



Foreword

*By Dr Tan Ter Chyan (Chairman)
Chapter of Hand Surgeons
College of Surgeons, Singapore*

Dear Fellows,

2021 brings us new challenges as we in the Chapter of Hand Surgeons reflect on the lessons learnt in the past year.

In this 2nd issue of Hand Surgery CPD Bulletin, we bring a selection of articles that span the spectrum of common hand surgery clinical practice.

A special acknowledgement and thanks to our colleagues who have documented the challenging task of performing emergency reconstructive microsurgery in a time of COVID-19. I hope all fellows will benefit from this CPD Bulletin.



COVID-19

ARTICLES

1 [Emergency Hand and Reconstructive Microsurgery in the COVID-19-Positive Patient](#) ^{FULL}

ARTICLE ACCESS

Das De S, Liang ZC, Cheah AE, Puhaindran ME, Lee EY, Lim AYT, Chong AKS.

J Hand Surg Am. 2020 Sep;45(9):869-875.

PMID: 32888437

This article aimed to present the perioperative and technical considerations taken when managing COVID-19 positive patients with urgent, limb-threatening conditions including severe open injuries, infections, and bleeding/fungating tumours.

There are 5 overarching principles in the management of these COVID-19 patients – ensuring the safety of the medical team, prioritising life over limb, doing the minimum limb-saving procedure, minimising repeated operations during the contagious period, and deferring all other procedures till after the patient had recovered from the acute viral infection. The department was divided into 2 teams that were physically segregated. Each team comprised of 2 or 3 attending surgeons, 2 senior residents or fellows, and 2 junior doctors. The senior resident/fellow and junior doctors took turns covering the 24h emergency calls (1-in-4 schedule) to ensure they get adequate rest between calls. This also allowed for continuity of care as each team managed every aspect of each patient's care. Additionally, this model prevented cross-contamination between each call team, and helped minimise the number of medical staff in the operating room by ensuring that senior surgeons were attending to the more complex cases. The department calibrated non-essential services according to the severity of the COVID-19 situation. Standard rules such as wearing full personal protection equipment (PPE) and using powered air-purifying respirators (PAPR) for aerosol-generating procedures, applied when operating on COVID-19 positive patients. Specific precautions for hand surgeries on COVID-19 patients included the use of PAPR with high-magnification loupes during medium-sized vessel repairs, wearing goggles or a face shield when using the operating microscope for digital artery repairs, and ensuring all aerosol-generating procedures were complete before using the operating microscope. Additionally, regional nerve block (including the medial arm) with a tourniquet, ensuring thorough debridement, immediate skeletal stabilisation, revascularisation, and adequate soft tissue cover were prioritised during limb-saving surgery to reduce the risk of aerosol generation as well as multiple surgeries. Similarly, local anaesthesia was used in surgical repairs of severe, spreading infections. Radical debridement or early amputation was recommended to avoid repeated surgical procedures. All non-critical repairs should be delayed until the patients recovered from COVID-19 and was no longer infectious. In these cases, local anaesthesia was still preferred due to the possible lung fibrosis from COVID-19 infections. Definitive soft reconstruction should be delayed in COVID-19 patients, with quicker, less complex soft tissue coverage techniques recommended instead. Digital devices and clear instructions ensured post-operative recovery while minimising patient contact. Pharmacological interventions should be carefully prescribed, taking the effects of COVID-19 infections into account (e.g. high-volume fluid regimens should be carefully titrated in patients with acute interstitial lung injury). Surgeons should keep up with the evolving situation and information available about the COVID-19 pandemic to keep themselves as well as their patients safe.



2

[Sustaining a national surgical training programme during the COVID-19 pandemic](#) ^{FULL} ARTICLE ACCESS

Das De S, Puhaindran ME, Sechachalam S, Wong KJH, Chong CW, Chin AYH.

Bone Jt Open. 2020 May 6;1(5):98-102.

PMID: 33225282

This article aimed to present how the COVID-19 pandemic had impacted hand surgery training and the ways that the trainee education adapted to the pandemic to ensure continuing quality education. The cancellation of elective surgical procedures, suspension of cross-hospital rotations, redeployment of residents, and an unsustainable duty roster had severely affected the hand surgery residency programme in Singapore.

Several measures that prioritised resident safety and wellbeing, resource utilisation, as well as used technology and innovative teaching methods, were taken in order to maintain trainee competency. On top of ensuring strict hygiene practices and personal protective equipment (PPE) usage, residents only participated in essential clinical services.

Team segregation during the pandemic meant that residents were on call more frequently. Thus, scheduling was altered to ensure that “post-call” teams had minimal outpatient clinic sessions, non-emergency procedures were postponed, and consultant surgeons were rostered to direct emergency calls without a resident. These measures reduced the clinical burden on residents.

There was an increased use of technology to ensure continuation of training including the recording of lectures, use of teleconferencing for teaching sessions (especially for sub-specialty training which normally happens during cross-hospital rotations), and e-learning platforms for resource sharing. Practical surgical skills were trained using laboratory training models such as the banana skin model to train skin closure, and the pig/sheep tendon model to train tendon repairs, which were then assessed by dedicated supervisors and various software assessment programmes. Surgical videos were also made available to the residents for their review. A reduced elective surgical load meant that many cases handled by residents were directly supervised by a consultant who could impart valuable practical and technical knowledge.

Additionally, frequent case-based tutorials and oral examination sessions conducted by the attending supervisor ensured examination preparedness. Measures were also considered for a decentralised but standardised exam so that assessments could continue. These changes to the hand surgery residency training showed how a surgical residency programme could adapt to the pandemic to ensure continuing training so that future hand surgery services were not affected.



3

[The Impact of Coronavirus Disease 2019 \(COVID-19\) on the Practice of Hand Surgery in Singapore](#) FULL ARTICLE ACCESS

Hwee J, Chiew J, Sechachalam S.

J Hand Surg Am. 2020 Jun;45(6):536-541.

PMID: 32387156

This article aimed to present how the hand and reconstructive microsurgery (HRM) practice at Tan Tock Seng Hospital (TTSH) dealt with the COVID-19 pandemic. Since

TTSH was functionally linked with the National Centres for Infectious Disease (NCID); staff were deployed to the frontlines at NCID including surgical staff from HRM. Surgical staff were mainly involved at the NCID screening centre and all frontline healthcare workers (HCW) were required to wear an N95 mask, goggles, a shower cap, a long-sleeved gown, and 2 pairs of gloves.

31% of elective HRM operations (such as wrist arthroscopies) were postponed due to reduced anaesthesia support (as anaesthetists were deployed to NCID ICU), reduced HRM manpower, and limited beds for inpatient stays. Local anaesthesia and telemedicine were used wherever appropriate to ensure the continuity of HRM services. Emergency HRM services workload remained constant, thus consultants and senior residents performed step-down call duties to cover for staff deployed to NCID.

Strict requirements for PPE (such as N95 masks and goggles) when operating on COVID-19 positive patients limited surgeons' ability to perform HRM surgeries. Hence, these procedures were postponed to after the patients had recovered and tested negative for COVID-19 whenever possible. In critical cases, surgical times were kept short with breaks for the surgeon every 2 hours. Surgical methods were adapted to ensure that surgical equipment needed were compatible with PPE worn.

Additionally, inter- and intra-hospital rotations for teaching purposes were cancelled to prevent cross-contamination. Tele-conferencing replaced large group meetings and small group teachings (including microsurgery workshops) were socially-distanced. Split team arrangements prevented contact between teams.

The COVID-19 pandemic shifted certain priorities in the HRM service including the consideration of quicker but possibly less stable fixations or even non-surgical methods for fractures, and training in regional anaesthetic brachial plexus blocks due to the lack of anaesthesia support. Cosmetic outcomes were also deprioritised during the pandemic.



PRACTICE CHANGING UPDATES

ARTICLES

1 [The use of barbed sutures in the Pulvertaft weave: a biomechanical study](#)

Xing Fu Hap D, Rung Wong Y, Rajaratnam V.

J Hand Surg Eur Vol. 2020 Dec;45(10):1055-1060.

PMID: 32957856

This study aimed to compare the use of barbed sutures with conventional sutures for tendon transfers using the Pulvertaft weave technique in human cadavers. Biomechanical testing carried out on tendons reconstructed using the 3-0 V-Loc (Covidien Deutschland GmbH, Neustadt, Germany) sutures (n=10) showed that they had significantly greater ultimate tensile strength and stiffness than those reconstructed with conventional sutures (n=10 3-0 Prolene (Ethicon, Inc., Somerville, NJ, USA), n=10 3-0 Ethilon (Ethicon, Inc., Somerville, NJ, USA)). Additionally, reconstruction using V-Loc took the least amount of time and these sutures were the shortest. Therefore, V-Loc barbed sutures performed better than conventional sutures when the Pulvertaft weave technique was used.

2 [Arthroscopic ligament-specific repair for triangular fibrocartilage complex foveal avulsions: a minimum 2-year follow-up study](#)

Liu B, Arianni M, Wu F.

J Hand Surg Eur Vol. 2021 Mar;46(3):270-277.

PMID: 32967517

This study aimed to present the outcomes of 25 patients (mean age = 28 years (range 14-47)) who underwent arthroscopic ligament-specific repair for triangular fibrocartilage complex (TFCC).

20 patients underwent double limb radioulnar ligament repairs and 5 had single limb repairs. Significant improvements in wrist flexion-extension, forearm pronation-supination and grip strength were observed in all patients at final follow-up. Patient-rated wrist evaluation using Disabilities of the Arm, Shoulder and Hand score and modified Mayo wrist scores revealed significant improvements in pain and patient-reported outcomes.

These results, together with the fact that arthroscopic ligament-specific repair of TFCC does not require specialist dedicated equipment or consumables, indicated that it is a viable method of treating TFCC injuries.



3 [Dry Wrist Arthroscopy for Ulnar-Sided Wrist Disorders](#)

Burnier M, Herzberg G, Luchetti R, Del Piñal F, Kakar S.

J Hand Surg Am. 2021 Feb;46(2):133-141.

PMID: 33127207

This study aimed to describe the use of dry wrist arthroscopy (DWA) for ulnar-sided wrist disorders. DWA was useful in the diagnosis of ulnar-sided wrist disorders as there was no fluid to cause engorgement of tissue which could lead to misdiagnosis of tears, or floating of the synovial villi which obscured the view into the ulnar joint. Additionally, DWA allowed for the use of larger portals so that concomitant procedures (such as ulnar head resection) could be performed.

DWA could be particularly useful for the repair of triangular fibrocartilage complex (TFCC) tears by TFCC debridement (for Type 1A and 1D lesions), dorsal peripheral TFCC repair (in combination with automatic wash-out), and foveal TFCC avulsion repair. DWA was also effective in TFCC reconstructions as larger portals needed to pass the tendon graft could be accommodated. DWA was recommended for ulnotriquetral (UT) ligament tears as engorgement of synovial hyperplasia with fluid would not occur. A combination of DWA and automatic wash-out could be applied to the arthroscopic wafer procedure for the repair of ulnocarpal impaction syndrome (the automatic wash-out could prevent thermal necrosis from the radiofrequency probe), and the arthroscopic proximal hamate resection for HALT syndrome.

In conclusion, DWA appeared to be useful in numerous ulnar-wrist disorders and a combination of DWA with automatic wash-out brings the best of wet and dry wrist arthroscopy together.

TECHNOLOGY AND MEDICINE

ARTICLES

1 [Initial Outcomes of a Novel High-Visibility Endoscopic Carpal Tunnel Release Technique](#)

Liu B, Wu F.

J Wrist Surg. 2021 Feb;10(1):64-69.

PMID: 33552698

This pilot study evaluated novel high-visibility endoscopic carpal tunnel release technique involving the creation of a clear plastic shield for the carpal tunnel and median nerve using a standard syringe, and release of the transverse carpal ligament using Metzenbaum dissection scissors. 9 cases in 8 patients were assessed. No complications were reported during or after the procedure and all patients showed significant clinical improvements as assessed by the Disabilities of the Arm, Shoulder, and Hand score, the Boston Carpal Tunnel Questionnaire score, and a visual analogue score for pain.

These results suggested that this high-visibility endoscopic carpal tunnel release technique was safe and effective alternative for carpal tunnel syndrome, warranting future trials in a larger population.



TABLE OF CONTENTS

	COVID-19	View Summary	View Article
1	Emergency Hand and Reconstructive Microsurgery in the COVID-19-Positive Patient FULL ARTICLE ACCESS		
2	Sustaining a national surgical training programme during the COVID-19 pandemic FULL ARTICLE ACCESS		
3	The Impact of Coronavirus Disease 2019 (COVID-19) on the Practice of Hand Surgery in Singapore FULL ARTICLE ACCESS		
	PRACTICE-CHANGING UPDATES	View Summary	View Article
1	The use of barbed sutures in the Pulvertaft weave: a biomechanical study		
2	Arthroscopic ligament-specific repair for triangular fibrocartilage complex foveal avulsions: a minimum 2-year follow-up study		
3	Dry Wrist Arthroscopy for Ulnar-Sided Wrist Disorders		
	TECHNOLOGY AND MEDICINE	View Summary	View Article
1	Initial Outcomes of a Novel High-Visibility Endoscopic Carpal Tunnel Release Technique		
	HAND SURGERY	View Summary	View Article
1	Management of Tendon and Bony Injuries of the Distal Phalanx		
2	Electroacupuncture and splinting versus splinting alone to treat carpal tunnel syndrome: a randomized controlled trial FULL ARTICLE ACCESS		
3	The effect of digital sensory loss on hand dexterity		



4	Guidelines for management of crush injuries of the hand		
5	The Importance of Restoring Anatomy of the Proximal Interphalangeal Joint in Dorsal Fracture Dislocations FULL ARTICLE ACCESS		

HAND SURGERY

ARTICLES

1 [Management of Tendon and Bony Injuries of the Distal Phalanx](#)

Liao JCY, Das De S.

Hand Clin. 2021 Feb;37(1):27-42.

PMID: 33198916

This article aims to describe the pertinent clinical anatomy of the distal phalanx, and review the current literature to summarise key management strategies for tendon and bony injuries of the distal phalanx. Detailed knowledge of the anatomy of the distal phalanx is necessary for the repair of injuries to this part of the hand. Briefly, the bony part of the distal phalanx has a broad base, narrow, waist-like shaft and a bulbous tuft with lateral interosseous ligaments (LIL) attached to the lateral tubercles and ungual spines on both sides of the distal phalanx. The terminal extensor tendon inserts into the dorsal ridge at the base of the distal phalanx whereas the flexor digitorum profundus (FDP) inserts into the shaft of the distal phalanx. The fingertip is supplied by a rich and complex network of blood vessels and nerves. There are 5 categories of flexor tendon injuries of the distal phalanx – Class I to V – with Class 1 injuries the most serious and requiring repair the most urgently (within 1 to 2 weeks compared to Class II which can be repaired within 3 months). Early repair of these injuries improve their functional outcomes with a suture anchor technique preferred (less complications and quicker return to work) in Class I and II injuries. Open reduction and internal fixation of the fracture fragment is preferred in Class II, IV and V injuries. On the other hand, there is a lack of consensus on the optimal treatment for acute extensor tendon injuries. Nonoperative treatments (such as a custom-made thermoplastic stack splint) are recommended for closed soft mallet injuries and trans-articular pinning across the DIPJ is recommended for open soft mallet injuries without skin loss. Surgery, though challenging, is recommended for bony mallet injuries. Distal phalanx injuries are the most common type of hand fractures and most of these cases can be treated nonoperatively (careful soft tissue repair and a well-padded splint) as they are inherently stable (minimal soft tissue injury) and/or are able to tolerate some malunion. Shaft fractures with substantial angular displacement and unstable fractures are exceptions that should be managed surgically. Articular fractures are also commonly treated surgically with K-wires before arthrodesis is subsequently performed if symptomatic nonunion or deformity is present.

In conclusion, repair of distal phalanx fracture is complex and a comprehensive understanding of its anatomy and treatment options is crucial to achieve the most optimal clinical outcome.



2 [Electroacupuncture and splinting versus splinting alone to treat carpal tunnel syndrome: a randomized controlled trial](#) FULL ARTICLE ACCESS

Chung VCH, Ho RST, Liu S, Chong MKC, Leung AWN, Yip BHK et al.

CMAJ. 2016 Sep 6;188(12):867-875.

PMID: 27270119

This randomised controlled trial aimed to assess the use of electroacupuncture in patients with carpal tunnel syndrome receiving continuous nocturnal wrist splinting treatment.

181 patients were randomised to the treatment group (who received both electroacupuncture and splinting; n = 90) and control group (splinting only; n = 91). At 17-week of treatment, the treatment group showed a significantly bigger improvement in Symptom Severity Scale score than the control group (-0.25 vs -0.09 (compared to baseline scores); P = 0.02). Patients in the treatment group also displayed significantly bigger improvements in Functional Status Scale scores (-0.16 vs 0.02; P = 0.01), Disabilities of the Arm, Shoulder and Hand Questionnaire score (-7.72 vs -1.53; P < 0.01), pain on the numeric rating scale (-1.22 vs -0.61; P = 0.03), blinded Dellon-modified Moberg pick-up test score (-6.50 vs -0.32; P < 0.01) and maximal tip pinch strength (1.75 vs 0.52; P < 0.01) compared with patients in the splinting treatment only group. Clinically important improvements were observed in a larger proportion of patients in the treatment group in Disabilities of the Arm, Shoulder and Hand Questionnaire score (47.1% vs 29.2%; P = 0.02), and blinded Dellon-modified Moberg pick-up test score (37.6% vs 19.1%; P < 0.01). Adverse events were infrequent and mild, indicating that this was a safe treatment option. These results suggested that splinting alone was insufficient in the conservative management of carpal tunnel syndrome and that combining splinting and electroacupuncture could lead to more significant improvements. Further studies are needed to verify this result.

3 [The effect of digital sensory loss on hand dexterity](#)

Luukinen P, Leppänen OV, Jokihaara J.

J Hand Surg Eur Vol. 2021 Mar;46(3):253-259.

PMID: 32746688

This study aimed to determine how loss of sensation affect hand dexterity. 12 right-handed participants were anaesthetised in their dominant hand and all showed increase in Moberg pick-up test time with increasing number of digits anaesthetised. Thumb anaesthesia had the most significant impact on pick-up time, increasing it by 10.5 seconds with visual control and by 16.3 seconds without visual control. Loss of sensation to the index and middle fingers had a smaller effect on pick-up time. Cylinder grip force particularly decreased with index and middle finger anaesthesia whereas key pinch force decreased with thumb anaesthesia. Chuck pinch force decreased with anaesthesia of any digit. This study also aimed to assess the Moberg pick-up test as a tool for determining hand dexterity. While the test was easy to administer and reproducible, it was too simplistic and could not capture all aspects of prehension.

In conclusion, these results suggested that loss of sensation in the thumb affected hand dexterity the most. However, future studies involving more complex validated dexterity tests are still needed to confirm this result.



4 [Guidelines for management of crush injuries of the hand](#)

Lahiri A.

J Clin Orthop Trauma. 2020 Jul-Aug;11(4):517-522.

PMID: 32684687

This article aims to present the considerations taken by a hand surgeon in the treatment of crush injuries of the hand. The overarching principles of the treatment of such injuries are accurate assessment of the injury and creating a reconstructive plan by structures, where the primary surgery aims to restore function and the secondary surgery enhances the function and/or improve the aesthetics of the hand.

Accurate assessment of the injury involves understanding how, when and where the injury occurred, accounting for the age of the patient and their co-morbidities, investigating for any associated life threatening trauma, examination of the hand visually and with imaging methods such as X-rays, and recording of all observations and reconstruction plan structure by structure. Information obtained from this assessment guides the preparation and goals of surgical management.

The primary surgery should aim to excise debridement accurately so that intact structures are preserved while dead/contaminated tissues are completely removed. Reconstruction of the thumb is prioritised before salvaging the rest of the fingers with the least injured finger saved first. The best amputated segment is transferred to the best available stump with severely traumatised digits potentially used as a source of spare parts. Skeletal stabilisation, revascularisation and skin cover are also goals of the primary surgery. The type of skeletal stabilisation performed depends on the nature of contamination, adequacy of debridement, and presence of bone loss. Skin cover is necessary if blood vessels are exposed.

Rehabilitation after primary surgery tailored to each injury and aim to allow wound healing, maintain joint mobility, prevent adhesions and contractures and enhance scar maturation. Secondary surgery (if needed) is performed after the patients has completely healed from the primary surgery. It aims to enhance function or improve the appearance of the hand, and can involve nerve reconstruction (using nerve grafts), tendon grafts or transfers, bone grafting, joint fusion, toes transfers, or flap-debulking.

The author then presented a case study that was successfully managed using the guidelines presented.



5

[The Importance of Restoring Anatomy of the Proximal Interphalangeal Joint in Dorsal Fracture Dislocations](#) FULL ARTICLE ACCESS

Tan RES, Cheah AEJ.

J Hand Surg Asian Pac Vol. 2020 Sep;25(3):257-266.

PMID: 32723048

This article aims to summarise the current methods used in the treatment of dorsal fracture dislocations. Successful management of such injuries requires detailed knowledge of the anatomy and biomechanics of the proximal interphalangeal joint (PIPJ).

Crucially, the PIPJ is not a simple hinge joint but one with 4 degrees of freedom (2 passive [translation and axial rotation] and 2 active [rotation in the sagittal plane around either centre of rotation]). The volar plate and the collateral ligament ensure stability of the joint and damage to these soft tissue can also affect joint stability. Dorsal fracture dislocations commonly occur when the PIPJ is hyperextended and axially loaded, leading to fracture at the volar lip and dorsal subluxation. In such cases, restoration of the gliding motion of the joint without hinging is of utmost importance. Unstable dorsal fracture dislocations are usually surgically treated with a variety of methods including K wires for transarticular, dorsal blocking, or fragment specific damage, external fixators (dynamic or static), open reduction and internal fixation (with plates and screws, buttress plate or screws alone), volar plate arthroplasty, and hemi-hamate arthroplasty. Despite the number of treatment options, PIPJ active range of motion is only restored to about 80 degrees in most cases, demonstrating the complexity of such repair. Although rigid surgical fixation which allows for early motion has been shown to lead to favourable outcomes, there is increasing evidence that minimising soft tissue disruption (through less invasive surgery), reducing the implant footprint, and preserving native PIPJ kinematics in a joint that is already pre-disposed to stiffness are equally important. As such, the authors propose the concept of the “circle of happiness” which balances rigid fixation with minimal soft tissue disruption. This involves the fixation of circle formed by the proximal phalanx head to within the circle formed by the middle phalanx base to form the “circle of happiness”. They postulate that this extent of repair allows for an acceptable degree of joint subluxation. This hypothesis will need to be tested in future biomechanical studies.

SELF-LEARNING MODULES

Check out the [Self-Learning Modules](#) on the AMS website!

Unlimited attempts, with 5 CME points awarded on successful completion of each module.

