruptions to these databases as these require both software updates and linkage from current classification to the previous one. This article outlines a number of areas where changes to the OMT Classification should be considered in the future following more robust research evidence and discussion.

1. Simplifying the current alphanumerical system

The OMT Classification uses a combination of Roman (e.g., I, II, III) and Arabic (e.g., A, B, C; a, b, c; 1, 2, 3) alphanumericals to classify conditions. The Roman system was adopted from the Swanson system (Groups I-VIII). For example, radial longitudinal deficiency of the entire upper limb is classed as 'I-A-2-I'. This combination of alphanumericals may present certain challenges when coding for registry databases and also when searching for a diagnosis. For example, when searching for "IB4I" it may automatically also bring up "IB4II" and "IB4III" In the future, a simpler option will be to convert the coding to a single alphanumerical system, probably the Arabic system. This may make it easier to add new categories/make changes at the end of a classification, i.e., "4" instead of 'IV". Under the new system, radial longitudinal deficiency of the entire upper limb would thus be classed as '1-A-2-1'. Further discussion is needed among the major registries with

the involvement of data analysts, as this can represent a significant change to existing databases.

2. Symbrachydactyly vs transverse deficiency of the entire upper limb

Various reports examining the inter-rater reliability of the OMT Classification have shown a high rate of disagreement between the phenotypes of symbrachydactyly and transverse deficiency (Bae et al, 2018; Ekblom et al, 2014; Sletten et al, 2022). The term 'symbrachydactyly' was first suggested by Pol in 1921 (Holmes and Nasri, 2022) to describe a deformity of the hands and feet with shortened fingers or toes, hypoplasia of the middle or distal phalanges and often accompanying syndactyly.

Buck-Gramcko (1999) developed the teratologic line of symbrachydactyly with two lines: the typical regression in symbrachydactyly and transverse arrest. In the original Swanson classification (Swanson, 1976), symbrachydactyly and transverse deficiency were placed under two separate categories: undergrowth and failure of formation, respectively. In the 2020 OMT update (Goldfarb et al, 2020), the term 'with ectodermal element' was added to symbrachydactyly (I-A-1-IIa, b and I-B-1-II) to differentiate these from transverse deficiency ('without ectodermal elements'; I-A-1-IIIa, b and I-B-1-III).

Despite this, various authors considered the two conditions as part of a continuum. Nubbins are usually associated with symbrachydactyly; however, in a recent study by Hu et al., (2023), 52% of extremities categorized as transverse deficiency in the Congenital Upper Limb Differences Registry (CoULD) registry had nubbins. Another interesting finding from the study included a lower incidence of nubbins in more proximal limb differences, e.g., amelia and humeral level transverse deficiencies as compared to distal deficiencies. There was also a 20- times higher chance of surgeons diagnosing symbrachydactyly rather than transverse deficiency if a CHD is distal as compared to proximal. The study indicates that the level of deficiency is more determinant to a given diagnosis of transverse deficiency vs symbrachydactyly than the absence or presence of nubbins. A similar observation was reported by Sletten et al. (2022) where they found that many patients with transverse deficiency proximal to the wrist were classified as such despite having ectodermal elements. A change in terminology to the symbrachydactyly and transverse deficiency categories was discussed at the recent World Congenital Hand Symposium in Minnesota and is currently being considered for the grouping of all proximal deficiencies, including symbrachydactyly, as 'Transverse deficiency - entire upper limb division' but to specify whether these were 'with or without ectodermal elements.' For the Hand plate division, the separate classifications of transverse deficiency vs symbrachydactyly should remain as this division remains meaningful in the context of microsurgical toe-transfer reconstruction (Sletten et al, 2022).

The term 'ectodermal elements' remains unclear but is synonymous with 'nubbins' to most surgeons, consisting of pedunculated soft tissue attachments, usually with bone, cartilage, and skin +/- nails but without bony articulations. These represent hypoplastic digits that have partially formed after an insult to the apical ectodermal ridge (AER) and underlying mesoderm. From studies of Poland syndrome, in which there is a high incidence of symbrachydactyly, the popular theory remains that a symbrachydactyly results from a partial or complete blockage of blood flow in the subclavian or vertebral arteries or their branches (Bavinck and Weaver, 1986), whereas a complete insult to the AER results in a transverse deficiency with no nubbins (Farr et al., 2018; Hu et al, 2023). Others have suggested an association of symbrachydactyly with the pathogenesis of brachydactyly, and therefore the development of symbrachydactyly may be closely related to mutations in the bone morphogenetic protein (BMP) pathway (Holmes and Nasri, 2022). In the future, vascular development at the embryonic level or the BMP pathway may be points for research to further define the relationship between transverse deficiency and symbrachydactyly, and thus guide possible OMT Classification changes.

3. Arthrogryposis nomenclature and classification

Currently, the classification of arthrogrypotic conditions is under 'Dysplasia' and 'Congenital contracture' (III –C–I–a, b and c). Under the subheading of 'Arthrogryposis Multiplex Congenita', the conditions are divided into a) Amyoplasia, b) Distal arthrogryposis and c) Other.

The term 'arthrogryposis' covers a very heterogenous group of over 400 known conditions. Classification of all these conditions remain challenging. Lowry et al. (2017) commented that arthrogryposis is a general term that could be a malformation, deformation or dysplasia and proposed a classification system that took into account the different phenotypes as well as aetiology, including possible syndromic associations. Hall and colleagues (2019) suggest approaching it in four ways: clinically, genetically, aetiologically and functionally. They suggested a multi-layered approach to classification as one system is unlikely to address all the needs of various specialties. The OMT Classification is designed to improve communication between surgeons and other disciplines, but it is primarily surgeons who will use the classification. Consequently, most would be familiar with the different presentations of amyoplasia (more than one major joint involved usually including the elbow and wrist) or distal arthrogryposis (can involve more than one joint but typically affecting the hand, including camptodactyly and thumb-in-palm deformity) (Alzahrani and Farr, 2022). Most would see these as distinct entities and hence the conditions are classified as such. At present, we do not recommend any further reorganization or movement of this group of conditions within the OMT Classification. The only changes worth considering are related to terminology; the terms Arthrogryposis Multiplex Congenita and amyoplasia are used interchangeably and therefore in the future, a more generic main heading can be used, i.e., 'Arthrogryposis' rather than 'Arthrogryposis Multiplex Congenita', as the latter is considered by several surgeons to be the same as amyoplasia.

4. The ongoing challenge with classifying syndactyly

Various authors have expressed views on the aetiology of syndactyly as resulting from an error in the proximal-distal axis, (e.g., Al Qattan, 2023). The process of patterning the autopod (hand plate) is the most complicated portion of limb development. Subsequently, classifying four digits, a thumb, and variations in the interdigital web spaces according to the development axis is far more complicated than more proximal anomalies.

Digital patterning starts with anlagen formation influenced by the sonic hedgehog (Shh) Gli3 counter gradients and the Hoxd9 13 gradients (Pérez-Gómez et al., 2018). As the digits extend and the corresponding interdigital spaces progress, retinoic acid, bone morphogenetic protein (BMPs) and Notch signalling target interdigital regression, while concurrently Wnt and fibroblast growth factor (FGH) signalling pathways counter interdigital cell death. This delicate balance was shown in the elegant experiments by Bandyopadhyay et al., (2006) where BMP2- deificent mice exhibited a soft tissue type syndactyly.

Cutaneous syndactyly has multiple patterns that do not appear to follow a specific axis; rather the patterns appear to demonstrate gene specific embryological "watershed regions" of contribution that are most deficient with mutation and highlight syndactyly between the digits of these watershed regions. The molecular array of these genes and how they contribute to typical digit and interdigital space formation has not been well characterized. Nevertheless, some are AER related such as WNT, Notch or FGF while others appear to be unlinked to an axis, at least at present (Cassim et al., 2022).

To complicate matters, the genetics of osseous versus cutaneous syndactyly differ. Osseous syndactyly can start at the level of metacarpal development and

disruption of the pattern can yield metacarpal fusion (more associated with the radioulnar axis).

A well-known feature of HoxD13 mutations is osseous syndactyly, usually of digits 3-4 with polydactyly (synpolydactyly). In Apert syndrome, it seems the ongoing activation/mutation of fibroblast growth factor receptor (FGFR2) (Andersen et al. 1998) is associated with terminal phalangeal fusion, i.e., osseous acrosyndactyly of the terminal phalanges, but which also decreases the hand plate size during metacarpal anlagen formation causing frequent fusion of metacarpal 4 and 5.

In summary, knowledge of the morphogenetic relationships underlying syndactyly is accumulating, but a clear relationship has not yet emerged. The most consistent contributing axis are factors from the AER overlying the interdigital space. But the proximal-distal axis does not appear to correlate with the variable patterns of syndactylies that occur along the radioulnar axis. For this reason, it is recommended that syndactyly remains under the 'Unspecified axis' until further details emerge.

Symbrachydactyly vs complex syndactyly vs syndromic syndactyly vs synpolydactyly

Both Wall et al. (2022) and Sletten et al. (2022) found a lack of consensus with the classification of a specific non-syndromic complex syndactyly phenotype: symbrachydactyly with a polydactylous element. Opinions differ as to whether these should be placed under complex syndactyly or synpolydactyly or symbrachydactyly. Under the 2020 OMT Classification, symbrachydactyly (hand plate) is classified under the proximal-distal axis: IB-1-II, whereas syndactyly with its variants is classified under the Unspecified axis, including Osseous subheading: complex syndactyly (I-B-4-II-a). The complex syndactyly subheading (I-B-4-III) is further subdivided into a) Syndromic syndactyly (e.g., Apert hand), b) synpolydactyly or c) Not otherwise specified.

As mentioned, the classification of syndactyly is far from straightforward. The findings of symbrachydactyly with a polydactylous element represents a phenotype that is not commonly seen and which at present cannot be placed in a distinct category. Symbrachydactyly does not usually present with more digits and synpolydactyly, the result of HoxD13 mutations, does not usually present with missing phalanges. These 'brachy-synpolydactyly' cases may be worthy of a distinct category under the 'Unspecified axis and Complex subheading'. At present, they should be classified under the 'Not otherwise specified' category until more information is obtained.

REVISITING THE PURPOSE OF THE OMT CLASSIFICATION

The OMT Classification was designed to be a universal system that addresses some of the shortfalls of the Swanson system and increase inter-rater reliability in the classification of CHDs. An international survey was conducted among congenital hand surgeons to assess the current status of OMT usage in clinical and research settings (Goldfarb et al., 2023). From the survey, 61% of international experienced congenital hand surgeons use the OMT Classification regularly in their practice. The OMT Classification appears to be favoured by those who regularly use registries, whereas those who do not find the classification of CHDs according to developmental axes largely to be an exercise without relevance to patient care.

It is a long-held assumption that an effective classification should be both easy to apply and be an aid in treatment decision (Tonkin et al., 2013). However, the OMT Classification, like the Swanson classification before it, has always served a different purpose. Rather than provide a direct guide for the management of different conditions, these broad classifications give a more general overview of the different types of CHDs and the categories (seven for the Swanson and four for the OMT) cater to the vast heterogeneity of anomalies and facilitate comparisons between registries. The OMT system should not be compared to other conditionspecific classification systems designed more specifically to guide treatment, e.g., the Blauth classification for thumb hypoplasia. When used in registries, the OMT system helps categorize patients with a high inter-rater agreement to allow investigation of specific cohorts of patients. Moving forward, this purpose of the OMT Classification will perhaps need to be explained to future congenital hand surgeons to increase its usability and adoption.

IMPROVING THE UNIFORMITY OF CLASSIFICATION/CODING WHEN USING THE OMT SYSTEM

At present, the central place of the OMT system as a universal classification tool within major registries appears to be cemented; it has the highest inter-rater reliability of any classification at present. On the whole, regular users of the OMT system should find it straightforward to classify the majority of conditions. Criticism that its use requires a detailed knowledge of embryology is unfounded, as the user simply needs to search for a condition that has already been classified, e.g., radial polydactyly belongs under 'I-B-2-III, i.e., Malformation of the hand plate in the radial-ulnar axis'. Furthermore , the 'OMT App' (https://www.ifssh.info/OMTClassification-App.php) which can be freely downloaded, simplifies this process by using the 'search' function to match the clinical diagnosis or phenotype to its place within the OMT ontology. Regular use of the OMT system allows the user to gain a deeper understanding of embryology at the same time.

There remain difficulties with classifying a small number of conditions. Sletten et al. (2022) found an almost perfect inter- and intra-reliability for conditions with easily distinguishable characteristics which they termed Group 1 but only a moderate reliability for Group 2 (all other conditions). They chose not to use a consensus group or give instruction to the raters beforehand in order to test the reliability of the OMT system in settings as close to everyday practice as possible. Wall et al. (2022) conducted a Delphi-like consensus exercise to discuss cases that even experienced surgeons find difficult to classify. Most of these diagnoses were resolved following further discussions. Other reported difficulties, unrelated to diagnostic difficulties but rather coding difficulties, include confusions over how to classify a hand with two CHDs, e.g., cleft hand with associated syndactyly, or a child with bilateral CHDs. To improve the uniformity of classification across registries, this committee has produced a video (led by Charles Goldfarb) to provide step-bystep recommended instructions on the use of the OMT Classification. The video is available here: https://ifssh.info/OMT-Classification-App.php

The following points are highlighted in the video:

1. Overview of the OMT system and how to classify a condition based on the phenotype.
2. When classifying an upper limb with two CHDs, use the main phenotype, e.g., cleft hand as the primary diagnosis and other anomalies to be considered as secondary changes, e.g., syndactyly or camptodactyly.
3. When classifying a child with bilateral CHDs, list both*.
4. When classifying a child with a syndrome, list both the phenotype and also the syndrome*.

*These may be more relevant for registries where listing all phenotypes make it easier to search for a condition.

Lessons continue to be learnt about how to improve the uniformity of classification when using the OMT system. One suggestion for increasing inter-rater reliability is to merge certain conditions and remove the division of Malformation IA and IB. Using the example of radial longitudinal dysplasia (RLD), Sletten et al. (2022) argued that the separation of this condition into IA (entire upper limb) and IB (hand plate only) is somewhat artificial as all patients with RLD have some degree of thumb hypoplasia, and most patients with thumb hypoplasia have at least some degree of carpal abnormalities (considered a more proximal

abnormality). They expressed concerns that splitting conditions such as RLD can lead to more coding variations among surgeons. While simplification and merging of groups together may potentially increase consensus, there is a need for a balanced approach; the OMT system is designed according to pathoembryology in which one of the major considerations is the timing of insult. Merging conditions that have been formed during early and late patterning would reduce the fundamental strength of the OMT system to combine knowledge with diagnosis. It runs the risk of taking a step backwards and resembling the confusing and oversimplified categories of the Swanson system.

THE IMPORTANCE OF REGISTRIES

Patient registries have the potential to overcome research limitations inherent to rare conditions like CHDs. These use multi-centre observational study methods for the collection of uniform data and to evaluate the presentation of conditions, specified outcomes and associations for a population defined by a hand phenotype or syndrome. The data generated can be helpful especially where retrospective studies are lacking, or when randomized controlled trials are difficult or ethically impossible to conduct in children.

At present there are a number of major registries for CHDs such as the CoULD based in the United States, the Australian Hand Difference Register (ADHR), the Congenital Upper Limb Anomalies North (CULA North) project in Scandinavia and Germany, and the British Society for Surgery of the Hand (BSSH) registry.

Both the CULA North and the BSSH registries are based on the International Consortium of Health Outcomes Measurement (ICHOM). Some of these registries have compiled data that have resulted in a number of important publications; for example, the CoULD comprehensively collects functional outcomes and health-related quality of life data using the Paediatric Outcomes Data Collection Instrument (PODCI) and the Patient Reported Outcomes Measurement Information System (PROMIS) which has allowed valuable insights into children's overall well-being despite their CHDs (Bae et al., 2018b) or insights into rare clinical associations involving radial longitudinal deficiency (Forman et al., 2020).

The value of registry studies is undisputed, and every centre that treats these children should aspire to set up a registry to collect data. The amount of data and format of collection depends on the available resources but at the very minimum, these should include epidemiological data, hand conditions classified according to the OMT system, and the use of at least one outcome measure, e.g., the PROMIS.

CONCLUSION

In this report, the Committee has initially aimed to provide an update on the OMT Classification but as the project develops, it becomes apparent that any future discussion of the OMT system should be placed in the context of CHD registries. At present, the OMT Classification remains the best universal classification system with an excellent inter-rater reliability, allowing effective communication across registries. Resources such as the OMT App, or 'How to use the OMT' video should further facilitate the classification process and reduce discrepancies.

Any update must be substantiated by major progress in knowledge and an international consensus. This update has therefore recommended areas of consideration for change rather make definitive changes, as the evidence for these is lacking. The OMT Classification remains unchanged from the 2020 version (Appendix 1). These areas are recommended future points of collaborative research between surgeons and scientists with updates, if appropriate, at every major conference such as the World Congenital Hand Symposia, IFSSH congresses or the Limb Development Conferences (Lam, 2019). The Committee continues to recommend a 3-yearly appraisal of the OMT Classification in the light of new developments and knowledge as discussed at these conferences.

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Appendix 1:

The Oberg, Manske and Tonkin (OMT) Classification of Congenital Hand and Upper Limb Anomalies, last updated October 2020.

OMT CLASSIFICATION OF CONGENITAL HAND AND UPPER LIMB ANOMALIES

Last update 5th October 2020

I. MALFORMATIONS

A. ENTIRE UPPER LIMB - ABNORMAL AXIS FORMATION (EARLY LIMB PATTERNING)

1. Proximal-distal axis

i. Brachymelia

ii. Symbrachydactyly Spectrum (with ectodermal elements)

- a) Poland syndrome
- b) Whole limb excluding Poland syndrome (various levels – humeral to phalangeal)

iii. Transverse deficiency (without ectodermal elements)

- a) Amelia
- b) Segmental (various levels – humeral to phalangeal)

iv. Intersegmental deficiency (Phocomelia)

- a) Proximal (humeral – rhizomelic)
- b) Distal (forearm – mesomelic)
- c) Proximal + Distal (hand to thorax)

v. Whole limb duplication/triplication

2. Radial-ulnar (anterior-posterior) axis

i. Radial longitudinal deficiency

ii. Ulnar longitudinal deficiency

iii. Ulnar dimelia

iv. Radiohumeral synostosis

v. Radioulnar synostosis

vi. Congenital dislocation of the radial head

vii. Forearm hemi-physeal dysplasia, radial (Madelung Deformity), or ulnar

3. Dorsal-ventral axis

i. Ventral dimelia

ii. Dorsal dimelia

4. Unspecified axis

i. Shoulder

- a) Undescended (Sprengel)
- b) Abnormal shoulder muscles

ii. Upper to Lower limb transformation

B. HAND PLATE - ABNORMAL AXIS DIFFERENTIATION (LATE LIMB PATTERNING/DIFFERENTIATION)

1. Proximal-distal axis

i. Brachydactyly

ii. Symbrachydactyly (with ectodermal elements)

iii. Transverse deficiency (without ectodermal elements)

iv. Cleft hand (Split Hand Foot Malformation)

2. Radial-ulnar (anterior-posterior) axis

i. Radial longitudinal deficiency, hypoplastic thumb

ii. Ulnar longitudinal deficiency, hypoplastic ulnar ray

iii. Radial polydactyly

iv. Triphalangeal thumb

- a) Five finger hand

v. Ulnar dimelia (mirror hand)

vi. Ulnar polydactyly

3. Dorsal-ventral axis

i. Dorsal dimelia (palmar nail)

ii. Ventral dimelia (hypoplastic/ aplastic nail)

4. Unspecified axis

i. Soft tissue

- a) Cutaneous (simple) syndactyly

ii. Skeletal

- a) Osseous (complex) syndactyly
- b) Clinodactyly
- c) Kirner deformity
- d) Synostosis/symphalangism

iii. Complex

- a) Syndromic syndactyly (e.g., Apert hand)
- b) Synpolydactyly
- c) Not otherwise specified

II. DEFORMATIONS

A. Constriction ring sequence

B. Not otherwise specified

III. DYSPLASIAS

A. Variant Growth

1. Diffuse (Whole limb)

i. Hemihypertrophy

ii. Aberrant flexor/extensor/intrinsic muscle

2. Isolated

i. Macrodactyly

ii. Aberrant intrinsic muscles of hand

B. Tumorous conditions

1. Vascular

i. Hemangioma

ii. Malformation

iii. Others

2. Neurological

i. Neurofibromatosis

ii. Others

3. Connective tissue

i. Juvenile aponeurotic fibroma

ii. Infantile digital fibroma

iii. Others

4. Skeletal

i. Osteochondromatosis

ii. Enchondromatosis

iii. Fibrous dysplasia

iv. Epiphyseal abnormalities

v. Pseudoarthrosis

vi. Other

C. Congenital Contracture

i. Arthrogryposis Multiplex Congenita

- a) Amyoplasia
- b) Distal arthrogryposis

c) Other

ii. Isolated

a) Camptodactyly

b) Thumb in palm deformity

c) Other

IV. SYNDROMES*

A. Specified

1. Acrofacial Dysostosis 1 (Nager type) (MIM #154400)
2. Apert (MIM #101200)
3. Al-Awadi/Raas-Rothschild/Schinzel phocomelia (MIM #276820)
4. Baller-Gerold (MIM #218600)
5. Bardet-Biedl (21 types)
   Type 1) (MIM #209900)
   Type 2) (MIM #615981)
   Type 3) (MIM #600151)
   Type 4) (MIM #615982)
   Type 5) (MIM #615983)
   Type 6) (MIM #605231)
   Type 7) (MIM #615984)
   Type 8) (MIM #615985)
   Type 9) (MIM #615986)
   Type 10) (MIM #615987)
   Type 11) (MIM #615988)
   Type 12) (MIM #615989)
   Type 13) (MIM #615990)
   Type 14) (MIM #615991)
   Type 15) (MIM #615992)
   Type 16) (MIM #615993)
   Type 17) (MIM #615994)
   Type 18) (MIM #615995)
   Type 19) (MIM #615996)
   Type 20) (MIM #617119)
   Type 21) (MIM #617406)
6. Carpenter (MIM #201000)
7. Catel-Manzke (MIM #616145)
8. Cornelia de Lange (5 types)
   Type 1) (MIM #122470)

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OMT Classification – Updated 2020 Page 3

   Type 2) (MIM #300590)
   Type 3) (MIM #610759)
   Type 4) (MIM #614701)
   Type 5) (MIM #300882)
9. Beals (MIM#121050)
10. CLOVE (MIM #612918)
11. Crouzon (MIM #123500)
12. Down (MIM #190685)
13. Ectrodactyly-Ectodermal Dysplasia-Clefting (MIM #129900)
14. Fanconi Pancytopenia (MIM #227650)
15. Freeman Sheldon (#MIM 193700)
16. Fuhrmann (MIM #228930)
17. Goltz (Focal Dermal Hypoplasia - FDH) (MIM #305600)
18. Gorlin (Basal Cell Nevus Syndrome – BCNS) (MIM #109400)
19. Greig Cephalopolysyndactyly (MIM #175700)
20. Hajdu-Cheney (MIM #102500)
21. Hemifacial Microsomia (Goldenhar syndrome) (MIM #164210)
22. Holt-Oram (MIM #142900)
23. Lacrimoauriculodentodigital (Levy-Hollister) (MIM #149730)
24. Larsen (MIM #150250)
25. Laurin-Sandrow (MIM #135750)
26. Leri-Weill Dyschondrosteosis (MIM #127300)
27. Liebenberg Syndrome (MIM #186550)
28. Moebius sequence (MIM #157900)
29. Multiple Synostoses (4 types)
   Type 1) (MIM #186500)
   Type 2) (MIM #610017)
   Type 3) (MIM #612961)
   Type 4) (MIM #617898)
30. Nail-Patella (MIM #161200)
31. Noonan (2 types
   Type 1) (MIM #163950)
   Type 2) (MIM #605275)
32. Oculodentodigital dysplasia AD (MIM #164200); AR (MIM #257850)
33. Orofaciodigital (18 types)
   Type 1) (MIM #311200)
   Type 2) (MIM #252100)
   Type 3) (MIM #258850)
   Type 4) (MIM #258860)
   Type 5) (MIM #174300)
   Type 6) (MIM #277170)
   Type 7) (MIM #608518)
   Type 8) (MIM #300484)
   Type 9) (MIM #258865)
   Type 10) (MIM #165590)
   Type 11) (MIM #612913)
   Type 12) (No MIM yet (Moran-Barroso et al.,1998))
   Type 13) (No MIM yet (Degner et al., 1999))
   Type 14) (MIM #615948
   Type 15) (MIM #617127)
   Type 16) (MIM #617563)
   Type 17) (MIM #617926)
   Type 18) (MIM #617927)
34. Otopalatodigital Spectrum (FILAMIN A-FLNA)
   Type 1) Otopalatodigital Type 1 (Gain of function) (MIM #311300)
   Type 2) Otopalatodigital Type 2 (Disruption)(MIM #304120)
   Type 3) Frontometaphyseal dysplasia (MIM #305620)
   Type 4) Melnick-Needless (MIM #309350)
35. Pallister-Hall (MIM #146510)
36. Pfeiffer (MIM #101600)
37. Pierre Robin (4 subtypes)
   Type 1) Pierre Robin (MIM #261800)
   Type 2) Pierre Robin with campomelic dysplasia (MIM #602196)
   Type 3) Pierre Robin with oligodactyly (MIM #172880)
   Type 4) Pierre Robin with facial and digital anomalies (MIM #311895)
38. Poland (MIM #173800)
39. Proteus (MIM #176920)
40. Roberts (MIM #268300)
41. SC Phocomelia (MIM #26900)
42. Rothmund-Thomson (MIM #268400)
43. Rubinstein-Taybi (2 types)
   Type 1) (MIM #180849)
   Type 2) (MIM #613684)
44. Saethre-Chotzen (MIM #101400)
45. Split-hand-foot malformation (7 types)
   Type 1) (MIM #183600)
   Type 2) (MIM #313350)
   Type 3) (MIM #246560)
   Type 4) (MIM #605289)
   Type 5) (MIM #606708)
   Type 6) (MIM #225300)
   Type 7) (MIM #220600)
46. Thrombocytopenia Absent Radius (MIM#274000)
47. Townes-Brock (2 types)
   Type 1) (MIM #107480)
   Type 2) (MIM #617466)
48. Trichorhinophalangeal (3 types)
   Type 1) (MIM #190350)
   Type 2) (MIM #150230)
   Type 3) (MIM #190351)
49. Ulnar-Mammary (MIM #181450)
50. VACTERLS association (3 types)
   Type 1) VACTERL (MIM #192350)
   Type 2) VACTERL X-Linked (MIM#314390)
51. Type 3) VACTERLH (with hydrocephalus) (MIM #276950)

B. Others

*The specified syndromes are those considered mostrelevant; however, many other syndromes have a limb component categorized under “B. Others”.

IFSSH Educational Sponsorship Grants

Western China hand surgery seminars and workshops
16-20 June 2024

Due to China's geographical size, the economic development in some western regions is unequal, especially in the western mountainous areas. There are significant differences in economy and culture in these areas compared to the coastal areas. This has resulted in disparities in the management of diseases among hand surgeons of the eastern and western regions.

The surgeons in these western areas often have greatly delayed access to updated and advanced knowledge of hand surgery. Therefore, the purpose of our project is to enable surgeons in China's western regions to more easily update their knowledge and technology in hand surgery.

This year we spent five days (16-20 June) carrying out educational seminars and workshops in two selected cities in the western region: Lanzhou (Gansu province) and Zhengzhou (Henan province).

The faculty of this project are from the eastern regions of China, including Drs. Jin Bo Tang, Jing Chen, Qing Zhong Chen and Shu Guo Xing from The Affiliated Hospital of Nantong University, Nantong, Jiangsu, and Dr. Xiao Ju Zhen from Xian Fengcheng Hospital of Xian City. The project leaders were Drs. Jing Chen and Qian Qian Yang, and Zhen coordinated the hosts of these hospitals.

Promotional poster of the program

The IFSSH provided financial sponsorship to cover the transportation to these hospitals for this project.

Approximately 150 hand surgeons and trauma orthopedic surgeons attended the courses in the two cities, gaining knowledge and learning about updated technologies to better help the patients in the local areas.

Each of these seminars was held inside the host hospital, with live demonstrations, patient consultations and question and answer sessions. The host hospitals each have 10-20 attending hand surgeons and regularly treat large numbers of patients in their hand surgery units. Many topics were discussed, including tendon repair, tenolysis, secondary tendon reconstructions, tendon transfers, secondary bony non-union, joint release, and neurolysis, atypical nerve compressions in the upper extremities, and relative motion splinting. Workshops were focused on tendon repair techniques, splint making and rehabilitation methods after flexor and extensor tendon repairs.

The participating surgeons greatly benefited from this education format.

Dr. Tang shared his experience and updated concept for flexor tendon repair

A

B

A. Dr. Tang demonstrated the method of flexor tendons repair on a tube, provided a detailed explanation of the surgical technique, and answered questions raised by everyone.
B. Dr. Chen demonstrated the splint making and rehabilitation methods after flexor and extensor tendon repairs.

There was ample time for discussion after every course - surgeons raised a lot of good questions that the faculty answered one by one.

Dr. Zheng shared her experience in microsurgical lymphatic surgery for the treatment of secondary lymphedema and Alzheimer disease.

The host welcomed the project and shared their complicated cases they encountered in clinic. Faculty provided many suggestions and guidance.

A group photo was taken after the course. The host hope that the next seminar will select Renji Hospital again!

The faculty and local surgeons engaged in lively discussions.

We want to continue with this program by running the project in 2-3 different cities each year.

We, and the participants, thank the IFSSH for granting funding towards the project.

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The first city (Lanzhou)

The seminar was hosted by Peace Hospital of Lanzhou. About 80 surgeons attended this course.

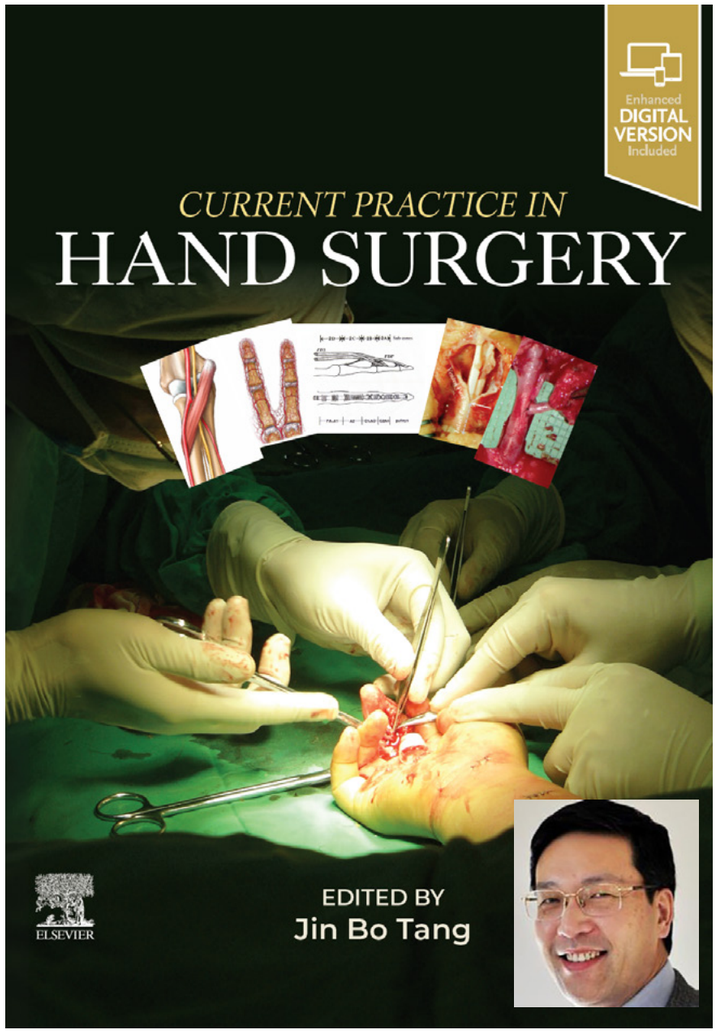
The second city (Zhengzhou)

The seminar was hosted by Renji Hospital of Zhengzhou. About 70 surgeons attended this course.

In summary

The educational seminars and workshops in the two cities were quite successful. The local surgeons provided feedback on what they have learned, how their knowledge was updated and new skills gained. The participants hoped that such courses will be held more frequently.

Textbook: Current Practice in Hand Surgery



Our IFSSH Communications Director Jin Bo Tang has worked tirelessly and with extraordinary dedication for over two years to bring this book to publication. The book (800pp) is a comprehensive text with chapters written by 110 hand surgeons from around the world (32 countries) whose hand societies are part of our International Federation. The scientific content surpasses any other Hand Surgery book, and it should become the standard textbook around the world. It will be published by the end of February 2025 and be available at the Washington IFSSH Congress.

Reflecting the central role of the IFSSH in providing educational resources across the world, IFSSH contributed a substantial sum of money to the project, and we will be acknowledged within the book as a partner; indeed the term IFSSH Textbook is richly deserved.

On behalf of IFSSH, thank you Jin Bo.

DAVID WARWICK
Secretary General IFSSH

IFSSH Educational Sponsorship

Apply for support: Turn projects and collaborations into reality

Do you and/or your society have ideas for furthering Hand Surgery education?

- Perhaps your society members could benefit from a specialty course? Perhaps you wish to run a workshop?
- Maybe you have been thinking of developing a resource but need financial backing?
- Could an outreach program achieve even more with increased funding?
- Does your society want to host an IFSSH Harold Kleinert Visiting Professor and be inspired by their wisdom and motivation?

The IFSSH Committee for Educational Sponsorship can help with all of these and more:

Apply now!

Remember to also use and share the resources on the IFSSH website, proudly endorsed by the IFSSH Committee for Educational Sponsorship

Application information and guidelines

Reports from previous recipients

Hand Surgery Resource

Previous recipients, sending thanks to the IFSSH for their life-changing experiences

"The vision to address a gap in knowledge and much needed training in Eastern Europe has been fulfilled."

Dr Daniel Herren (Switzerland) and Dr Kevin Chung (USA)

"The techniques were thoroughly explained and exemplified which permitted us to learn and complete the procedures. I had the chance to discover and to practice a new and different approach for this challenging pathology that is rarely handled in our country.""

Dr Veronica Romanescu (Romania)

Participants surround Dr Lalonde as he explains WALANT technoques in Kenya

"Attending this Symposium was an extraordinary experience that left an indelible impact on my professional and personal journey as a hand surgeon. Most significantly, I feel less isolated in trying to understand congenital upper limb differences and realized that many across the globe are asking the same questions as I am and that many more are trying to find ways to solve the challenges in making our patients' lives better."

Dr Nathaniel Orillaza (Philippines)

"It was not just about the knowledge gained, but also the personal development and newfound confidence that I took away from the event. I am determined to apply the lessons I have learned through the conference to advance both my career and passion, to ultimately strive for better care for my future patients."

Dr Jia Hui Nah (Singapore)

Dr Steven Moran (USA) the inaugural IFSSH Harold Kleinert Visiting Professor inspiring Hand Surgery registrars in Sydney, Australia – continuing the international legacy of Dr Kleinert (right)

Hand Surgery Resource®

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"An Educational Asset of IFSSH"

VOLUME 8, NUMBER 10

NEW PODCAST: SCAPHOLUNATE ADVANCED COLLAPSE (SLAC) WRIST

In this episode of the Hand Surgery Resource Podcast, learn more about a common cause of osteoarthritis of the wrist, Scapholunate Advanced Collapse, or as it is more commonly known, **SLAC Wrist**.
Check it out on Apple, Amazon Podcasters and Spotify!

SLAC Wrist with S-L gap(1), OA radioscaphoid joint(2),&OA Lunocapitate joint(3)

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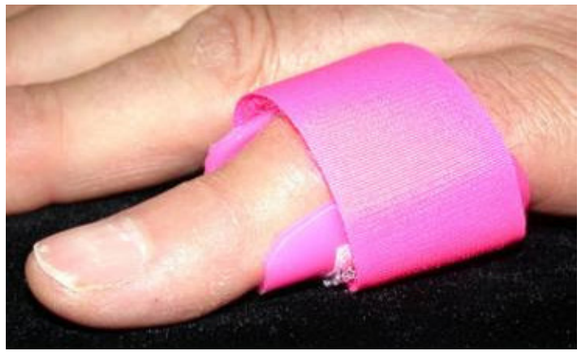
VOLUME 8, NUMBER 11

HAND THERAPY LIBRARY NEW CHAPTER: EXTENSOR TENDON THERAPY GUIDELINES

We are excited to present the latest chapter in our Hand Therapy Library on Extensor Tendon Therapy Guidelines (Zones III-IV) by our Hand Therapy Consultant Karen S. Schultz MS OTR/L CHT FAOTA.



Extensor tendon injury frequently accompanies complex injury with adjacent tissue involvement i.e., fracture, crush, revascularization, replantation, burn, rheumatic disease. This new chapter focuses on management of tendon discontinuity generally via sharp or blunt trauma.

Hand Surgery Resource®
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VOLUME 9, NUMBER 1

TRANSFORMING HAND SURGERY EDUCATION: LAUNCH OF THE "ANATOMY AT RISK" APP

The International Federation of Societies for Surgery of the Hand (IFSSH) and its educational team, Hand Surgery Resource are thrilled to announce the release of its latest new free mobile application, "Anatomy at Risk." Developed in collaboration with Mobileware, Inc., this innovative educational resource is now available for download on the Apple App Store and Google Play.

Key Features of "Anatomy at Risk":

- 40 concise educational videos covering dorsal and palmar hand/wrist anatomy and functional assessments.
- Detailed explanatory text enhanced with high-quality images, diagrams, and references.
- Hyperlinks to related Hand Surgery Source sections for extended learning.
- An anatomical abbreviations list for quick reference.

How It Works:

Simply select the location of a laceration or planned incision to access:

1. A curated list of at-risk anatomical structures.
2. Concise summary anatomy and exam videos.
3. Supporting text, images and diagrams.

Who It's For:

Perfect for students, trainees, and professionals in hand surgery, "Anatomy at Risk" provides a fast and reliable way to enhance your understanding of hand and wrist anatomy.

Why "Anatomy at Risk" Is Essential:

This app simplifies evaluating skin lacerations and designing safe surgical incisions. Whether you're repairing a laceration or planning a routine hand or wrist surgery, it offers a valuable "in your hand" resource for quick, confident decision-making.

Download Now:

Don't miss this opportunity to elevate your expertise in hand and wrist anatomy! Download "Anatomy at Risk" today on the Apple App Store or Google Play.

Member Society News

BELGIAN SOCIETY FOR SURGERY OF THE HAND

BELGIAN HAND GROUP TO HOST THE INTERNATIONAL SYMPOSIUM ON DUPUYTREN DISEASE – MAY 2025

The Belgian Hand Group is thrilled to announce that we will be hosting the International Symposium on Dupuytren Disease in May 2025. This highly anticipated event will take place on Friday 16 May and Saturday 17 May 2025, at the Nhow Brussels Bloom Hotel in Brussels, Belgium.

Held every five years, the symposium is the premier international gathering for Dupuytren specialists, researchers, and therapists. This year, we are honored to bring this exceptional event to Brussels, where we will collaborate with the Belgian Hand Therapists, the International Dupuytren Society, and the Dupuytren Research Group to foster innovative discussions and advancements in the treatment and understanding of Dupuytren disease and related conditions.

This symposium promises to be an invaluable experience for all professionals involved in hand surgery and therapy. With an outstanding group of international keynote speakers already confirmed, it will be an incredible opportunity to stay at the forefront of the field, engage with leading experts, and exchange knowledge with colleagues from around the world.

Don't miss this chance to be part of a landmark event that will shape the future of Dupuytren research and treatment. Mark your calendars now for 16-17 May 2025, and prepare for a dynamic and inspiring experience in Brussels!

We look forward to welcoming you to this exceptional symposium!

Ilse Degreef
Past President, Belgian Hand Group

Bernard Lefebvre
President, Belgian Hand Group

Dupuytren
BRU, BEL // 16 - 17·05·2025
International Conference on Dupuytren Disease and Related Diseases
https://dupuytrensymposium.org

DUPUYTREN FOUNDATION
A Future Without Dupuytren Disease

belgian handgroup

International Dupuytren Society

BHT

NEW ZEALAND SOCIETY FOR SURGERY OF THE HAND

IFSSH REPORT FROM THE NZSSH 2024

We have had a busy and productive past year which has just culminated in our Biannual Scientific Meeting and AGM which was held in Fiji at the Shangri-la resort very ably convened by Albert Yoon.

This was an excellent conference with international guest speakers Michael Tonkin (Sydney) and PC Ho (Hong Kong). We had over 50 delegates with accompanying families in some cases, bringing an informal and inclusive atmosphere to the event.

Michael, who kindly came out of retirement for our meeting, enlightened us with his considerable experience in the evaluation and treatment of both Congenital Hand Malformations and art appreciation. PC gave us incredible energy with incentive and direction for both Small Joint arthroscopy and Harmonica playing!

At the AGM current President Chris Lowden handed over to incoming President Jeremy Simcock, Robert Rowan handed over the secretary role to Allen Cockfield and we welcomed the new president elect Simon Chinchanwala and secretary elect Jennifer Hicks to the Executive team.

We farewelled our exiting exec members Tim Tasman-Jones and Sandeep Patel who continue to be actively involved in our society sharing crucial experience when required.

Earlier this Year Sandeep Patel (Past Secretary) represented New Zealand at the FESSH congress in Rotterdam and we are all excitedly looking forward to the IFSSH Triennial meeting in Washington DC in 2025.

We have also held a very successful wrist arthroscopy course hosted by Simon Maclean which we hope to make a regular event. Simon has also represented our society at the APWA and the APFSSH with plans to promote the upcoming meeting in Chennai in 2025.


PC Ho on the Harmonica


Chris Lowden

NZSSH dinner at the conference

Sunset in Fiji.

Tim Tasman-Jones with Michael Tonkin

VENEZUELA SOCIETY FOR SURGERY OF THE HAND

WRIST ARTHROSCOPY TRAINING WORKSHOP ON SIMULATORS AND BIOMODELS.

On Saturday 30 November 2024 the First Practical Arthroscopy Workshop was held in Caracas, Venezuela, using biomodels and simulators crafted with 3D printing technology..

This event was supported and recognized by the SVCMRMS, whose current president, Dr. José Vicari, actively participated throughout the development of this scientific meeting. It was organised by Dr. Carlos F. Morales Hackett and a skilled team of hand surgeons from various regions in Venezuela.

The workshop aimed to provide residents and specialists in Hand Surgery with academic information, technical knowhow, and the latest advances in wrist arthroscopy.

The event featured two internationally renowned wrist arthroscopy experts, Dr. Fabio Tandioy from Colombia and Dr. Mario Aita from Brazil.

Additionally, Dr. Sergi Barrera from Spain participated as a virtual guest, presenting the use of intramedullary screw fixation techniques for metacarpal fractures.

This highly productive and intensive arthroscopy course allowed Venezuelan specialists and residents to share and discuss clinical and surgical cases, seek expert guidance, and gain hands-on experience. The 3D biomodels and simulators were designed by Dr. Manuel Vélez from Argentina. This foundational training is essential before advancing to cadaveric courses in arthroscopy.

The event not only gathered hand surgeons from across Venezuela but also brought together international expertise. It marks the beginning of an ambitious project set to advance hand surgery in Venezuela, and in collaboration with our nation's official institutions.






MEXICAN SOCIETY FOR HAND SURGERY AND MICROSURGERY (SMCMYM).

The beginning of 2025 allowed us to see retrospectively the achievements of our Society during last year. One of the biggest steps we took was the digital publication of "La Gaceta de la Mano" or the "Gazette of the Hand", the brand-new official media of our Society. The issue is only electronic and will have four numbers per year, with a three-month periodicity. Hand surgeons from all over the world contributed to the first four numbers of La Gaceta de la Mano, including Eduardo Rafael Zancolli, Alejandro Espinosa, Rafael Reynoso, Mario Mendoza, Tuna Ozyurekoglu, Martín Pastrana, Carlos Zaidenberg, Ezequiel Zaidenberg, Cristhyan Baruch Cañedo, Lorenzo Merlini, Ahlam Arnaout, Christophe Mathoulin, Juliana Rojas, Francisco Soldado. Our members now have a new space to share clinical cases, scientific papers and communications. Additionally, La Gaceta de la Mano has a cultural section that recollects the work of Mexican artists, some of them hand surgeons, as well as Mexican traditions.

Last year, our Society had international representation during the XXVIII Congresso Português de Cirurgia da Mão-XIV Congresso Ibero Latino Americano de Cirurgia da Mão (ILA 2024) which was held in Coimbra, Portugal, from 3-5 October 2024.

During the combined meeting of SICOT with the Serbian Orthopaedic Trauma Association held in Belgrade, Serbia form 25-27 September 2024, SMCMYM participated in the microsurgery and hand surgery symposia, and moderated a microsurgery free papers session.


On 28 and 29 October 2024, our Society hosted in Mexico a course titled "Vascularized flaps for Orthopedic Surgeons", with the Ibero-American School of Microsurgery.

Finally, in December the General Assembly of the SMCMYM elected its new board of directors. The newly appointed members are as President Dr. Efraín Farías-Cisneros, Vice-President Dra. Susana Téllez Luna, Secretary Dra. Natalia Domínguez Chacón, and Treasurer Dra. Carla Fonseca Soto, which will be in office for the period 2025-2026.

We are looking forward to our 2025 Congress which will celebrate the 25th anniversary of the SMCMYM. It will be held from 21 to 23 May 2025 in Mexico City.

Our Society was invited as the guest nation to the Annual Meeting of the ASSH, in Vancouver, BC, Canada from 9-11 October 2025.

FRENCH SOCIETY FOR HAND SURGERY

(SOCIÉTÉ FRANÇAISE DE CHIRURGIE DE LA MAIN - SFCM)

During 2024, the French Society for Hand Surgery (Société Française de Chirurgie de la Main - SFCM) organized and participated in several major events, reaffirming its commitment to ongoing education and knowledge-sharing in the field of hand surgery.

Key Conferences and Events:

- **60th SFCM Congress:**
  Held from 19-21 December 2024, at the Palais des Congrès in Paris. This event brought together specialists to explore innovative themes. Brazil and Argentina were honored as guest countries, recognised for their significant contributions to hand and peripheral nerve surgery and anatomy.
  - Attendance: 1,000 participants
  - President's Dinner: On 20 December 2024, a celebratory dinner took place on the Seine River.
- **17th FESUM Day:**
  Organized on 28 September 2024, in Vannes. This event focused on advances in microsurgery and hand reconstruction techniques.
- **3rd Practical Course by the SFCM:**
  Conducted on 4 October 2024. This hands-on training provided surgeons with in-depth practical skills to refine their expertise.
  - Participants: 55 attendees and 10 faculty members
- **Hand Surgery University Diploma (DIU):**
  In 2024, the SFCM certified 86 new graduates. This diploma represents the first step in the journey of aspiring hand surgeons.

Projects and Initiatives:

- **Creation of the Young Hand Surgeons' Club:**
  Announced during the extraordinary general assembly at the start of the year, this initiative aims to invigorate the Society by involving young professionals, fostering intergenerational exchange, and promoting interdisciplinary collaboration.

These activities highlight the SFCM's enduring commitment to excellence and innovation in the field of hand surgery.

For 2025 :
Join Us for the 61st Congress of Hand Surgery in Paris from 18-19 December 2025!

We are delighted to announce the 61st Congress of the French Society for Hand Surgery (SFCM), to be held in the magnificent city of Paris, under the esteemed presidency of Laurent Obert (Besançon).

Theme: "Error: A Path to Progress"

This year, the congress will delve into the profound and pivotal theme of "Error"—exploring how challenges and mistakes can lead to learning, innovation, and advancements in hand surgery. Through keynote lectures, interactive sessions, and case studies, we will embrace the lessons learned from errors to enhance clinical practice and patient outcomes.

Highlights include:

- Inspiring keynote addresses from international experts
- Cutting-edge research presentations
- Interactive workshops and hands-on sessions
- Networking opportunities with global leaders in hand surgery

Don't miss this unique opportunity to exchange ideas, gain insights, and shape the future of hand surgery!

INDIAN SOCIETY FOR SURGERY OF THE HAND (ISSH)

Greetings and best wishes for the New Year from India. The Indian Society for Surgery of the Hand (ISSH) continues to advance hand surgery in India, with significant milestones achieved in 2024. The 23rd of August celebrated as National Hand Surgery Day with a theme of innovations and techniques in hand surgery and making hand surgery accessible.

There was widespread participation this year, with numerous institutes conducting various activities and awareness programs about the specialty.

The 10th ISSH Midterm CME, held on 6 and 7 April in Nagpur, featured hands-on workshops and academic sessions.

The 47th ISSH Annual Conference, ISSHCON 2024 and the 11th Society for Hand Therapy Conference (SHTICON 2024), held in Bengaluru from 4-6 October, attracted over 400 participants from around the world, with guest societies from Australia, Singapore, and the United Arab Emirates. Notable speakers included Dr Caroline Leclerq (France), Dr Yasunori Hattori (Japan), and Dr Greg Bain (Australia).

The highlight of the conference was the release of the 11 publications of the Indian Normative Data project, which was the presidential theme of Dr Mukund Thatte (2022) in the Indian Journal of Plastic Surgery. The Society also conducted the "Training the Trainers" program, the presidential theme of Dr Santosh Rath (2023) which has successfully trained 27 members to date, with support from the Kudav-Mudgal Foundation.

Looking ahead, the ISSH Academic Wing has planned several initiatives for 2025, including the circulation of 50 landmark articles on hand surgery, weekly case discussions, and a monthly online academic program. The ISSH Research Wing will also host monthly Research Clinics as webinars covering various aspects of research.

ISSH invites all Hand Federation members to participate in the 48th ISSH Annual Conference and the 14th Biennial Conference of the Asian Pacific Federation of Societies for Surgery of the Hand (APFSSH), to be held in Mumbai from 10-13 September 2025. This joint event will also feature the 10th Biennial Conference of the Asian Pacific Federation of Societies for Hand Therapy (APFSHT) and the 10th Annual Conference of the Asian Pacific Wrist Association (APWA).

Anil K.Bhat
Secreatry and Treasuer

EGYPTIAN SOCIETY FOR SURGERY OF THE HAND AND MICROSURGERY (ESSHM)

1. 17th Annual Meeting of ESSHM (6-8 March 2024, Triumph Plaza Hotel, Cairo)
The ESSHM held its 17th Annual Meeting in collaboration with the Annual Meeting of the Pan-African Society for Surgery of the Hand. The conference was a significant milestone, focusing on the theme: **Choice, Controversies, and Complications (CCC) in Hand Surgery**. Key highlights of the event included:

- Participation of over **320 attendees**.
- **Invited guest speakers** from China, Austria, Turkey, and the USA, alongside **ten virtual speakers**.
- **21 scientific sessions** featuring **210 talks**, covering a wide array of topics in hand and microsurgery.
- Presentation of the **Nash Naam Award** (Fifth Round) with a prize of **1,000 USD** for young investigators.
- **AO Course** on traumatic elbow disorders.
- A hands-on course on **flexor tendon repair**, utilizing goat legs for practical training.
-

2. ESSHM was a Guest Society at the 44th Brazilian Congress of Hand Surgery (8-10 August 2024, Florianópolis, Brazil).
This international collaboration further strengthened the ties between ESSHM and global hand surgery communities, fostering knowledge exchange and showcasing Egyptian expertise.

3. 17th Alexandria Hand and Microsurgery Congress (10-11 October2024, Alexandria)
In collaboration with the Alexandria Hand and Microsurgery Unit, ESSHM organized the **17th Alexandria Hand and Microsurgery Congress**. The congress revolved around the theme: **Sports Injury of the Elbow**. Attendees benefited from specialized discussions, workshops, and practical insights into managing sports-related elbow injuries.

The sports injuries of the Elbow seminar was very well attended

4. Participation in the Azhar Assiut Congress (23-25 October 2024)
ESSHM actively participated in the **Azhar Assiut Congress**, contributing to its scientific and educational sessions. This collaboration highlighted the society's commitment to engaging with diverse academic and professional platforms across Egypt.

5. Collaboration with Al-Azhar University (6-8 November 2024, Cairo)
The **Orthopedic Department of Al-Azhar University** partnered with ESSHM for its **Eighth Annual Meeting**, focusing on **Peripheral Nerve Injuries**. The event featured:

- A series of lectures on cutting-edge approaches to peripheral nerve injuries.
- A cadaveric course, providing hands-on anatomical insights.
- Live surgery sessions, enhancing the practical understanding of surgical techniques.

6. Contribution to the Egyptian Orthopedic Association Annual Congress (9-12 December 2024, Cairo):
The ESSHM participated in the **Egyptian Orthopedic Association Annual Congress**, contributing with:

- **Three dedicated scientific sessions** covering contemporary topics in hand and microsurgery.
- A hands-on course on **flexor tendon repair**, continuing its tradition of providing practical and skill-oriented training opportunities.

Some faculty members: Professors Ellaban, Sadek, Naam, Mahmoud and El Mahy

Professors Ellaban and El Nakeeb present a plaque of appreciation to Professor Warren Hammert, MD

Professors Ellaban and El Nakeeb present Professor Bob Szabo, MD with a plaque of appreciation

Summary
The ESSHM's activities in 2024 reflected its unwavering dedication to advancing hand and microsurgery through collaboration, education, and innovation. By organizing and participating in local and international events, the Society upheld its mission to foster professional development and improve patient outcomes in the field of hand and microsurgery.

AMERICAN SOCIETY FOR SURGERY OF THE HAND (ASSH)

Handthology is the newest learning platform from the American Society for Surgery of the Hand (ASSH). Curated by leading surgeons in our field, Handthology compiles the best of the ASSH's resources to provide you with the premiere online source for hand and upper extremity education. This platform requires no login, allowing you to access the materials for free to create a personalized learning experience.

HANDTHOLOGY™

On Handthology, browse 59 topics featuring full, updated chapters from the ASSH Textbook of Hand and Upper Extremity Surgery, 2nd Ed., along with bulleted summaries, key points, and anatomical insights. Each topic also includes a media gallery with detailed figures, informative surgical videos, and relevant peer-reviewed articles for further research. Additionally, structured lesson plans are available to guide your learning through key topics with videos and other academic resources.

Try out Handthology today to see how this comprehensive tool will become your go-to for hand and upper extremity education. Visit handthology.assh.org to learn more.

COLOMBIAN SOCIETY FOR SURGERY OF THE HAND

(ASOCIACION COLOMBIANA DE CIRUGIA DE LA MANO) (ASOCIMANO)

The **41th National Congress** of ASOCIMANO will be held from 20-23 August 2025 in the city of Barranquilla.

Barranquilla, also known as the 'Arenosa' or 'Curramba la Bella', is one of the main cities of Colombia and a reference tourist destination for locals and foreigners. It has a sunny climate with an average temperature of 30ºC and perfect beaches with enjoyable breezes from the Caribbean Sea.

This city, where the Magdalena River ends its long journey, is the birthplace of great musicians, writers, and painters. It is also the scene of one of the most important festivals in the country: the Carnival of Barranquilla. Thanks to its privileged geography, Barranquilla, capital of the department of Atlántico, has one of the most important ports in the country. For this reason, the city is also known as the 'Golden Gate' of Colombia. This has allowed it to position itself as a city with a high potential for economic and industrial development.

The academic program will be of the highest quality, with the best national and international speakers in each subspecialty.

MANOS A LA OBRA, is a health brigade, created by the Colombian Association of Hand Surgery ASOCIMANO. A group of expert Colombian surgeons in collaboration with surgeons from different countries such as Germany, Brazil, Chile, Venezuela, among others, seek to give a smile to underprivileged children with congenital differences of the hands, elbows, arms and shoulders, in order to improve their functionality and quality of life.

The next journey for 2025 is in the city of Medellin and the entire region of Antioquia and Choco. For this humanitarian journey, free medical consultations will be made, and they will be operated during the month of May with all expenses paid, including the necessary post-surgical medications.

Our hope is that this initiative will set an example and encourage more and more Colombians do good things and show more solidarity with and to others.

POLISH SOCIETY FOR SURGERY OF THE HAND (PTCHR)

In 2024, the Polish Society for Surgery of the Hand (PTChR) continued to pursue its mission with vigor, focusing on the dissemination of knowledge, improvement of treatment standards, and integration of the medical community, including hand surgeons and physiotherapists. The past year was marked by numerous scientific events, educational initiatives, and activities aimed at improving patient care.

1. International Conferences and Meetings
22-23 March 2024:
The International IBRA Course in Poznań attracted many participants interested in advanced techniques in hand surgery.

12-13 April 2024:
The 14th International Poznań Course in Upper Extremity Surgery (Forearm, Wrist, Hand) gathered 220 specialists from Poland and abroad. The course featured:

- 48 lecturers and instructors (including 11 international experts),
- 9 thematic sessions,
- 9 workshops conducted over two days,
- a poster session,
- 17 exhibitors,
- a dedicated Hand Therapy Day comprising 3 sessions.

7-8 June 2024:
The Hand Surgery Course under PTChR patronage in Warsaw. The program included advanced wrist arthroscopy, reconstructive techniques using flaps in the upper limb, and an intensive cadaver course (Warsaw Lab).

22-23 August 2024:
The Scandinavian Hand Society Meeting in Copenhagen featured a session by the Polish Society for Surgery of the Hand. The event provided an excellent opportunity for exchanging experiences and showcasing the achievements of Polish specialists and PTChR's initiatives on the international stage.

2. Summer School of Hand Surgery
The Summer School of Hand Surgery provided participants with the opportunity to enhance their skills under the guidance of experienced instructors. Detailed information is available on the official PTChR website.

3. Cadaver Course in Hand Surgery in Poznań
This course hosted 20 participants and 5 instructors. A highlight was the presence of Dr. Martin Richter from Bonn, who shared his expertise in modern surgical techniques.

4. Online Webinars
In 2024, a series of online webinars was organized, featuring leading Polish lecturers. These events facilitated broad knowledge dissemination and accessibility for participants regardless of location.

Summary and Acknowledgments
The Board of the Polish Society for Surgery of the Hand extends its heartfelt gratitude to all members, partners, and sponsors for their dedication and support. The year 2024 was fruitful, with numerous initiatives contributing to the development of the medical community and enhancing the quality of patient care.

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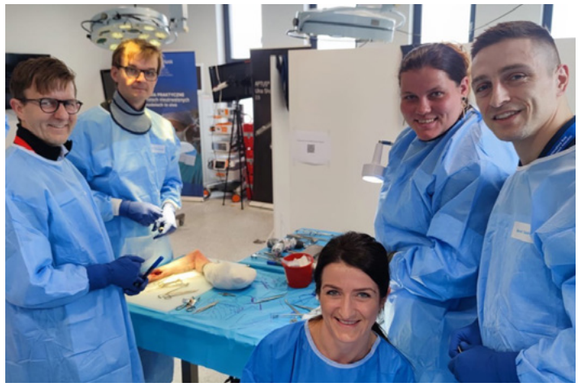


The International IBRA Course in Poznań 03.2024, faculty and participants

The Hand Surgery Course under PTChR patronage in Warsaw, June 2024, demostration and workshop

The 14th International Poznań Course in Upper Extremity Surgery Poznań , 04.2024. International faculty.

The Scandinavian Hand Society Meeting in Copenhagen . Polish Sesion

The 14th International Poznań Course in Upper Extremity Surgery Poznań , 04.2024. Microworkshop for participants

Cadaver Course in Hand Surgery in Poznań, 11.2024, guest faculty , prof. Martin Richter

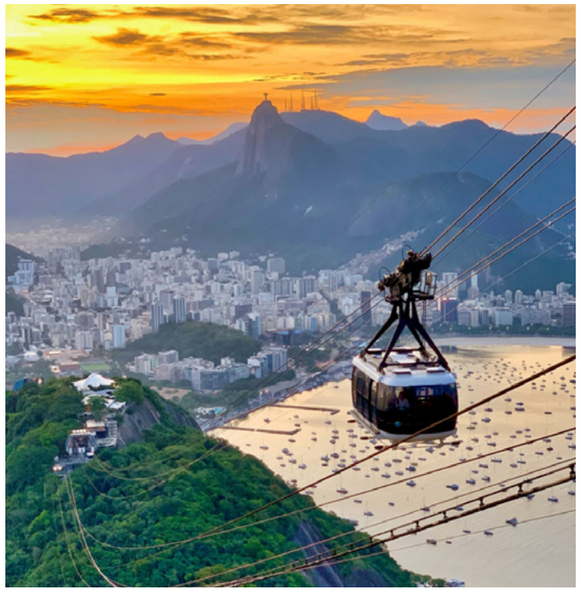
BRAZILIAN SOCIETY FOR SURGERY OF THE HAND (SBCM)

RIO DE JANEIRO - BRASIL: HANDS'N'RIO 2031 IFSSH/IFSHT TRIENNIAL CONGRESS

The Brazilian Society for Surgery of the Hand (SBCM) and the Brazilian Society of Hand Therapy (SBTM) proudly present Rio de Janeiro as a candidate city to host the International Federation of Societies for Surgery of the Hand (IFSSH) and the International Federation of Societies for Hand Therapy (IFSHT) Congresses in 2031. This proposal underscores Brazil's dedication to fostering scientific excellence and delivering unique cultural experiences.

Rio De Janeiro will host an unforgettable gathering, where learning and leisure harmoniously come together

Rio de Janeiro, globally recognized for its warmth and hospitality, boasts outstanding infrastructure for large-scale events, as demonstrated by its successful hosting of the FIFA World Cup and the Olympic Games. The Windsor Barra Convention Center, located in Barra da Tijuca, will serve as the hub for scientific and social activities, accommodating over 7,000 participants with modern facilities and seaside comfort.



Like this Carioca symbol, the 2031 congress promises to be a milestone in the history of hand surgery and therapy

A view as inspiring as the breakthroughs showcased at the 2031 congress

SBCM's proposal outlines a comprehensive scientific program that spans traditional surgical techniques to groundbreaking innovations like robotics and regenerative medicine. Furthermore, the event emphasizes global inclusion and reducing inequalities, with sessions tailored to the economic and cultural contexts of diverse regions.

Windsor Barra will provide outstanding facilities for an event worthy of Rio De Janeiro

With attractions such as ecotourism, iconic beaches, and cultural experiences, Rio de Janeiro promises to be the perfect backdrop for blending learning and leisure. This candidacy reflects not only Brazil's technical expertise but also its renowned warmth, inviting the world to experience Rio's vibrant culture in 2031.

GUATEMALAN HAND SURGERY ASSOCIATION

AGCM
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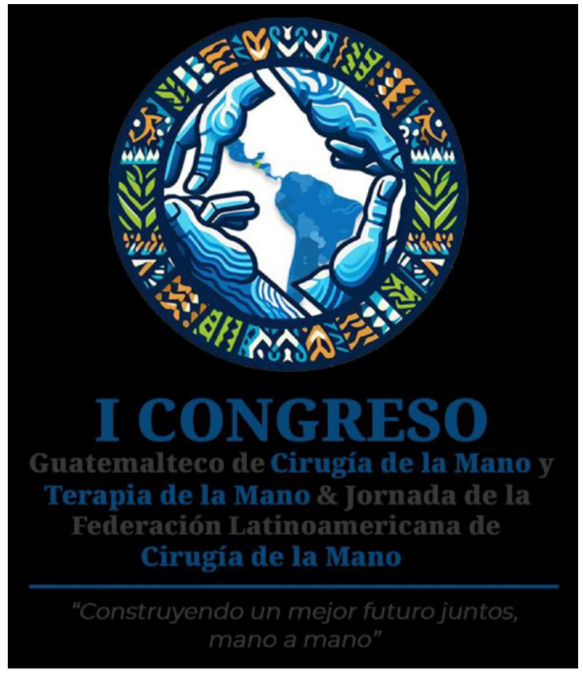
The Guatemalan Hand Surgery Association began as an early Study Group for those interested in the treatment of hand conditions since the 80´s. To comply with the laws of Guatemala regarding new formal educative and no-profit associations it changed its name to the Guatemalan Hand Surgery Association in September 2020.



Logo of the Guatemalan Hand Surgery Association´s First Congress and Latin American Federation of Hand Surgeons First Latin American Course in Guatemala.

In October 2023 Dr Juan Carlos Gonzales, the Associations president at the time, proposed a combined national congress as host country with the Latin American Federation for Hand Surgery in November 2024. Our Association was small, and many thought we would not be able to host such a big organisation as the Latin American Federation. However, our members were determined to make this a success. It would also showcase to the other Latin American countries and indeed the rest of the world that Guatemala is serious at improving the standard of hand surgery in our country by actively promoting the spread of knowledge. After much hard work and a combined effort by many members the necessary funds were found, and a venue was booked for the 21 and 22 November 2024 for our First Congress and Hand Surgery Course..

The Latin American Federation helped our organisational committee to get the necessary details for a congress right, and even the unexpected ones solved. They helped the committee to contact many faculty from all over South America, including countries such as Argentina, Colombia, Brazil, Venezuela, and Ecuador.

The Association invited hand surgeons from all Central America (El Salvador, Honduras, Nicaragua, Costa Rica, Belize, and Panama), to meet in Guatemala. Many hand surgeons from Guatemala did their fellowship in Mexico. This also helped to organise the Congress. A special thanks must be given to Dr Eduardo R. Zancolli, who believed in the project from the beginning, and even gave the Association a privileged place on his agenda to participate with us as one of our invited faculty for the course.

One hundred and eighty participants attended the Congress and Course which included 32 invited faculty members from Argentina, Colombia, Mexico, Ecuador, Venezuela, Chile, Brazil, Costa Rica, Panama, and Nicaragua. Initially we anticipated about 100 delegates, but the interest was more than we had expected. The Association's budget was tight, but we also managed to have a pre-course dinner for the international attendees, a faculty dinner for the national and international professors and a closing cocktail and four coffee breaks. There was also a special present for all the faculty who participated as national and international professors. So, the social agenda was as complete as it could be, giving the opportunity for the attendees to have a complete Guatemalan experience.

Photographs of Doctor Eduardo R. Zancolli participating in Guatemala.

Invited Faculties and assistants.

This first experience to host our First Congress and Course in hand surgery in Guatemala was not only a major success, but a learning experience for many attendees from various backgrounds including young surgeons, hand surgery fellows, orthopaedic residency students, plastic surgery residency students, physiotherapists, physiotherapy students and general medical students. The interaction between junior and senior colleagues was encouraged through the 'Meet and Greet' session, breaking down the stigma that senior doctors are not approachable! It also encouraged the important interaction to seek advice when a medical problem may arise.

Many diverse topics were covered which included tendon transfers, managing complex injuries, arthroscopy, microsurgery, infections, etc. Case studies were also discussed.

The Association hopes that this event is just the first one of many international events where Guatemala will be the host country. The enthusiasm of our members to learn and exchange knowledge of the hand is encouraging and bodes well for the future of hand surgery in Guatemala.

Photographs of the opportunity to socialise, meet and share.

After all the effort, after all the time, after all the commitment, we thank all those who believed in this project and participated with us to make it the success it was.

DR JUAN CARLOS GONZÁLEZ, DR FERNANDO ROMERO AND DR FADUAH SALAZAR
COURSE ORGANISERS

The CMMS Treatment Technique for Stiffness of the Hand

Casting Motion to Mobilize Stiffness (CMMS) is a treatment technique developed by the author to treat stiffness in the hand.[1] The technique reduces hand stiffness using a series of plaster of Paris casts which immobilize selected joints to direct active muscle force to the stiffer joints, to reduce edema, and to repattern the motor cortex. See Figure 1.

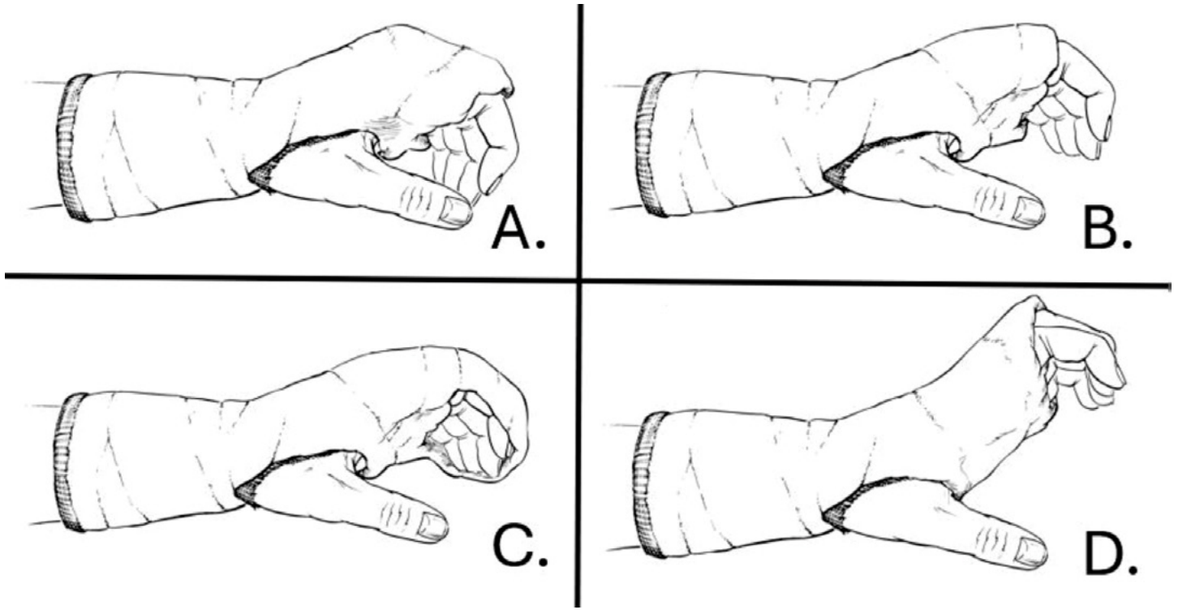


Figure 1: Common CMMS cast designs: A. Cast to block MP joint flexion and stabilize wrist in slight extension: Note MP joints are not fully extended because of severe interosseous tightness. B. Cast to block MP joint flexion with MP joints in full extension: this could be the first cast if edema is minimal and interosseous tightness mild. C. The first CMMS cast may require a hood to help the patient isolate the extrinsic finger flexors. D. When range of motion gains are made, a cast taking the MP joints into hyperextension will maximize interosseous and lumbrical muscle length, if needed.

Immobilizing any part of a stiff hand is counterintuitive, especially because we are taught one should never immobilize the finger metacarpophalangeal (MP) joint in extension! See Figure 2. Why then does the CMMS treatment method advocate both contradictory approaches? And why are therapists the world over using this technique with impressive results?

Fig.2: A CMMS cast positioning the wrist in slight extension and the finger MP joints blocked in extension to allow active motion to elongate the interosseous muscles. Note the varying levels of the block to allow full PIP joint motion. Photo courtesy of Kevin Parks.

For this article to be meaningful, the common example of a patient who falls on the outstretched hand and sustains a distal radius fracture will be used. After immobilization for fracture healing, the patient's hand is stiff, swollen, and nonfunctional—and often painful. A detailed examination would reveal:

- Limited active and passive motion in all finger joints
- Inability to initiate the normal pattern of finger flexion[2] (flexion occurs first at the MP joints: Figure 3)
- Inability to support wrist in extension during active finger flexion
- Edematous hand, often with a hyper-sympathetic tissue response which may include heightened pain response
- Inability to use the hand functionally.

Since the hand per se was not injured, it is assumed the patient should be able to resolve the stiffness with hand therapy. But the improved finger motion obtained after stretching in therapy is not maintained between sessions because the patient reverts to their maladapted active movement pattern created by the stiffness.

Fig.3: Typical maladapted pattern of active finger flexion: dominant MP joint flexion and inability to stabilize wrist in extension.

In our example, the maladapted pattern is finger flexion initiated with MP joints rather than the interphalangeal (IP) joints, and wrist flexion instead of stable wrist extension (Figure 3). Following mobilization in therapy, the patient has no ability to actively use the passive joint motion gained. To regain productive active finger motion, the patient's brain must redefine the normal finger flexion pattern by prolonged, repetitive, active motion in the cast which demands finger flexion to start with the IP joints.[2]

The patient is caught in a vicious circle. In our example:

- Joints are stiff, making the normal pattern of active motion impossible
- Because there is limited motion, hand edema persists
- Because the patient initiates flexion at the MP joints, the IP joint stiffness and the interosseous muscle tightness (which causes the MP joint to flex first) cannot be resolved. [3-5]

Progress can be initiated only by simultaneously addressing the problems listed above to: 1) decrease edema and tissue reactivity (and thus reduce pain), 2) increase joint mobility, and 3) 2 improve the pattern of active motion. Applying a non-removable plaster of Paris cast with the wrist in slight extension and the MP joints blocked in extension accomplishes the following:

- The evenly distributed pressure and warmth of the plaster cast decreases the hand edema and calms the tissues. Sometimes the only purpose of the first cast is edema reduction.
- Regardless of whether the joint stiffness is caused by capsular tightness or lack of tendon glide, immobilizing the more mobile proximal joints directs the force of active motion to the stiffest joints. Yes, active motion can improve passive motion! One of the hallmarks of this treatment technique is the elimination of all passive motion.
- The fact that the cast is non-removable means the new pattern of motion (our example: initiating active IP joint flexion) is repeated continuously over a prolonged period, requiring the patient's brain to relearn how finger flexion should occur.

CMMS treatment consists of a series of non-removable plaster casts which may be of the same design or differing designs; each cast has a specific goal. The greatest challenge for the clinician is to trust the CMMS process, letting go of long held beliefs and habits about common treatment techniques.

The two most difficult challenges are 1) knowing that the temporary stiffness created by the casting is necessary to allow a change in the pattern of motion and 2) leaving the cast on long enough. Improved joint motion and edema reduction occur quickly but changing the pattern of motion embedded in the motor cortex takes many repetitions over a longer time. When therapists start using the CMMS technique, they invariably remove the cast too soon because they are nervous about leaving it on longer.

What are the frequently asked questions about CMMS?

Q: Is there a written CMMS Protocol?

A: Protocols are written for specific diagnoses which follow a specific course of healing. The CMMS technique is used for multiple types of stiffness in the hand, seen at many different stages of healing, with differing injury complexities. Therefore, there is no simple structured description of the technique. Advanced knowledge of anatomy, biomechanics, tissue maturity and critical clinical thinking are required to appropriately use the CMMS technique.

Q: What is the design of the cast?

A: The cast design is determined by an evaluation of the hand and observation of active motion. See Figure 1. In our example above of the stiff hand following a distal radius fracture, finger flexion began with MP joint flexion: a cardinal sign of interosseous muscle tightness.[3-5] Positioning the wrist in some extension while blocking the MP joints in extension positively addresses the many reasons for IP joint limitations, because this "hook" position within the cast:

1. Maximizes both flexor digitorum profundus (FDP) and flexor digitorum superficialis (FDS) glide within zone 2, driving IP joint flexion.
2. Maximizes differential glide between the FDP and FDS within zone 2, maximizing IP joint flexion.
3. Maximally elongates both the interosseous and the lumbrical muscles, allowing full IP joint flexion.
4. Compresses the fingers and palm to mobilize edema.
5. Patterns the motor cortex to initiate finger flexion with the IP joints, while the wrist is in some extension: the normal pattern essential for active grasp.

Q: When do I change the design of the cast and what is the design of the next cast?

A: Each cast design has one specific purpose: To direct active motion to the one area where motion is most needed to regain function (See Figure 1). This goal is developed from a detailed examination of the hand and observation of its movement. When that goal is met, the hand is again evaluated to determine the next most needed motion, which informs the next cast design.

In our example above, perhaps the first cast goal is edema reduction while beginning some active IP joint flexion (blocking the MP joints from initiating finger flexion). If it is determined the interosseous muscle tightness is severe, the next cast should not extend the MP joints fully into a hook position, thus allowing the active motion to regain the IP joint flexion without the maximum resistance of the tight interosseous muscles. When IP joint flexion is regained in this position, the next cast positions the MP joints in full extension (perhaps hyperextension) to maximally elongate the interosseous muscles. Maximum interosseous muscle elongation, which occurs in the hook position, is required before full finger flexion can be regained. [3-5]

Q: What diagnoses can be treated with the CMMS technique?

A: CMMS is typically used after the acute healing of many kinds of trauma or surgery to alter residual hand stiffness. Since the focus of CMMS is to reestablish a productive active motion pattern, it can be especially useful in helping regain motion in an adhered flexor tendon after tendon healing is assured or following tenolysis. The non-removable cast assures that all exercise is directed to the specific tendon glide/motion needed.
Some examples that include, but are not limited to, the use of CMMS for stiffness/limited tendon glide are:

1. After fractures of the hand/wrist
2. After tendon repair or tenolysis
3. Following Dupuytren's surgery6
4. After soft tissue/crush injury to the hand
5. Following joint dislocation/s of the hand

Q: How long do I leave the cast on?

A: This is an unanswerable question as it varies with each patient and with each cast, but two guidelines are helpful:

1. Keep each cast in place until the goal for that cast is achieved.
2. Consider how long the hand has been in the maladapted pattern with accompanying tissue stiffness: the longer the stiffness, the longer the total time in the casts will be required.

Retraining of the motor cortex requires many repetitions over time for the active motion to be retained when the cast is removed. Until one becomes comfortable with this technique, the cast is likely to be removed too soon, and the maladapted pattern will return. The main obstacle to regaining functional motion in a stiff hand is permanently changing the maladapted motion pattern, which means changing the brain.

Q: Why can I not make a removable orthosis to accomplish the same purpose?

A: In some patient circumstances, a removable orthosis accomplishes the same purpose, but a chronically stiff hand will revert to the maladapted pattern and erase the gains made when the orthosis is removed. If it can be removed, it will be removed, taking longer to achieve progress, or perhaps, not gaining functional motion at all.

Fig.4: Left hand shows good range of IP flexion while stabilizing wrist in extension. (MP joint flexion is temporarily limited from being in the cast.) This patient is ready to start slowly weaning out of his left hand CMMS cast.

Q: How do I discontinue the CMMS treatment?

A: When the patient can demonstrate the normal active pattern of motion out of the cast for short periods of time, they may be ready to begin weaning out of the cast. See Figure 4. The cast is bi-valved (cut down each side) so that one side allows an opening for the hand to be removed/reapplied and the other side serves as a hinge because the stockinette and padding remain intact (only the paster is cut.) To reapply, the cast is fastened with circumferential hook and loop straps. See Figure 5.

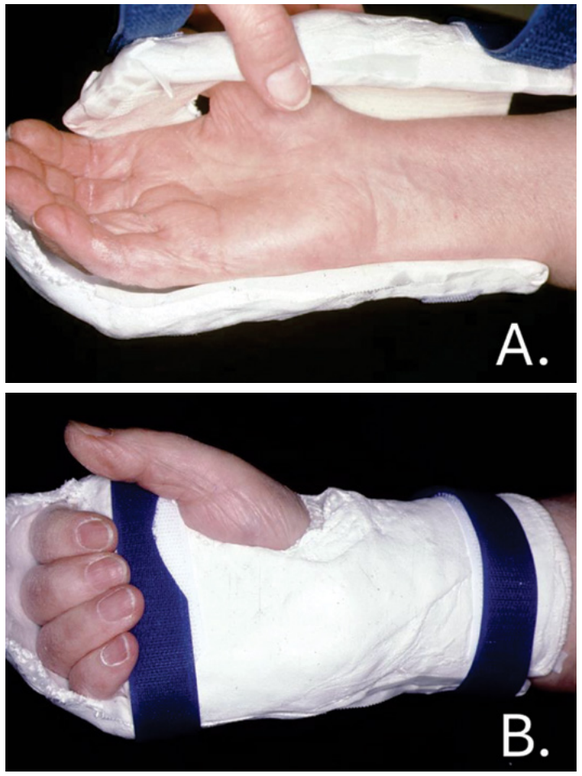


Fig.5: CMMS cast is bivalved. A: Cut side edges are finished with wide adhesive tape and B. Hook and loop circumferential straps hold the cast closed.

Weaning must be a slow process. The patient begins with short periods of time out of the cast. When the active pattern of motion begins to deteriorate and reverts to the maladapted pattern, the cast must be immediately reapplied. Instead of increasing the length of time out of the cast, keep the periods out of the cast short and increase the number of times out of the cast.

The goal is that the patient never experiences the maladaptive movement pattern when out of the cast but continues to reinforce the productive pattern. It is recommended that the patient continue to sleep in the cast until full weaning has occurred.

Q: Why is plaster of Paris casting recommended over the newer and more convenient casting materials?

A: Most chronically stiff hands retain significant edema limiting motion and the limited motion prevents the edema reduction. The cast redirects motion to the stiffest joint while also providing warmth and a "pseudo-massage" to stimulate the initial lymphatics7 as the hand moves slightly inside the cast. This direct positive pressure and warmth is vital to create edema reduction. Intimate contouring of the cast material against the hand cannot be achieved with the newer synthetic casting materials, thus robbing the patient of the maximum benefit of casting.

Occasionally, there may be limited motion in one finger, for example, and the hand is not edematous or reactive, making the use the synthetic materials more appropriate for this purpose.

Q: What are the barriers to using the CMMS treatment technique?

A: This is not a technique to be used by beginners. It requires advanced understanding of hand anatomy and movement, tissue response to stress, and biomechanics. CMMS also demands a well-developed skill in applying comfortable and precise casts, which is not a common skill among therapists.

Most of all, this approach creates anxiety for many therapists. For this technique to be successful, one must abandon all passive range of motion and other hands-on treatment techniques and allow active motion within the cast to create the improvement.

The immobilization of some joints within the cast will usually create temporary stiffness in the immobilized joints, so range of motion measurements may initially show a decline in total active motion. But these joints will readily regain their motion—now as part of a normal pattern of movement.

The only concern would be if there has been direct trauma to the dorsum of the hand, causing adherence of the extensor tendons, or skin shortening.

Interestingly, in our example, although one assumes the wrist muscles are prevented from contracting through range when casted, one can often observe the spontaneous contraction of the wrist extensor muscles during active finger flexion upon the removal of the cast --when in fact this was impossible prior to casting!

Q: What are the advantages of the CMMS technique?

A: Surgery is rarely helpful in resolving chronic hand stiffness because there is no focal point of stiffness. CMMS is a non-invasive, non-painful way to reestablish functional motion which requires a minimal number of visits. The best candidate for this technique is the patient whose hand seems impossible to help. The only requirement is the patient have normal muscle innervation.

Q: How can I learn more about this technique?

A: The author has taught several CMMS courses in years past and many therapists who attended those courses now use the technique and teach their co-workers. Although there are avenues to learn this technique online, CMMS is best mastered via hands-on, in-person learning. Some additional resources are:

ONLINE RESOURCES (Free of charge)
- Live CMMS Online Discussion Group held every other month in the USA at 8PM EST. Register to receive notifications. https://survey.zohopublic.com/zs/iyCCry
- BraceLab LinkedIn Page about CMMS https://lnkd.in/gmHudxDh
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extremity. 6th ed. Philadelphia: Elsevier Mosby; 2011. **Free online copy**. https://bracelab.com/clinicians-classroom/therapists-management-of-the-stiff-hand)

- **Clinical Pearls** https://bracelab.com/clinicians-classroom/category/clinical-pearls

- **No. 84** - May 2024: The CMMS Discussion Group: What We Have Learned https://bracelab.com/clinicians-classroom/the-cmms-discussion-group-what-we-have-learned
- **No. 77** - February 2023: CMMS: How is the Cast Position Determined? https://bracelab.com/clinicians-classroom/cmms-how-is-the-cast-position-determined
- **No. 65** - Nov. 2020: Which Hook Exercise Most Effectively Decreases Finger Stiffness? https://bracelab.com/clinicians-classroom/which-hook-exercise-most-effectively-decreases-finger-stiffness
- **No. 66** - Feb. 2021: Regaining Synergistic Wrist Extension after Ending CMMS Too Early https://bracelab.com/clinicians-classroom/regaining-synergistic-wrist-extension-after-ending-cmms-too-early
- **No. 40** - May 2016: Regaining Flexor Tendon Glide within Zone 2 https://bracelab.com/clinicians-classroom/regaining-flexor-tendon-glide-within-zone-2
- **No. 32** - October 2014: Immobilizing the MP Joint in Extension? https://bracelab.com/clinicians-classroom/immobilizing-mp-joint-extension
- **No. 22** - November 2012: Lumbrical Muscle Tightness & Testing https://bracelab.com/clinicians-classroom/lumbrical-muscle-tightness
- **No. 21** - September 2012: Nuances of Interosseous Muscle Tightness Testing https://bracelab.com/clinicians-classroom/nuances-of-interosseous-muscle-tightness-testing
- **No. 20** - July 2012: Quantifying Interosseous Muscle Tightness Testing https://bracelab.com/clinicians-classroom/quantifying-interosseous-muscle-tightness-testing
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HANDS-ON COURSES

ASHT Traveling Course https://asht.org/education/courses/traveling-course
(2025); CMMS: Changing the Way We Treat the Stiff Hand (yet to be scheduled at time of publication.)

Session at the **IFSHT Triennial Congress** https://www.ifssh-ifsht2025.org/s/
in Washington, DC on March 26, 2025: Introduction to Casting Motion to Mobilize Stiffness for Treatment of the Stiff Hand

ONLINE COURSE (FEE)

CMMS Introductory Course https://www.robynmidgley.com/cmms-intro-course

CONCLUSION

This brief article does not allow an in-depth explanation of this technique. Seek an experienced therapist who uses the CMMS technique who is willing to be your mentor. Consider the resources listed above to gain further insight and information from your therapy peers. Most of all, imagine the day you are excited to receive a treatment referral for an impossibly stiff hand because you now have the tools to change it!

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IFSHT NEWSLETTER – REACH

Issue 2 of volume 4 of the IFSHT newsletter is available on the IFSHT website.

This issue is a special feature on the musician and hand therapy: https://ifsht.org/publications/

The publication aims to collate Research, Education, Achievement and Clinicians in Hand and upper limb therapy around the world.

We call on hand and upper limb therapy clinicians and researchers to submit any contributions for consideration to: informationofficer@ifsht.org

UPCOMING EVENTS

The 60th Congress of the French Society of Hand Surgery will be held from the 19th to the 21st December 2024 at the Palais des Congrès Porte Maillot in Paris:
Website: https://gemcongres.com/

Finally, the next IFSSH and IFSHT Triennial Congress is only months away! Hosted by the American Society for Surgery of the Hand, American Society of Hand Therapists, and American Association for Hand Surgery. The event will be held in Washington, USA in 2025 from March 24-28.

https://www.ifssh2025.org/s/

Explore the hundreds of different programs and sessions at the 2025 IFSSH and IFSHT Triennial Congress, including where the programs and sessions will held, when they will occur, and who will be presenting!

Check back often as new details on these programs and sessions are added frequently.

Re-published Article

Acknowledgment: We thank the Editor, Publisher, and Author for allowing us to re-publish this article from the Journal of Hand Surgery (European Volume) 2023, Vol. 48(3) 230–245

Review Article

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The distal radioulnar joint after distal radial fractures: when and how do we need to treat pain, stiffness or instability?

Grey Giddins

Abstract

The importance of distal radioulnar joint problems associated with distal radial fractures is recognized increasingly. But there remains considerable disagreement about how to treat these problems both acutely and chronically. This review outlines the knowledge about the natural history of ulnar-sided wrist problems with distal radials fractures. In particular, the recent increased understanding of the almost inevitable joint instability associated with distal radial fractures is highlighted, including the unreliability of clinical assessment and hence why there has been so much misunderstanding. Provided there is reasonable bony alignment, most ulnar-sided wrist problems can be treated non-operatively initially (typically for over a year) in anticipation of substantial improvement with time. The exception is early marked subluxation of the distal radioulnar joint (DRUJ) blocking forearm rotation, which needs urgent (typically closed) reduction.

Keywords

Distal radius, fracture, distal radioulnar joint (DRUJ), ulnar head, pain, instability, stiffness, malrotation, delay

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A 21-year old man presented with a history of a fall on the outstretched right hand 5 months earlier. He reported good restoration of hand and wrist function but had a painful block to pronation. On examination, the ulnar head was dislocated anteriorly, and this was confirmed on radiographs (Figure 1) and a CT scan (Figure 2). Surgical reduction of the dislocation was recommended but it was unclear how difficult the dissection would be, what soft tissue stabilization would be required after the reduction and whether an ulnar head replacement might be needed to address the damage to the ulnar head; an excision arthroplasty, namely Darrach's procedure, was also considered. The published information is limited, but 108 cases of acute anterior distal radioulnar joint (DRUJ) dislocations have been reported (O'Malley et al. 2022); 25% were diagnosed more than 6 weeks after injury. Typically, patients with this injury present acutely and the joint can be reduced closed, but late presentation is quite common. The best treatment for late presenting cases is not established but open reduction is often required (O'Malley et al. 2022). At operation via a dorsal approach the DRUJ could be reduced in this case once the local soft tissues were released. There was increased DRUJ instability shown on shear testing but not sufficient to warrant further soft tissue stabilization. The patient rapidly regained nearly full forearm rotation with mild symptoms, despite persisting increased DRUJ shear indicative of DRUJ instability. This case highlights many uncertainties in the treatment of DRUJ pathology not least how much instability can be tolerated.

Introduction

The complexity of the problems involving the DRUJ are becoming better understood but many uncertainties remain, not least when to intervene to treat a clinical or radiological abnormality and when it is better to wait. This review will address the treatment of acute problems, including the significance of ulnar styloid fractures, the treatment of concomitant distal radial and ulnar neck fractures, and acute DRUJ dislocation or marked subluxation. The subacute problems of DRUJ dislocation/marked subluxation and chronic issues of DRUJ pain, stiffness and instability will also be discussed.

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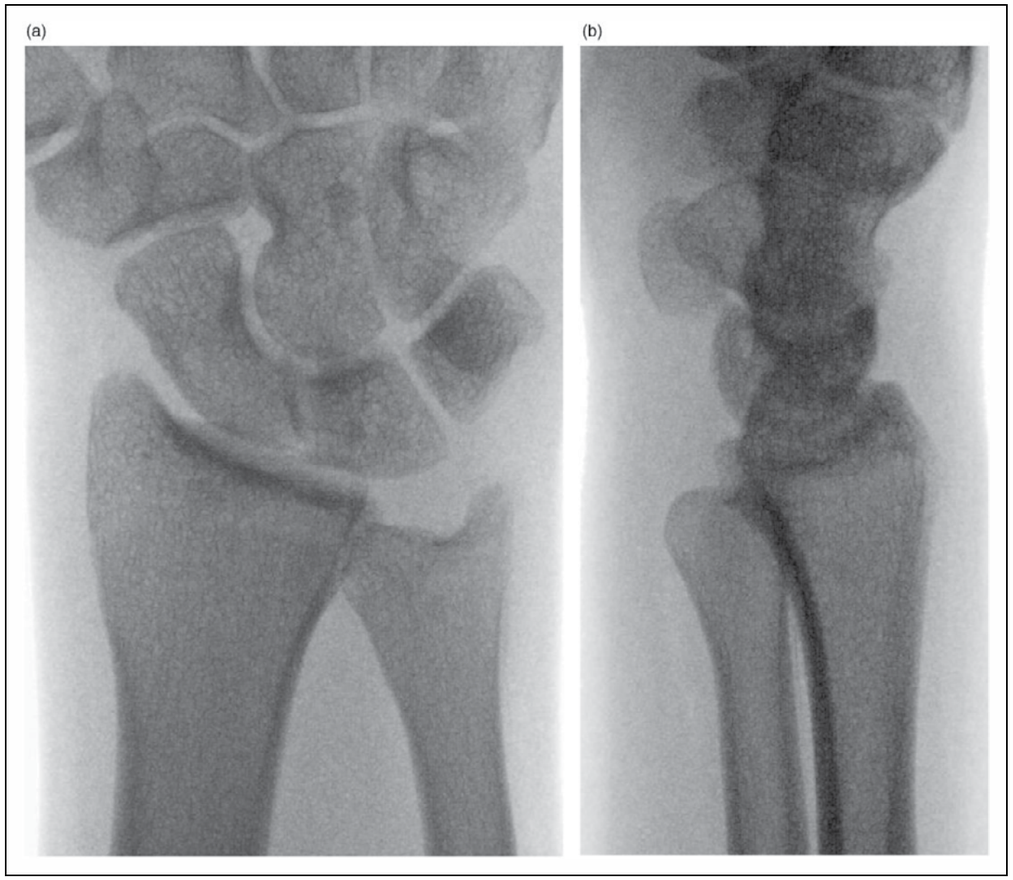

Figure 1. (a) Posteroanterior radiograph and (b) lateral radiograph, of an anterior dislocation of the ulnar head after a fall.

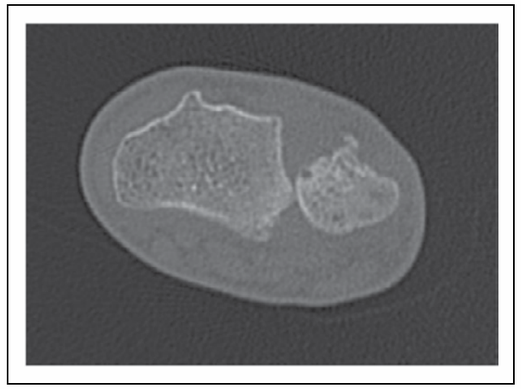

Figure 2. Axial CT scan image of the anterior dislocation of the ulnar head after a fall.

Anatomy and biomechanics

The anatomy and biomechanics of the DRUJ have been studied extensively. The bony anatomy providing stability is the interaction between the ulnar head, with its small radius of curvature, which articulates with the sigmoid notch with a much larger radius of curvature. There are a range of shapes of

the sigmoid notch: C-shaped, slope-shaped, S-shaped and flat (Tolat et al., 1996). It has been postulated that the flat type predisposes to instability, but that has not been proven clinically. The primary soft tissue stabilizers are the tissues of the triangular fibrocartilaginous complex (TFCC) (Gofton et al., 2004). There are a number of secondary stabilizers, including the ulnocarpal ligaments and the interosseous membrane. The exact significance of each is not established. This is highlighted by the work of Lindau and co-workers (2000), who showed that patients with TFCC tears in association with distal radial fractures had more DRUJ instability but two who had no TFCC tear also had appreciable DRUJ instability. This may reflect the unreliability of clinical assessment of DRUJ stability, but also highlights our uncertainty about the complex anatomy around the DRUJ.

Investigations

If a patient's symptoms remain intolerable or persistent beyond 1 year from injury despite appropriate non-operative treatment, further investigations may be warranted with a view to surgery. It is important that any operation should attempt to address the underlying problem. Although this is stating the obvious, it is particularly important for the ulnar side of the wrist where the site and extent of the pathology may be unclear. Clinical assessment may clarify whether a patient's symptoms are due to DRUJ problems or other pathology on the ulnar side of the wrist, including painful TFCC tears, ulnocarpal abutment, extensor carpi ulnaris (ECU) tendon pathology and even pisotriquetral problems. Diagnostic local anaesthetic injections may help exclude or confirm a diagnosis, although in the presence of a TFCC tear the DRUJ and the ulnocarpal joint are in communication and an injection in either space is likely to affect both.

Radiographs will almost certainly have been done after treatment of the radial fracture. They may demonstrate an appreciable distal radial fracture malunion, DRUJ arthritis (Figure 3), ulnocarpal abutment or even a screw in the DRUJ as causes of ulnar-sided symptoms. If the diagnosis remains unclear, an MRI scan or MR arthrogram can be done. As always, it is important with any test to know what question is being asked and not just to use the test as a 'fishing' exercise. I find CT scans more useful for assessment of bone malalignment, including marginal sigmoid notch fractures, and screw misplacement, for example into the sigmoid notch of the distal radius. CT scans can be utilized for the production of three-dimensional (3-D) printed

Figure 3. Distal radioulnar joint arthritis in association with a distal radius fracture.

models and operative planning in complex, multiplanar malunions. Rarely are other tests necessary.

If there is symptomatic acute or subacute DRUJ instability, this may be evident on radiographs if it is marked, typically shown as dorsal subluxation of the ulna relative to the radius (technically the other way around) on a true lateral radiograph (Figure 4). If unclear, ultrasound has been reported to be a useful tool for assessment of DRUJ instability but is operator dependent. A CT scan of both wrists in pronation should identify displacement of the distal ulna relative to the distal radius greater on the symptomatic side. It is important to note that the scans are typically performed in pronation, which may affect the findings. A CT scan should also demonstrate any post-fracture sigmoid notch malalignment.

Natural history

Ulnar-sided wrist pathology, particularly instability, in association with a distal radius fracture has been reported to occur in the range from 2% to 37% of distal radial fractures (Geissler et al., 1996; Lindau and Aspenberg, 2002). Recent research

Figure 4. Distal radioulnar joint (DRUJ) instability after a distal radial fracture. (a) Lateral radiograph 10 days after injury showing moderate DRUJ subluxation; the significance was not appreciated and (b) Subsequent lateral radiograph 5 weeks after injury when the problem was noted.

(Giddins and Pickering, 2022) shows that measurable DRUJ instability occurs in all cases (100%). This fits with the recent description of the upper limb falling reflex (Giddins and Giddins, 2021). Therefore, there is always an ulnar-sided wrist injury in patients who suffer a distal radial fracture. Kim et al. (2016) showed that at 3 months after injury, 22 of 140 (16%) patients with distal radial fractures treated operatively reported ulnar-sided wrist pain when assessed with the patient related wrist evaluation (PRWE).By 1 year from injury only three patients reported ongoing pain. This clearly indicates a gradual improvement in ulnar-sided wrist symptoms for over a year; this fits with my clinical experience. There is no evidence that the instability in the DRUJ after a distal radial fracture changes with time. My belief is that it does not change appreciably after 6 weeks from injury.

Non-operative treatment

Non-operative treatment is the first line of treatment for most DRUJ problems. The exceptions are some unstable distal ulnar (neck or head) fractures and an early marked painful block to forearm rotation, which may require urgent intervention.

In the year of 'natural recovery' following a distal radius fracture, some patients report appreciable

ongoing ulnar-sided wrist pain. The management options include the standard orthopaedic strategies of activity modification, splints or straps and oral analgesics, typically non-steroidal anti-inflammatory medication (NSAIDs). The efficacy of these treatments has not been reported but empirically they appear to help. Steroid injections are given to treat ongoing wrist pain. The results of this form of treatment have not been reported. In our experience, 90% of patients report some improvement in symptoms when reviewed at 6–8 weeks after injection. This can be repeated at least once, as it is typically very safe. If the pain persists, the work of Kim et al. (2016) suggests patients should be supported and encouraged to wait for spontaneous improvement in their symptoms over at least 1 year from injury, assuming there is no gross bone malalignment.

There is no evidence to indicate whether the DRUJ becomes more or less stable with time after a distal radial fracture. Similarly, there is no good evidence that early treatment improves the outcome of DRUJ instability, so it is worth waiting for a prolonged period, typically at least 12 months, before addressing that. Mrkonjic et al. (2012) carried out a long-term (13–15 year) review of 51 patients who had had distal radial fractures treated and assessed arthroscopically at the time of the primary treatment of their fractures. They found instability on shuck (ballottement) testing of the DRUJ in 17 of 38 (45%). One patient had had a TFCC reattachment for symptomatic DRUJ instability. The remainder reported mild symptoms with a trend to worse outcomes if they were more unstable on clinical assessment. They concluded that there was no evidence that acute TFCC repair after a distal radial fracture would improve the outcome for patients. This is also suggested by Wijffels et al. (2017) who noted that the presence of clinically assessed DRUJ instability in patients with distal radial fractures followed-up at a mean of 4.2 years did not affect the clinical outcome. In contrast, Kasapinova and Kamiloski (2019) reported worse PROM outcomes at 3 and 12 months in patients who had arthroscopically proven TFCC tears in association with a distal radial fracture. There are case series recommending acute TFCC repair, but we do not see many patients with long-term symptomatic DRUJ instability requiring treatment after distal radial fractures despite these fractures being very common. It should be noted that Pickering et al. (2022) have shown that clinical assessment of DRUJ instability is unreliable, so any published studies on DRUJ instability based purely on clinical testing pre- or post-intervention remain open to question.

In my experience stiffness of the DRUJ typically improves best in the first 6 weeks after injury but may improve late, namely over several months. The minimum range of forearm rotation at any set time point (such as at 6 or 12 weeks after injury) that is required for a good long-term outcome has not been established. In my experience patients should be close to functional ranges of forearm rotation (45° each of pronation and supination from neutral) after 6 weeks unless there is a very severe distal radial fracture, for example involving the sigmoid notch; late recovery of forearm rotation is unpredictable. Physiotherapy and encouragement are the mainstays of treatment. If pain is limiting progress, a steroid injection into the DRUJ can be very effective. Mostly I wait until an initial period of 6–12 weeks has passed, but it may be that an earlier injection would help optimize recovery. If there is a persisting marked lack of forearm rotation after a distal radial fracture, I consider that there is no role for a manipulation under anaesthetic (MUA), which risks a forearm fracture; I have never seen it give prolonged benefit; rather it often causes more pain and inhibits progress.

If there is persisting marked distal radial malalignment after primary treatment (Figure 5), it may be appropriate to correct that earlier to improve symptoms. Dorsal angulation of the distal radius (Nishiwaki et al., 2014) and coronal shift (Dy et al., 2014) have been shown to increase DRUJ instability and can be corrected surgically (Ross et al., 2015). Typically, correction of the distal radial malunion alone will address many ulnar-sided wrist problems.

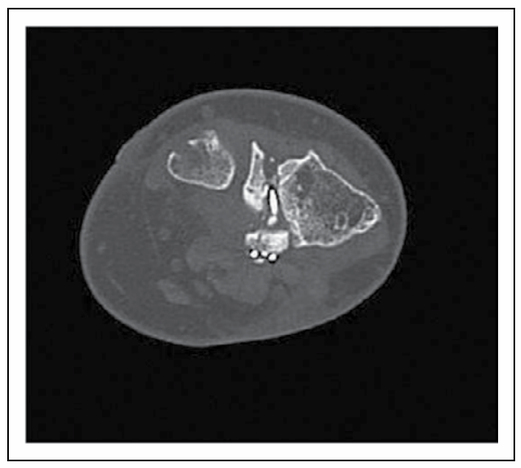

Figure 5. Marked distal radial malunion involving the sigmoid notch.

I consider that separate ulnar-sided procedures with a view to stabilizing the DRUJ are often best left for a later planned operation that may never be needed. This fits with the established principle of generally correcting bone alignment first and soft tissues subsequently.

Specific DRUJ problems

Acute problems

Ulnar styloid avulsion fractures. The importance of ulnar styloid avulsion fractures has been argued for decades (Almedghio et al., 2018; Mulders et al., 2018). The results of studies have been conflicting, with some authors reporting that patients with ulnar styloid fractures have worse outcomes and other authors reporting no difference. Recent systematic reviews and meta-analyses have shown no difference in outcomes in patients with distal radial fractures whether there is a concomitant ulnar styloid fracture (either basal or tip) or not (Almedghio et al., 2017; Mulders et al., 2018). Specifically, they have reported no difference in patient-rated wrist evaluation (PRWE) scores, range of motion, grip strength, visual analogue scale (VAS) pain scores, ulnar-sided wrist pain and DRUJ instability; they noted a four-point better DASH score without an ulnar styloid fracture, but this is less than the 10 point difference of clinical significance. This is similar to the review of Baradaran et al. (2016), who also carried out a systematic review and meta-analysis and found that patients without ulnar styloid fractures had better DASH scores and wrist flexion at 1 year but no difference in PRWE or VAS pain scores. These studies fit with the report of Giddins and Pickering (2022) that showed a degree of instability, namely an ulnar-sided problem, in all patients with distal radial fractures, indicating there is always an ulnar-sided soft tissue injury irrespective of the presence or absence of an ulnar styloid fracture, suggesting that the fracture fragment itself is not significant. Overall, the presence or absence of an ulnar styloid fracture is of no prognostic significance; hence there is no indication for surgical treatment of an associated ulnar styloid fracture.

Acute DRUJ instability. Various published studies have reviewed DRUJ instability and reported ulnar-sided surgery at the same time as stabilization of the distal radial fracture to address DRUJ instability (Kasapinova and Kamiloski, 2019). As it has been shown that clinical assessment of DRUJ instability is unreliable (Pickering et al., 2022) and we know all patients with distal radial fractures have DRUJ instability (Giddins and Pickering, 2021), the published studies advocating ulnar-sided treatment have to be viewed sceptically. Currently there is no evidence that additional ulnar-sided wrist surgery at the same time as stabilization of the distal radial fracture improves patient outcomes.

Lindau et al. (2000) reported greater DRUJ instability on clinical assessment of 51 patients reviewed at 1 year after a distal radial fracture assessed with a wrist arthroscopy. They reported that 19 had instability; of these, ten of 11 had had complete TFCC tears versus seven of 32 with no, or partial, peripheral TFCC tears. Those with complete tears had worse Gartland and Werley scores (Lindau et al., 2000). As we now know that all patients with distal radial fractures have DRUJ instability, this finding is difficult to interpret. Although it may imply that the study is unreliable, it is more likely that the patients noted to have 'instability' were patients with more marked DRUJ instability. This would fit with the higher Gartland and Werley scores and more severe soft tissue injuries. Nonetheless, two of eight patients with no TFCC tear had clinically obvious instability. This indicates that the soft tissue injuries on the ulnar side of the wrist at the time of the distal radial fractures are complex and not just variations of TFCC tears. Currently there is no reliable evidence that surgical stabilization of ulnar styloid avulsion fractures or TFCC tears at the same time as stabilization of a distal radial fracture improves the outcome. As all interventions carry risks, I believe they should not be undertaken unless as part of a research study. This is not to dismiss concerns about ongoing ulnar-sided wrist symptoms giving adverse outcomes; it is to recognize our ignorance and look to perform well-designed research studies, likely to require large randomized controlled trials, to answer these questions.

Ulnar head or neck fractures. In older patients, the evidence suggests there is no difference in outcomes between conservative or operative treatment of distal ulnar fractures in association with distal radial fractures (Cha et al., 2012) (Figure 6). In the elderly, the results are also comparable with an acute Darrach's procedure for unreconstructable ulnar head fractures (Yoneda and Watanabe, 2014). The data in younger patients are less clear, not least as this is a rare combination of injuries. Gschwentner et al. (2008) published a series of 13 cases in younger patients (age 18–59 years); they reported that the key was good, stable reduction of the distal radius. If the ulnar head was reasonably stable and aligned, then plaster cast immobilization, possibly with K-wire stabilization, would suffice. If the ulnar head

Figure 6. Concomitant distal ulnar and distal radial fractures.

was still very unstable after fixation of the distal radius, they recommended operative reduction and internal fixation (ORIF) of the distal ulna. Various other case series have reported good outcomes of concomitant ORIF of distal radial and distal ulnar fractures (Nemeth and Bindra, 2014). A recent retrospective study by Glogovac et al. (2022), with a mean follow-up of 27 months, suggested no benefit from ORIF versus non-operative treatment versus distal ulnar resection in patients with concomitant distal ulnar fractures (excluding ulnar styloid fractures) with a mean age of 56 years. Lutsky et al. (2020) reported the same conclusion in 172 patients of whom 72 were treated surgically and 91 were not; the mean age of their patients was 69 years. Typically, concomitant distal ulnar fractures occur in older patients. It would appear that in these patients there is no proven benefit from surgical stabilization and there will always be risks; of note the only nonunions in the series of Lutsky et al. (2020) were in those treated surgically. In addition, there are good salvage procedures in older patients in the presence of persisting ulnar-sided wrist pain, especially distal ulnar resection (Darrach's procedure).

In younger and higher demand patients, based on first principles, restoration of DRUJ articular congruency should be undertaken if possible. In particular, if in the long-term there is stiffness but articular congruency, then an open joint release can be done. If there is appreciable articular incongruency this can be extremely difficult to reconstruct. A salvage procedure is likely to be the best option for treating intrusive symptoms. If after reconstruction of the distal radius there is good radiological alignment of the ulnar head or neck fracture, I consider it is reasonable to treat the ulnar fracture non-operatively with immobilization of the distal forearm and wrist, despite the distal radial ORIF to minimize the surgical risks; careful follow-up is required to detect and treat re-displacement. If there remains appreciable displacement (I suggest an articular step $\geq$2 mm or angulation in any plane $\geq$10°), I would recommend surgical correction. Angulation may correct with longitudinal or transverse K-wire (s). An articular step is more likely to need ORIF. Current plates are quite bulky and are likely to require secondary plate removal. Patients need to be advised of this when discussing surgical options as well as the risks of injury to the superficial sensory branch of the ulnar nerve, the risk of nonunion and that there is a lack of evidence that surgery makes any difference. Given the rarity of these injuries in younger patients, it is likely that the role of surgery for concomitant ulnar head fractures will not be resolved for many years.

Whether a concomitant ulnar neck fracture is associated with an increased (or decreased) risk of DRUJ instability is not known. It could be argued that this is a more severe injury so there will be an increased risk of DRUJ instability. It could also be argued that the energy of the 'fall' is dissipated through the ulnar neck rather than the DRUJ. I consider both arguments will apply, namely there will be some DRUJ instability but not appreciably greater than with most distal radial fractures assuming reasonable reduction of the sigmoid notch and ulnar head. Currently the advice can only be to assess after bone union and treat based on symptoms. There is no evidence as yet to support acute soft tissue reconstruction when treating these injuries. That is supported by the comparable outcomes with reconstruction versus ulnar head excision; the latter inevitably leads to instability between the forearm bones.

Subacute problems

Delayed or subacute DRUJ subluxation or dislocation

DRUJ subluxation or dislocation can be acute or chronic. There is surprisingly little written about subacute DRUJ subluxation. It is not rare. We have reviewed a series of 15 patients with subacute DRUJ subluxation $\geq$50%. It occurs between 2–18 days after treatment (surgical or non-operative) and is often overlooked initially (35%) (Figure 4). It appears to occur with all types of fractures (intra- and extra-articular) and all types of treatment (non-operative, closed K-wiring and ORIF). Distal radial malalignment, especially after ORIF could lead to this (Figure 5); in contrast this is a bony rather than predominantly soft tissue problem. Almost all the patients had apparently adequate reduction of the distal radial fracture (Figure 7). Patients present with a marked block to supination (rarely pronation) and may have 'disproportionate pain'. Radiographs show dorsal subluxation of the distal ulna relative to the distal radius (this is actually an anterior subluxation of the radius relative to the ulna). If there is an earlier series of post-treatment radiographs, this often shows gradually increasing subluxation of the DRUJ (Figure 4). Obtaining a true lateral radiograph of the wrist is critical in accurately identifying DRUJ subluxation; an oblique lateral may 'hide' the extent of DRUJ subluxation (Figure 8).

The mechanism of this problem is unclear. As shown by Giddins and Pickering (2021) there is always an ulnar-sided soft tissue injury in association with distal radial fractures. I presume it is more marked in these cases and the secondary restraints of the DRUJ gradually fail. The treatment is urgent reduction of the DRUJ. This can typically be done in the clinic under local anaesthetic but may require regional or general anaesthesia. The DRUJ is reduced and held in an above-elbow plaster cast in supination (rarely pronation) or in neutral with one or

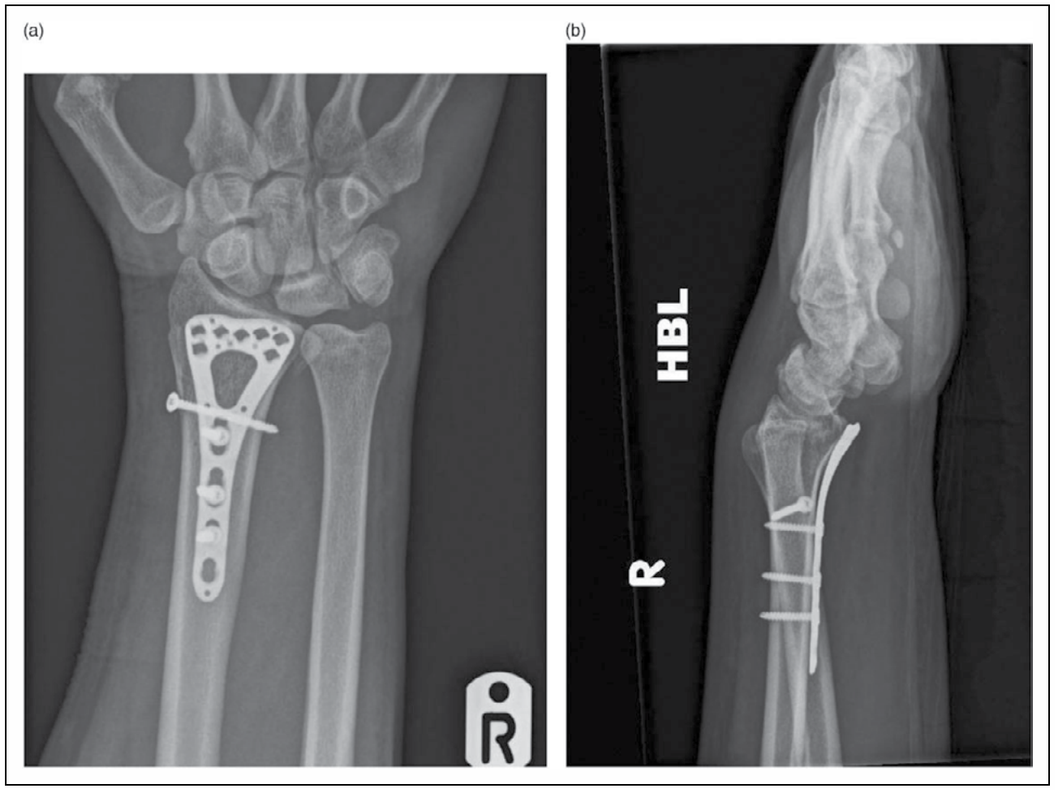

Figure 7. Distal radioulnar joint subluxation despite good reduction of the distal radial fracture. (a) Posteroanterior radiograph and (b) Lateral radiograph.

Figure 8. (a) Distal radioulnar joint subluxation not clear on an oblique lateral radiograph and (b) It is much clearer on a true lateral radiograph. Note the axial rotational malreduction of the distal radius as shown by the overhand of the distal fracture fragment on the anterior aspect but not dorsally.

two K-wires from the ulna to the radius either, across the DRUJ or just proximal to it (Figure 9). Strikingly the patients with marked pain all reported rapid and substantial pain relief after reduction of the DRUJ. After 6 weeks, the plaster cast is removed, and the K-wire(s) if used, and mobilization is organized; whether the immobilization needs to be as long as 6 weeks is unclear. In the longer term, most patients appear to achieve good results with more than functional ranges of forearm motion but with a degree of persisting DRUJ instability, although this is not typically symptomatic enough to need

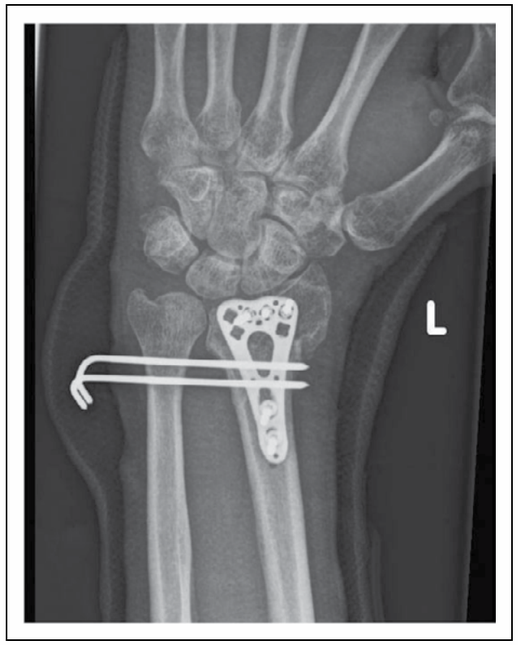

Figure 9. Distal radioulnar joint reduced and held in neutral rotation with two 1.6 mm K-wires.

Figure 10. Ulnar positive variance causing symptomatic ulnocarpal abutment.

treatment. If the subluxation/dislocation is overlooked, the DRUJ becomes increasingly difficult to reduce and open reduction may be needed. Predicting the development of this problem is not yet possible. The pathognomonic clinical feature is a painful block to supination (or pronation) beyond neutral; true lateral radiographs of the wrist should be diagnostic.

Chronic problems

The main chronic problems relating to the DRUJ are pain, stiffness, instability and reduced grip strength; the latter is typically associated with pain.

Pain

The cause of any ulnar-sided wrist pain after a distal radial fracture needs to be ascertained. The commonest causes will be related to ulnocarpal abutment or instability. The other causes of pain are a screw in the DRUJ or DRUJ arthritis (Figure 3). Mild to moderate (up to 25%) long-term subluxation of the DRUJ (ulnar head dorsal) is not typically painful and appears to occur in around 10–15% of patients treated for simple extra-articular distal radial fractures as shown on lateral radiographs. Marked subluxation or dislocation is typically very painful early in the postoperative period.

Ulnocarpal abutment has been estimated to occur in 24% of patients after distal radial fractures (Sharma et al., 2014). There will be many factors: preoperative ulnar positive variance will in theory increase the risk (the abutment may have pre-existed the fracture typically shown as a cyst over the ulnar-proximal corner of the lunate, or it may have been present with no radiological changes) (Figure 10); and malunion, especially shortening and dorsal tilt, will increase that risk. As with most ulnar-sided pain after a distal radial fracture, there is considerable merit in waiting and expecting improvement in symptoms over at least a year. Treatments used to help the patient to wait include analgesics, splintage and steroid injections; there are no good reports of the outcomes of these treatments. If the symptoms persist the best treatment seems to be to operate on the bones to reduce the abutment. If the main cause is shortening of the distal radius, namely with reasonable radial inclination and volar or dorsal tilt, treatment is best addressed to the ulnar with a Feldon wafer procedure, which can be done arthroscopically, or an ulnar head shortening osteotomy

using a plate and screws or distally just with screws (Figure 11). Published evidence suggests that the outcomes are comparable, but the Feldon wafer has fewer complications; this is confirmed in a recent systematic review and meta-analysis, although it was acknowledged that the quality of the data was not high (Yu et al., 2022). There is a limit as to how much ulnar positive variance can be addressed with a Feldon wafer procedure. In addition, an ulnar shortening osteotomy will tighten the ulnocarpal ligaments, making the DRUJ more stable; that may be a consideration if there is marked DRUJ instability but there are no scientific studies to clarify this. If there is a more complex distal radial malunion it makes more sense to carry out a corrective osteotomy of the distal radius; both anterior and dorsal approaches have their advocates and increasingly custom plates and jigs are used. It is often difficult to gain full correction in length of the distal radius. Some authors recommend a concomitant ulnar shortening osteotomy. In my experience this is often not needed so I would rarely do it. Rather I would wait and see if it were necessary as a secondary procedure; that is also rare in my experience. There are no scientific studies to decide which approach is better. It is therefore a matter of personal preference as to what advice is given to patients.

Screws in the DRUJ can occur after anterior or dorsal plating, especially of more complex fractures. Patients usually present with a marked loss of forearm rotation and pain. Pain may be minimal at rest, but immediate and severe on attempted movement. Radiographs may indicate the problem, but a CT scan is usually the best and most practical investigation. If there is a screw in the DRUJ this needs to be addressed urgently, preferably within 1–2 weeks, unless there are clear contraindications such as marked swelling or possible infection. Often removal of the one screw in the DRUJ suffices without compromising the rest of the fixation. The DRUJ can be assessed gently on the operating table, but a MUA should not be done as I consider this only causes further soft tissue damage without improving the outcome. If the screw is not removed, it will either block rotation and cause pain, or if rotation can occur it will lead to appreciable DRUJ articular surface damage.

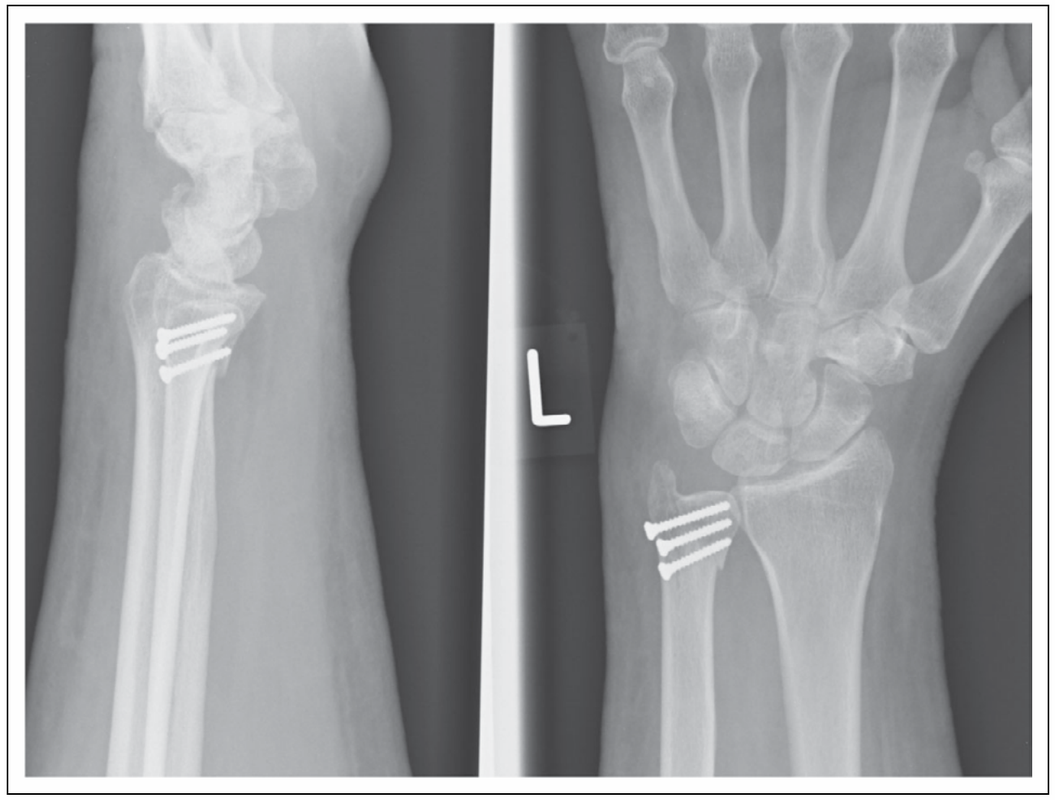

Figure 11. Ulnar shortening through the metaphysis held with three screws.

If a CT scan shows marked sigmoid notch malalignment, namely a step of ≥2 mm or displacement of a large marginal fragment of the sigmoid notch associated with appreciable ulnar subluxation, I would recommend acute correction of that assuming there are no major contraindications (Figure 12). This is not easy surgery but it does not become easier with time. As noted above, stiffness after bone union with reasonable alignment can be addressed with soft tissue releases but they work significantly less well in the presence of appreciable bony malunion (Figure 13). Surgery to address sigmoid notch malunion has been described but only in limited cases (Tham and Bain, 2007).

DRUJ arthritis is uncommon and not typically aggravated by a distal radial fracture. In my experience it is rare for there to be painful DRUJ arthritis after a distal radial fracture that was not painful previously. If marked pain persists the surgical options include denervation, ablative surgery or arthroplasty. In my experience denervation does not work well for DRUJ arthritis but it has the merit of being a low-risk operation that 'burns no bridges'. The ablative procedures are the Darrach's procedure and its variants, such as the Sauve–Kapandji procedure or distal ulna hemi-resection or matched resection. There is no published evidence that the variants out-perform the Darrach's procedure (Verhiel et al., 2020) or that modifications of the Darrach's procedure, such as pronator quadratus transfer, improve the outcomes. So if undertaken, I recommend a simple Darrach's procedure, preserving as much length of the ulna as possible, which at least in theory reduces the rate of symptomatic ulnoradial impingement. Because the ulna is the fixed bone in the forearm with the radius, wrist and hand 'suspended off it', ulnoradial impingement is inevitable as is ulnar stump instability, but they are typically not very symptomatic. In general, if a patient achieves a good initial outcome they do well in the long term (Grawe et al., 2012).

In younger and higher-demand patients with DRUJ pain and joint damage after a distal radial fracture, consideration should be given to partial or total

Figure 12. Acute displaced sigmoid notch fracture.

Figure 13. Distal radioulnar joint subluxation associated with distal radial malunion.

arthroplasty. I consider that under the age of 50 years (and moving to more than 60 years old) reconstruction, for example by an ulnar head replacement, should be advised rather than a salvage procedure. Published articles report reliable results from DRUJ hemi-arthroplasty (Moulton and Giddins, 2017) in most patients in the medium to longer term (although it should be noted that most implants were implanted for symptoms related to rheumatoid arthritis or osteoarthritis rather than pain after distal radial fracture). In my experience a successful ulnar head replacement requires reasonable congruency of the sigmoid notch; how much malalignment can be tolerated is not established. Almost inevitably there will be some DRUJ instability as we cannot surgically reconstruct the 'normal' soft tissue constraints, but that does not seem to be a symptomatic problem for most patients. Where that is a very irregular sigmoid notch, a Sauve–Kapandji procedure can be done with placement of a spherical revision ulnar head arthroplasty under that of the fused distal ulna head. The results of total DRUJ arthroplasty, typically with the Aptis prosthesis (Aptis Medical, Louisville, KY, USA), are also reported to be good (Moulton and Giddins, 2017), but appreciable soft tissue problems have been reported (Bellevue et al., 2018; DeGeorge et al., 2019) albeit often in patients who have had several previous operations or inflammatory arthritis. In addition, little is known of the complexity and outcome of revision procedures from such a large intervention. Whether patients do better in the long term with arthroplasty rather than a Darrach's procedure or an equivalent is not established.

Stiffness

Loss of forearm rotation, particularly loss of supination, can be quite disabling especially if patients also have shoulder stiffness as they are even less able to compensate. Most patients regain a functional range of forearm rotation after a distal radial fracture. The prime causes of stiffness are DRUJ subluxation or dislocation, a screw in the DRUJ or marked malalignment of the sigmoid notch.

DRUJ subluxation is common; research we are undertaking suggests radiological subluxation of ≥25% in 10–15% once fracture stability is achieved; in the majority this does not seem to cause many problems. Ishikawa et al. (2005) showed that DRUJ subluxation causes a small loss of forearm rotation; dorsal subluxation of the ulnar head blocking full supination and anterior subluxation blocking full pronation. In most patients this is not functionally limiting. In patients with a reasonably congruent DRUJ there is typically functional forearm rotation. If not and there is pain particularly at extremes of rotation, then it is worth giving a steroid injection in and around the DRUJ. If stiffness persists, I would recommend a CT scan to look for DRUJ congruency; it may also show some unappreciated axial rotation of the distal radius (Filer et al., 2019) (Figure 8). (The importance of this is unclear but appears to have some effect on forearm rotation.) Obtaining simultaneous side-by-side comparative imaging of the uninjured contralateral wrist can often be helpful both diagnostically and for operative planning (Figure 14). Where there is appreciable distal radial malalignment this should be corrected as it may improve forearm rotation sufficiently (Dy et al., 2014; Ross et al., 2015) and correction of stiffness in the presence of persisting bone malalignment is less reliable. Bronstein et al. (1997) reported that 10 mm loss of radial height led to substantial loss of supination (29%) and pronation (47%). In most patients the malunion is less marked; the effect on forearm rotation of correction of the distal radial malunion will also typically be less marked. Alternatively, an open DRUJ release can be carried out. I consider a closed MUA to 'stretch' the tissues or 'break adhesions' should not be done; it is rarely successful and typically causes more pain. Deciding when to carry out a distal radial osteotomy or simply a DRUJ release is not clear. If the radial alignment is within acceptable parameters (AAOS, 2020), I would recommend against the complexity of an osteotomy and just do a DRUJ release. In particular, an open DRUJ release is a relatively small operation and can be repeated in conjunction with a subsequent distal radial osteotomy if needed.

Where the radius is more malaligned an osteotomy is more likely to be needed; this can be anterior or distal depending upon the surgeon's preference as noted above. If there is incomplete correction of radial length, an ulnar osteotomy can be done at the same time but (as noted above) is not routinely required in my experience.

Open release should start on the side opposite the greatest restriction, typically anterior for loss of supination. A longitudinal capsular release is done, avoiding damage to the TFCC. After release, a gentle stretch can be done. If there is a plate on the radius or ulnar that needs removal, this should be done after release and a gentle stretch of the DRUJ to avoid fracturing through empty screw holes. Full forearm rotation will not be regained; the aim is a range of motion appreciably more than functional, namely at least 60° each of pronation and supination (if possible), with the expectation of some loss of movement after operation. If at operation there is persisting marked stiffness but reasonable bony

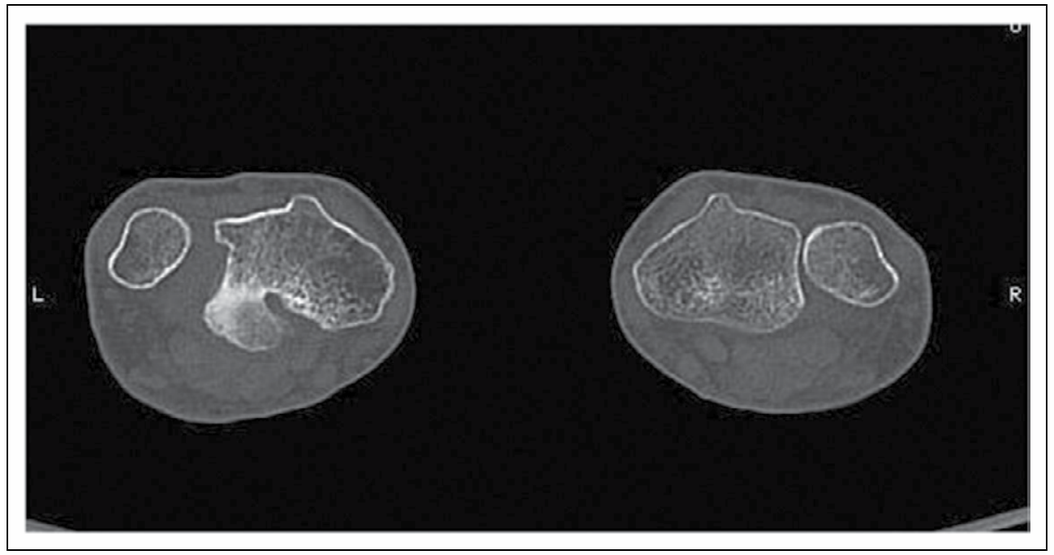

Figure 14. Sigmoid notch incongruency clearly shown on a CT scan compared with the opposite (uninjured) side.

anatomy, this is very difficult to manage; an extensive release of the interosseous membrane is rarely indicated. After operation it is important to have sufficient analgesia and physiotherapy support particularly for the first 6 weeks. I have not found any benefit from forearm rotational splintage, but other surgeons use it.

If there is bony malalignment of the sigmoid notch, this is much harder to treat so expectations should be less. Sigmoid notch osteoplasty has been reported (Tham and Bain, 2007), but currently there is no appreciable body of evidence that an osteotomy of the sigmoid notch reliably improves the outcome. An open release with removal of a prominent ridge in the sigmoid notch is a reasonable first option before more extensive surgery, particularly if the loss of forearm rotation is not too marked. Patients need careful counselling about the likely outcome and possible need for further surgery.

DRUJ instability

Subacute DRUJ instability presents as pain and a marked loss of forearm rotation; it requires urgent treatment as noted above.

Long-term or chronic DRUJ instability is inevitable after a distal radial fracture (Giddins and Pickering, 2021). This is typically associated with a little discomfort on stress testing, but most patients are not symptomatic enough to warrant treatment. Non-operative treatment with a circumferential strap for symptomatic activities may suffice. If this gives some symptomatic benefit this indicates that surgical stabilization of the DRUJ may be successful. A MRI scan can indicate a TFCC or other ulnar-sided tear and suggest DRUJ incongruence. Using scans to look for instability is difficult as these are typically taken in pronation but comparison with a scan of the opposite wrist in the same posture can be indicative. If there is doubt about the integrity of the anterior or dorsal rims of the sigmoid notch, a CT scan may give better imaging of the bone anatomy. Where the skills are available, real-time dynamic imaging using ultrasound may offer further information. Bony reconstruction of the sigmoid notch to treat DRUJ instability is reported but is not established (Tham and Bain, 2007). Various techniques have been reported to improve stability (Adams and Berger, 2002; Filius et al., 2017). As these are all based upon clinical assessment and this has been shown to be unreliable (Pickering et al., 2022), it brings into question how effective they are. Nonetheless patients report improvement in their symptoms. I consider that such operations can make the DRUJ more stable but not restore normal stability; at best the operation takes the patient from a potentially symptomatic range (typically >12 mm shear based on research) to a minimally symptomatic range (10–12 mm shear). As there have been no comparative studies, I recommend simpler procedures rather

than complex ones. I recommend a wrist arthroscopy as the first step. If there is a reparable (peripheral) TFCC tear, I would repair that and hope to stabilize the DRUJ sufficiently; this can be assessed in part on the operating table before and after tightening the repair. This can, in theory, be combined with an ulnar shortening osteotomy. This should in theory improve DRUJ stability (Pickering et al., 2016) by tightening the ulnocarpal ligaments and has been shown to work in vitro (Nishiwaki et al., 2005). Alternatively, the DRUJ can be stabilized with dorsal capsular tightening for dorsal subluxation (Filius et al., 2017) or an Adams–Berger procedure for bi-directional instability (Adams and Berger, 2002).

While discussing instability, it is important to note that DRUJ movement is more complex than just dorsal or anterior shearing; these are as yet unmeasurable. This area of research will progress substantially, but even with this greater understanding most patients will not require any treatment for DRUJ instability after distal radial fractures.

Conclusion

DRUJ problems can compromise the outcome of otherwise successful treatment of a distal radial fracture. Recent research has highlighted the importance of DRUJ problems and that ulnar-sided injuries occur with all distal radial fractures. Good correction of distal radial malalignment should help reduce the incidence of DRUJ problems. It is very important to remember that DRUJ instability is inevitable after distal radial fractures, but only very infrequently needs treatment, and ulnar-sided wrist problems are common but typically resolve over the course of a year from injury. Most problems can be resolved with non-operative treatment. Most reported operations are selected cases series with no strong proof that the extra intervention has improved the patients' outcome.

Urgent treatment is needed to address subacute DRUJ subluxation or dislocation that is easily overlooked. Chronic problems need careful assessment and realistic management of the expectations of the patient (and surgeon).

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Ralph T. Manktelow
(29/06/1938)

Ralph Thomas Manktelow was born on 29 June 1938. He qualified as a medical doctor from the University of Toronto, Ontario, Canada in 1964, and practiced as a family doctor until 1968 when he entered a residency program in Plastic and Reconstructive Surgery at the same University graduating in 1972 with an FRCS(Plastic and Reconstructive Surgery).

Manktelow became interested in microvascular surgery and visited China in the late 1970s to observe their techniques. He became Chief of the Division of Plastic and Reconstructive Surgery at the Toronto General hospital from 1979 to 1996.
During this time, he established the Toronto Replantation Team. In 1984 he performed the first microneurovascular muscle transfer for facial paralyses in Canada. He was also the first in Canada to perform a hand replantation, a thumb replantation, and a finger replantation. In 1986 he authored the classical textbook on microsurgery , titled: “Microvascular Reconstruction: Anatomy, Applications, and Surgical Technique”.

He assumed the Division Chair of Plastic Surgery in 1986 until 1996, in the Department of Surgery, University of Toronto, Ontario, and became Professor in 1987, and in 1998 Head of the University Hand Program.
Professor Manktelow was member of numerous organisations, including American Association of Plastic Surgeons, American Society for Reconstructive Microsurgery (President 1995-1996, Member and Chairman of multiple committees), American Society for Surgery of the Hand (Member and Chairman of multiple committees), Canadian Medical Association, International Society of Reconstructive Microsurgery, Canadian Society for Surgery of the Hand (MANUS) (President 1988-1990), Canadian Society of Plastic Surgeons, Group for the Advancement of Microsurgery (GAM Canada), and Ontario Medical Association. He was on the Editorial Boards of various major journals.

Apart from multiple visiting professorships and presentations, Manktelow published 35 books and book chapters and 80 journal publications. He was honoured by the Canadian Society of Plastic Surgeons with the “Lifetime Achievement Award” in 2010. The University of Toronto honoured him with the “Annual Ralph Manktelow Hand Symposium”

Ralph is married to Marg, and they have a farm since 1983 in Mono, Ontario, Canada. He served on the Mono Council. He has been an ardent rower and won gold medals at the Master’s Olympics.

At the 11th Triennial Congress of the International Federation of Societies for Surgery of the Hand in Seoul, Korea, Ralph Manktelow was honoured as “Pioneer of Hand Surgery”

Ik-Dong Kim
(1930)

Ik-Dong Kim was born on 25 May 1930 in Cheongsong-gun, Gyeongsangbuk-do, Korea. He graduated from the Daegu Medical University, Daegu, Korea (now the Kyungpook National University, School of Medicine) in 1951. Dr. Kim worked as a military doctor during and after the Korean War until 1955. He then did an internship at the St. Joseph Hospital, Phoenix, USA for a year before taking up a residency position in the Department of Orthopaedics, University of Pittsburgh Medical Center, Pittsburgh, USA. until 1959. In 1960 he did a Fellowship at Cornell University in New York, USA. Kim then became a Clinical Fellow at the Hong Kong University in 1961, followed by a year Fellowship at the Hand Research Unit, Christian Medical College, Vellore in India with Paul Brand.
Ik-Dong Kim was Director of the Department of Orthopaedic Surgery, Dongsan Medical Center, Daegu, Korea from 1963 to 1971. In 1971 Kim became professor at the Department of Orthopaedic Surgery, Kyungpook National University, Daegu, Korea until 1990. He was also the Dean of the Medical School of the Kyungpook National University from 1980-1982, and the President of the same University fro 1990-1994. Prof. Kim became Emeritus Professor from this University in 1995.

Ik-Dong Kim was Member of the Board of Trustees of the Korean Orthopaedic Association (1965), Chairman of the Board of Trustees, Wilson’s Rehabilitation Center, Yeo-Soo, Korea (1979), President of the Korean Orthopaedic Association (1982) and President of the Korean Society for Surgery of the Hand (1989).

In 2010 at the 11th Triennial Congress of the IFSSH in Seoul, Korea, Ik-Dong Kim was honoured as “Pioneer of Hand Surgery”

Viktor Emil Meyer
(1937-2024)

Pioneer in Hand Surgery, Microsurgery, and Medical Education

If I have seen further, it is by standing on the shoulders of Giants. (Isaac Newton)

Professor Viktor Emil Meyer, a visionary Swiss hand surgeon and pioneer in microsurgery, passed away on 18 October 2024, at the age of 87. His revolutionary work reshaped the landscape of hand surgery and microsurgery in Switzerland and beyond.

Born on 5 March 1937 in Bern, Meyer's exceptional journey in medicine began at the University of Bern, where he completed his studies in 1964. After the state exam he started in Bern at the Pathology Institute. His surgical training took him to the University Hospital of Zurich.

After obtaining his board qualification as a general surgeon in 1972, Viktor Meyer was awarded a one-year traveling fellowship by the University of Zurich Medical School (Stipendium zur Förderung des akademischen Nachwuchses). This pivotal year shaped his career and introduced him to the techniques that would define his professional life. He completed a fellowship in hand, plastic, and reconstructive surgery at the Institute of Reconstructive Plastic Surgery at New York University under John M. Converse and Robert W. Beasley. During this fellowship in 1973, Viktor Meyer visited several renowned hand surgery centers across the United States and spent six weeks with Hanno Millesi in Vienna before returning home.

Returning to Switzerland in 1974, Viktor Meyer performed the country's first successful replantation of a completely severed hand at the metacarpal level. This groundbreaking 16-hour surgery, published in the Journal of Bone and Joint Surgery in 1976, marked the beginning of his pioneering work in microsurgery in Switzerland.

Demonstrating extraordinary vision and leadership, Viktor Meyer established a state-of-the-art microsurgical training laboratory at the University Hospital Zurich. This initiative not only advanced the field, but also created a new generation of skilled microsurgeons.

In 1975, he successfully performed Switzerland's first free flap transplantation, and in 1976, he completed the country's first toe-to-hand transplantation.

His contributions were acknowledged in 1982 when he received the prestigious Georg Friedrich Goetz Award from the University of Zurich for introducing reconstructive microsurgery. In 1984, Viktor Meyer was appointed Director of the new Department of Hand, Plastic, and Reconstructive Surgery at the University of Zurich, and in 1986, he was named Professor of Surgery.

From 1998 to 2000, he served as the Medical Director of the University Hospital Zurich and Chairman of the Hospital Directors' Conference, and he was Vice Dean of the Medical Faculty at the University of Zurich.

Following his retirement in 2005, Viktor Meyer became the first Dean of the newly established Swiss Faculty of Veterinary Medicine, a joint initiative of the Cantons of Bern and Zurich. He continued in this position until 2010.

Prof. Viktor Meyer's legacy is not just in the procedures he pioneered, but in the countless lives he improved and the generations of surgeons he inspired. His unwavering commitment to innovation, education, and patient care set a new standard in the field of hand surgery and microsurgery.

The medical community has lost a giant, but Prof. Viktor E. Meyer's contributions provide giants' shoulders for many future generations of reconstructive surgeons to stand on. He is survived by his wife Carmen and their daughter Pascale.

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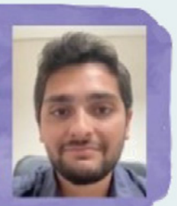

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