

# Hand Surgery in Hong Kong

Wing-Yee Clara Wong<sup>1,2</sup> Wing-Lim Tse<sup>3</sup> Siu-Cheong Jeffrey Justin Koo<sup>4</sup>

<sup>1</sup>Department of Orthopaedics and Traumatology, Faculty of Medicine, The Chinese University of Hong Kong, Hong Kong

<sup>2</sup>Department of Orthopaedics and Traumatology, The Chinese University of Hong Kong Medical Centre, Ma Liu Shui, Hong Kong

<sup>3</sup>Department of Orthopaedics and Traumatology, Prince of Wales Hospital, Shatin, Hong Kong

<sup>4</sup>Department of Orthopaedics and Traumatology, Alice Ho Miu Ling Nethersole Hospital, Tai Po, Hong Kong

**Address for correspondence** Wing-Yee Clara Wong, FRCS(Ortho), Department of Orthopaedics and Traumatology, Faculty of Medicine, The Chinese University of Hong Kong, Hong Kong (e-mail: clara.wongclara@gmail.com).

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## Abstract

### Keywords

- ▶ hand surgery
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- ▶ industrial hand injuries
- ▶ microsurgery
- ▶ minimal invasive surgery

Hand surgery in Hong Kong was borne out of necessity. It has been changing with the social, economic, and political situations. The spectrum of hand surgeries evolves with time, from infection-related hand surgeries to microsurgical or non-microsurgical operations on the huge volume of industrial hand injuries, to a wider variety of reconstructions on rheumatological, congenital upper limbs, traumatic, neurological diseases, etc, to minimally invasive surgeries on hand, wrist, and elbow. Hand surgery was deeply-rooted in orthopaedics in Hong Kong and is inseparable from microsurgeries, which have built a strong foundation for any kind of its future development.

## Introduction

Hand surgery in Hong Kong was borne out of necessity. The evolution is the result of the changes and adaptation with the times.

## Population Upsurge in 40s and 50s and Infections

Hong Kong started out as a sparsely populated area of farming and fishing villages to an important free port. The territory's 1104 km<sup>2</sup> area consists of Hong Kong Island, the Kowloon Peninsula, the New Territories, Lantau Island, and over 200 other small islands. Hong Kong became a colony of the British Empire after the Imperial China ceded Hong Kong Island at the end of the First Opium War in 1842. The colony expanded to the Kowloon Peninsula in 1860 after the Second Opium War and was further extended to the New Territories in 1898. By the end of the Second World War in 1945, Hong Kong was liberated from Japanese Occupancy and became a Britain crown colony again. The renewal of the Nationalist-Communist Civil War in Mainland China prompted a large influx of refugees from the Mainland, causing a huge population surge from 600,000 in 1945 to 2.1million in 1951. The recovery

from the Japanese occupation (1941–45) took a long period of time. With the limited natural resources, substandard nutrition and crowded living environment, infectious disease was the major health problem. Hand-related diseases were mainly infective, tuberculosis, mycobacterial tenosynovitis, osteomyelitis, and leprosy-related deformities and neuropathic lesions. Saving lives and reducing the threat of diseases to life were the upmost health concern in the early 50s. Hand surgery to reconstruct, rebuild, and improve the hand function and quality was luxurious and not taken into consideration under the socioeconomic burden.

## Industrialization and Traumatic Hand Injuries in 50s and 60s

Although the 1950s began with a large number of impoverished people without jobs and resources, people fleeing to Hong Kong also included rich farmers and capitalists who brought with them skills and management experience. In late 50s and early 60s, businesses in China and especially in Shanghai relocated their assets and capitals to Hong Kong. Together with the vast pool of cheap labor of the immigrants, economy was significantly revived. Hong Kong transformed from a territory of entrepôt trade to one of industry and

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manufacturing. The manufacturing industry employed large sections of the population. In the mid 60s, Hong Kong was featured as people spent more time in the factories than at home. Most workers had long working hours, with products ranging from buttons, artificial flowers, umbrellas, textile, enamelware, and footwear to plastics, all manufactured in small spaces. The work safety precautions, and the safety quality of the machines, were not observed. This resulted in a rapid increase in traumatic hand injuries, which formed the majority of the injured patients attending emergencies. Hand-related diseases were mainly industrial hand injuries, ranging from finger amputations to severe crush injuries and multiple chop wounds.

## Hand Surgery and Orthopaedics

Orthopedic discipline was introduced to Hong Kong in 1951. The first Orthopaedic and Trauma Unit was established in 1951 in Queen Mary Hospital (QMH). QMH was the only university hospital at that time under Hong Kong University (HKU) and was situated in Hong Kong Island. The unit was initially under the Department of Surgery. Prof. Arthur Hodgson was appointed from Britain to head the unit. Hand surgeries were initially done by both “orthopedic surgeons” and “general surgeons.” In 1961, Prof. Hodgson established an independent orthopedic service, Department of Orthopaedic Surgery, the first orthopedic department in QMH. An orthopaedic unit was then also established in Kowloon Hospital, another acute hospital in Hong Kong, which was located in the Kowloon Peninsula. Hand surgeries were then formally treated under orthopedics. In 1963, a new hospital, Queen Elizabeth Hospital (QEH), was opened in the Kowloon Peninsula. Dr. SF Lam, later the Deputy Director of Medical and Health Department (1977–1984), was appointed from QMH to the orthopaedic Unit in QEH. With the enormously huge volume of hand injuries demanding operations, hand surgery became a major and inseparable part of orthopedics in Hong Kong.

## Budding of Hand Surgery in 60s

With an increasing number of industrial traumatic hand injuries, while the manpower of the university department and other orthopedic units in Hong Kong was in serious shortage, most injured were treated by junior doctors, including house officers alone in the side rooms of wards. The common types of injuries were hand crush. These demanded microvascular techniques which had not been developed. Coordination between orthopedic surgeons, physiotherapists, and occupational therapists was also not present. Outcome of the treatment was not satisfactory. Prof. Hodgson, the first orthopedic professor in Hong Kong, realized that hand surgery should be developed systematically. Prof. Joseph Boyes, later the Founding Editor of the *Journal of Hand Surgery*, was invited by him to come to Hong Kong for a whole year, when leprosy, mycobacterial infection and industrial injuries were rife. There were also other pioneering hand surgeons visiting Hong Kong at that

time, including Dr. Eugene Kilgore and Dr. Daniel Riordan. In 1965, Prof. Hodgson sent Dr. YS Tsao to Los Angeles for 1 whole year to study hand surgery under Prof. Boyes. Dr. Tsao was the first orthopedic surgeon in Hong Kong keen at surgery of the hand and the development of hand surgery service. He was also the first surgeon in Hong Kong being sent overseas for hand surgery training. In 1966, the first organized hand service in Hong Kong was then started after he returned to QMH. However, he left QMH a year later because of health issues, and the hand clinic was then taken up by Dr. KP Chan, who was the second orthopedic surgeon sent overseas (USA) for hand surgery training in 1968.

## Birth of Key Figures

In the 70s, the economy of Hong Kong was further boosted by the ongoing industrial industry, especially the textile industry. Public health services were expanded and improved. Epidemics and infectious diseases were under control. However, factories were very small, and many were home-based. Machines were crowded. Standard of industrial safety was extremely low. Development of new towns in the New Territories resulted in a lot of industrial and traffic accidents. Number and severity of the hand injuries were still on the rise. Hand problems demanded more attention. The development of hand surgery was accelerated dramatically by Prof. SP Chow, currently Emeritus Professor of Orthopaedics and Traumatology, Faculty of Medicine, HKU, and by Prof. PC Leung, currently Emeritus Professor of Orthopaedics and Traumatology, Faculty of Medicine, the Chinese University of Hong Kong (CUHK). Through their devotion, efforts and hard work, the subspecialty of hand surgery was well-established in the late 70s. They were both recognized as the Pioneers of Hand Surgery in Hong Kong.

Prof. SP Chow and Prof. PC Leung witnessed many breadwinners losing their jobs after being subject to injuries as the hand function could not be restored. They were troubled by the lamentable results of hand surgeries and felt the urgent demand for an effective and better hand service. At the end of 1971, Prof. Leung was awarded a Commonwealth Scholarship, and he went to Britain for training hand, burn, plastic and war surgeries for 30 months, where he was honored as senior registrar in Britain. He returned to Hong Kong in 1974 when hand surgery was at its nascent stage of development. He started hand surgery in Kwong Wah Hospital (KWH), another acute hospital in the Kowloon Peninsula, and conducted the first successful replantation of a chopped off hand at wrist level in a 82-year-old lady in 1975. In 1976, while still working on the hand patients in KWH, Prof. Leung established a Orthopaedics, Plastic and Reconstructive Unit in a new hospital, Princess Margaret Hospital (PMH). Prof. Chow was appointed as Senior Lecturer in the Department of Orthopaedic Surgery in 1973 in QMH. He went abroad in 1976 to 77 to study hand surgery in Britain and USA. He performed the first successful replantation of a severed thumb in Hong Kong in 1977. He pushed forward the clinical research spirits in the field of hand surgery significantly and formed a hand team in QMH in 1978.

## Microsurgery, an Integral Part of Hand Surgery

Profs SP Chow and PC Leung worked hard together days and nights to make sure the severe hand injuries were dealt with by them personally to make sure a better outcome. They spent hours using very primitive instruments and ENT microscopes for replantation. The first replantation was performed by Prof. Chen Zhongwei in Mainland China in 1963, which must have been a form of real stimulation for them. Replantation, flap reconstruction, and microsurgery were the bread and butter operations in the Mainland in the 70s. Skills and experience were generously shared, and microsurgery became an integral part of hand surgery in Hong Kong. Replantations were done twice weekly. Toe-to-hand transplants, free-flaps, and vascularized bone transfers were performed one after another. According to the statistics in 1978, there were 2300 traumatic hand patients operated in QMH annually, 4000 in PMH annually, and 8000 in QEH annually. Prof. JIP James, Hand Surgeon and Professor of Orthopaedic Surgery in Edinburgh, visited PMH in 1979 and was impressed with the parade of operated hands dressed in his favorite “boxing glove” fashion. Microsurgical work was a breakthrough in salvaging the injured limbs and helping those injured to regain satisfactory hand functions. In the same year, Profs SP Chow and PC Leung co-organized the first microvascular skill course in Hong Kong. The peak of microsurgery in Hong Kong was achieved in the late 70s. Those were the days when microsurgery for hand problems earned heated attention in the world. Cross-country and cross-continent conferences and visits were plentiful. Hong Kong became a hot spot for teachers, fellow surgeons, and young surgeons from all over: Mainland, Singapore, Japan, USA, France, Germany, etc. China was particularly keen to learn from our hand rehabilitation.

## Formation of Hand Surgery Units and Rehabilitation in 70s

While injuries were frequent in a heavily populated Hong Kong, congenital anomalies of the upper limb were also common. Prof. GC Lloyd-Roberts, Pediatric Orthopaedic Surgeon in London, visited PMH in 1978 and was amazed with the varieties of congenital anomalies of the hand that he encountered during his 2-hour visit. PMH also ran a congenital hand anomaly clinic in QEH. Rheumatologists also started to establish a specialized service in the hand clinic in PMH. Varieties of hand diseases and the successful treatment results interested more surgeons. High incidences of occupational injuries and occupational infections initiated many concerned surgeons to study the medicosocial implications of injuries sustained at work. Enthusiastic surgeons made personal trips to factory sites to identify the machines causing disastrous hand injuries as well as to suspicious sites to sort out the origin of the causative bacteria spreading odd hand infections. The case load of hand injuries prompted better trained nurses and keen and skilled therapists. Collaborative team work among hand surgeons, physiotherapists, occupational therapists, nurses, rheumatologists, and pediatricians made

the hand surgery units mature in QMH and PMH, which were led by Prof SP Chow and Prof PC Leung, respectively, in the late 70s. Concepts of microsurgery inspired better skills and techniques of tendon surgery, while physiotherapists created flexor tendon rehabilitation with excellent results. Besides the routine of managing the pain, swelling, muscle strength, joint motion, sensibility and coordination, physiotherapists attended hand clinics, offered treatment of fingertip wounds and large skin defects, and educated the patients with the concept of hand rehabilitation. Occupational therapists joined hand surgeons in ward rounds and clinics, and designed and planned desired rehabilitation for each patient. Mr. CY Wan, founder of hand occupational therapy, was nurtured and supported in PMH. He had ingenious ideas in designing practical, cheap, reusable, durable, and functional hand splints using improvised materials, including leather, metal wires, aluminum strips, low-temperature thermoplastic materials, etc. His inventions were passed onto many occupational therapists interested in hand rehabilitation. The flourishing garment industry might have enlightened the occupational therapists, creating the best pressure garments in the world, which were individually tailor-made to the patients' needs when burn and scald injuries were common in a crowded place in Hong Kong. Hand rehabilitation was fervently practiced with real team spirit to help the patients with hand trauma, burn hand conditions, congenital upper limb anomalies, and rheumatoid arthritis since the mid 70s.

## Hand Surgery, A Well-established Subspecialty Bloomed in 80s

In the 80s, the successful treatment outcomes fascinated many budding orthopedic surgeons. Hand and microsurgery turned from an unpopular subspecialty to one of the most sought-after disciplines. It was also recognized as a major achievement in the field of orthopedics. Demand of competent hand therapists was also very high. In 1981, the first batch of 42 locally trained occupational therapists graduated from Hong Kong Polytechnic (HKP) which had put hand therapy in the curriculum since its opening in 1978. They started to practice hand rehabilitation in different hospitals and rehabilitation centers. In the same year, the Faculty of Medicine was established in the CUHK. It was the second medical school after HKU. In 1982, Prince of Wales Hospital (PWH), the second university hospital, was established in the New Territories under CUHK. Prof. PC Leung was the Founding Chairman of the Department of Orthopaedics and Traumatology there. The structure of the Hand Unit in PWH gradually evolved between 1982 and 1986. The Hand and Microsurgery Division was then established in 1987 and headed by Prof. LK Hung, Chairman, Department of Orthopaedics and Traumatology, CUHK (2007–2012). Hand surgery in Hong Kong bloomed further. In 1984, the first course of internal fixation of hand bone fractures, supported by French hand surgeons, Michel Merle and Guy Foucher, was held in Hong Kong. This was an advancement of hand bone fixation from K-wire or splints to internal fixation, in which better functional outcomes

were observed. In the same year, the Australasian College of Surgeons started its first examination in Hong Kong. Six months of hand surgery training was included in the training requirement of an orthopedic surgeon. All orthopedic departments in Hong Kong made appropriate arrangement for their staffs, including doctors and therapists, to devote more time to the work on “hand.” Surgery on hand was well developed in all major hospitals, hand trauma being at the core, and congenital anomalies, rheumatoid deformities, infection, nerve problems, and others at the periphery. In 1986, the Hong Kong Society for Surgery of the Hand (HKSSH) was established by Profs SP Chow and PC Leung. HKSSH provided regular channels for exchange and communication with overseas hand surgeons and the International Federation of Societies for Surgery of the Hand (IFSSH).

### Wider Surgical Varieties Developed on a Well-established Solid Platform since 80s

In the 80s, opening of the Mainland China market and the rising salaries in Hong Kong drove many manufacturers north across the border into Mainland. Suggestions from the hand surgeons to the Labor Department improved the work and machine safety. With better public education, better safety devices in the factories, and fewer factories in Hong Kong, the incidence of industrial hand injuries decreased significantly. The transformation of the structure of Hong Kong’s economy from manufacturing to commercial and financial services was dramatic. The demand on higher quality of life and health care service was increasing. Hand trauma happened in different forms, for example, sports, recreational activities, and home accidents. Surgeons had more time and energy to focus on other hand disease conditions, for example, congenital anomalies, inflammatory joint and tendon diseases, infections, tumors, nerve problems, bony deformities, cerebral palsy-related upper limb deformities, etc. With a solid platform established in the previous 30 years—a strong background of microsurgical skills and vast experience in handling traumatic wounds, burn hand and leprosy-related deformities—hand surgeons could further create and build in the area of basic research works, biomechanical studies, surgical skills, and innovative techniques, etc. to bring in early healing, faster rehabilitation and recovery, and improvement in hand functions in conditions previously not considered to be manageable.

### Local Training and International Commitments

In 1983, the inaugural meeting of the Hand Section of the Western Pacific Orthopaedic Association was held in Hong Kong.

Since 1986, when HKSSH hosted the post-Congress meeting of the 3rd IFSSH Congress, regular annual international meetings were held. The themes represented the trend of

hand surgeries and the areas hand surgeons in Hong Kong were interested in (►Table 1).

- In 1986, Chinese scholars were invited to the first Annual Meeting, and the Asian Pacific Scholarship was also established. Linkage of HKSSH with regional hand centers of the Asia Pacific region, especially with Mainland China, was well-established and continued to grow.
- In 1992, HKSSH sent out 15 delegates to Paris to attend the 5th IFSSH Congress, one ambassador to the Singapore Hand Society Meeting in 1993, 25 delegates to the IFSSH Congress in Finland in 1995, followed by Vancouver in 1998 which since then has become a regular event.
- In 1994, HKSSH, in conjunction with IFSSH, organized a regional course, “Western Pacific Regional Education Program - Microsurgery, Congenital Upper Limb Anomalies, Brachial Plexus Surgery.” Dr. Timothy YC So, Chairman of the Program, convened a committee meeting that HKSSH coordinated with the establishment of Asia Pacific Federation of Societies for Surgery of the Hand (APFSSH) in Hong Kong. Formation of APFSSH led to the establishment of a new journal, *Hand Surgery*, the editorial base of which was in Hong Kong.
- In 1994, the official HKSSH delegation was formed to attend the Chinese Medical Association Hand Surgery Society Congress in Dai Lin, and in Beijing and Shanghai in 1995, which since then has become an annual event.
- Ambassador programs were set up with the Japanese Society for Surgery of the Hand in 2000, Korean Society for Surgery of the Hand in 2017, and Taiwan Society for Surgery of the Hand in 2019. A total of 28 ambassadors attended.
- In 2008, HKSSH hosted the 7th Congress of APFSSH in Hong Kong.
- In 2018, HKSSH hosted the World Symposium of Congenital Malformations of Hand and Upper Limb in Hong Kong.
- A total of 81 Chinese Scholars, 33 Asian Pacific Scholars, and 134 overseas speakers were invited to the annual meeting.

Besides HKSSH, Hand and Microsurgery Division, Department of Orthopaedics and Traumatology, CUHK, organized regular courses, workshops and conferences locally and internationally to promote transfer of knowledge and skills and exchange new ideas and concepts.

- The first basic microsurgery training course was held in 1986 with an annual intake of 20 surgeons. The first advanced microsurgery training course was held in 1993. They have been conducted biannually to provide microsurgical training for trainees and specialists of different disciplines, local and overseas, including orthopedics, general surgery, ENT and plastic surgery, etc.
- Cadaveric workshops and conferences were held yearly since 2000. They were led by world experts on elbow arthroscopy, elbow arthroplasty, elbow fracture fixation, flap dissection, scaphoid fracture fixation, finger arthroplasty, wrist arthroplasty, 3D simulation surgeries, etc.
- The Annual Wrist Arthroscopy Workshop was founded in 1997 by Prof. Hung LK as part of an advanced training

**Table 1** List of the themes of the international meetings HKSSH organized since its establishment

Year	Theme of the meetings
1986	Post-Congress Meeting of the 3rd IFSSH Congress
1988	Fractures and dislocations of the hand
1989	Peripheral nerve lesions
1990	Rheumatoid hand
1991	Wrist disorders
1992	Tendon transfer in paralytic conditions of the upper limb
1993	Management of complex upper limb injuries—an update
1994	IFSSH Western Pacific Regional Education Program—microsurgery, congenital upper limb anomalies, brachial plexus surgery
1995	Pain and paresthesia of the upper extremity
1996	Wrist disorders
1997	Hand reconstruction—optimization of outcome
1998	Reconstruction in upper limb paralysis
1999	Congenital Upper Limb Paralysis
2000	Elbow 2000
2001	Complications of common hand problems
2002	Microsurgery in limb reconstruction
2003	Severe acute respiratory syndrome epidemic and no meeting organized
2004	Hand and wrist fractures
2005	Hand surgery: repair, reconstruction and replacement
2006	Common Wrist Problems
2007	Problems in pediatric hand and upper limbs
2008	7th APFSSH & 1st Conjoint Meeting of APFSSH & EWAS, 3rd Congress of APFSHT, 1st HKSHT Annual Congress
2008	Finger Joint Replacement Workshop (co-organized with CUHK)
2008	Scaphoid Fracture Workshop (co-organized with CUHK)
2009	Peripheral nerve injury and disorders
2009	Brachial Plexus Injury Workshop (co-organized with HKU)
2010	Major trauma in upper extremities—21st century perspective
2010	1st International Conference on Extra Thumb
2011	Upper limb problems in sports
2011	Combined symposium on birth palsy
2011	Hong Kong Elbow Cadaveric Workshop in Sports Injuries (co-organized with CUHK)
2012	Arthroplasty in hand, wrist and elbow
2013	11th International Meeting on Surgical Rehabilitation of the Tetraplegic Upper Limb cum 26th HKSSH Annual Congress and 6th Annual Therapist Symposium of the HKSHT
2014	Pediatric upper limb problems
2015	Advances in elbow surgery
2016	Upper limb tumor and infection
2016	Upper Limb Flap Course (co-organized with CUHK)
2017	The battle against upper limb stiffness
2017	Limb replantation meeting
2017	Hong Kong International Elbow Seminar and Workshop—sports related elbow problems (co-organized with CUHK)
2018	World Symposium of Congenital Malformation of Hand and Upper Limb cum 31st Annual Congress of HKSSH
2019	Carpus discovery

Abbreviations: CUHK, Chinese University of Hong Kong; HKSHT, Hong Kong Society for Hand Therapy; HKSSH, Hong Kong Society for Surgery of the Hand; IFSSH, International Federation of Societies for Surgery of the Hand.

course for orthopaedic surgeons from Mainland China. Since 2008, Dr. PC Ho, Division Head (2007–2017), Hand

and Microsurgery Division, PWH, transformed the event into an international one, with teaching faculty and

participants from worldwide, including the Asia-Pacific countries, Europe and America. Over 800 surgeons worldwide have attended. Many of them applied as clinical fellows and stayed in PWH for varied duration. Several Bunnell's Travelling Fellows of the American Society for Surgery of the Hand have been paying visits since 1992.

- Dr. PC Ho inspired many centers overseas, including Strasbourg, Copenhagen, Montpellier, Taiwan, Singapore, Wenzhou, Shanghai, Ningbo, and Beijing, to set up wrist arthroscopy courses and led a team from Hong Kong to collaborate with these centers on a regular basis. Since 2009, he collaborated with the European Wrist Arthroscopy Society in conducting wrist arthroscopy workshops twice every year in Taiwan and France.
- In 2015, 21 determined wrist experts in the Asia-Pacific region gathered in PWH and established the Asia Pacific Wrist Association (APWA) to promote wrist surgeries. Dr. PC Ho is the Founding President.

QMH and HKU have also been organizing microsurgery courses since 2010 four times per year for local trainees. Distinguished international experts were invited by HKU to share their experience.

Hand surgery training for local doctors is part of the orthopedic training. Trainees are required to undergo 3 months of training in hand surgery. Hand tutorials are conducted in the form of regular didactic lectures. The HKSSH certificate course in hand and upper limb surgery had its inception in 2015 for trainees and orthopedic surgeons. Interhospital meetings hosted by HKSSH have been organized at intervals. There is no board or certifying examination or subspecialty continuing medical education (CME) for a hand surgeon, although a setting up a hand surgery subspecialty board had been discussed in 2009. HKSSH, CUHK, and HKU also deliver regular education for the primary health care setting and the public.

### Achievements and Contributions

Hong Kong has produced more than 500 publications on almost all aspects of hand surgeries throughout the years. Prof. SP Chow had in-depth and significant studies about the mycobacterium infection, microvascular anastomosis, hand fractures, nerve regeneration, etc. Extensive output has been produced by Prof. PC Leung in microsurgeries, including various applications of toe-to-hand transfer, burn hand reconstructions, etc. The following are some of the original ideas or innovations made in Hong Kong:

- Since 1976, Profs PC Leung, JCY Cheng (Chair Professor, Department of Orthopaedics and Traumatology, CUHK (1999–2018)), and KS Leung (Chair Professor, Department of Orthopaedics and Traumatology, CUHK (2004–2016)) have pioneered basic science with HKP on the optimal pressure for pressure garment used for postburn hypertrophic scar. The techniques were standardized and are popular to date.
- Since 1977, Prof. PC Leung has been using vascularized iliac crest for reconstruction of large defects in the proximal femoral region and for the solution of difficult problems in the hip.
- Since 1978, Prof. SP Chow modified the Bier's block by putting the tourniquets over the forearm and used this technique for various operations on the lower forearm, wrist, and hand.
- In 1980, Prof. Chow advocated electroacupuncture in the treatment of posttraumatic sympathetic dystrophy.
- In 1980, Prof. Chow first described the detailed anatomy of the digital nerves in the terminal phalanx.
- In 1982, Prof. Chow successfully experimented with repair of blood vessels of 0.15 mm diameter; also, detailed anatomical features of micro arteries 0.15 to 0.3 mm was first described.
- In 1984, Prof. Chow devised a splint for controlled active motion after flexor tendon repair.
- In 1989, Prof. LK Hung devised a fixation method for transverse or short oblique finger fracture—combined intramedullary Kirchner wire and intraosseous wire loop.
- In 1989, Prof. Hung reported replanting skin tube flap onto proximal stump to salvage ring avulsed fingers.
- In 1991, Prof. PC Leung used vascularized iliac crest graft as a replacement following excision of giant cell tumor of distal radius.
- In 1991, Prof. Hung advocated percutaneous screw fixation of acute scaphoid fractures. Since then, percutaneous screw fixation of acute scaphoid fractures has been the first-line surgical fixation for acute scaphoid fractures in PWH.
- In 1991, Prof. Hung was the first to publish clinical use of dynamic splintage for extensor tendon rehabilitation.
- In 1991, Prof. Chow published the largest reported series of open finger fractures.
- In 1995, Prof. Hung classified extra thumb and alluded to the tendon webbing and osteotomy for reconstruction.
- In 1996, Prof. Hung designed hypoplastic thumb using free hemimetatarsal transfer with impressive results.
- In 2004, Prof. Hung reported selective neurotization of median nerve in brachial plexus palsy.
- In 2005, a novel artificial prosthetic replacement for the finer proximal interphalangeal joint was developed by Prof. Chow.
- Hand and Microsurgery Division in PWH, which was led by PC Leung since 1982, then Prof LK Hung in 1987, followed by Dr PC Ho since 2007, has come up with new ideas and surgical methods which many local and overseas surgeons have been adopting, such as the following:
  - Subclassification of Wassel type 4 extra thumb in 1995.
  - Dorsally based flap for extra thumb reconstruction in 1997.
  - Cushioned posteroanterior view to assess the scapholunate (SL) interval accurately in 1999.

- Palmaris longus graft augmentation for ulnar styloid fracture nonunion in 2000.
- Lateral head of triceps transfer to restore wrist extension in 2000.
- New wrist function assessment system in 2000 which has been used to date.
- Dorsal radiocarpal ligament reconstruction with split flexor carpi ulnas graft for palmar midcarpal instability in 2000.
- Composite reverse-flow homodigital flap for wound and bone reconstruction in a finger in 2000.
- Syndactyly release using dorsal winged-flap without skin grafting in 2001.
- Neurovascular onychocutaneous island flap transfer in extra thumb reconstruction in 2002.
- Modified Camitz transfer by transferring the palmaris longus tendon, elongated with palmar aponeurosis, to a distally based split extensor pollicis brevis tendon graft anchored around the ulnar collateral ligament of metacarpophalangeal (MCP) joint, in order to correct the thumb adduction supination deformity in 2002.
- Musculocutaneous nerve to brachialis to free gracilis transfer for restoring finger flexion in 2006.
- First use of self-locking finger joint in advanced hand arthritis outside Japan in 2008.
- New classification system for scaphoid fractures in 2011.
- Imaging technique in assessing the scaphoid bone vascularity in scaphoid nonunion, and correlation of MRI with the wrist arthroscopy in 2013.
- Stem cell therapy for wrist cartilage regeneration in 2015.
- Over the past 25 years, Dr. PC Ho successfully introduced and pioneered endoscopic and arthroscopic surgeries in the wrist and hand.
- Identification of ligament injury in scaphoid fractures in 1995.
- Identification of a new pattern of triangular fibrocartilage complex (TFCC) tear and the dorsal TFCC tear in 1997.
- Arthroscopic surgeries:
  - Treatment of volar wrist ganglion in 1997.
  - Bone grafting for scaphoid nonunion in 1997.
  - Scapho-trapezio-trapezoid joint fusion in 1997.
  - Bone grafting for lunate cyst in 1997.
  - Under portal site local anesthesia with no sedation and tourniquet in 1998.
  - TFCC reconstruction with palmaris longus graft in 2000.
  - Treatment of scaphoid delayed union in 2001.
  - Scaphoidectomy and four-corner fusion in 2001.
  - SL ligament reconstruction with palmaris longus graft in 2002.
  - Distal scaphoidectomy for scaphoid nonunion advanced collapse (SNAC) wrist in 2003.
    - Thermal shrinkage for pisotriquetral instability in 2006.
  - Osteochondral grafting for cartilage defects in 2006.
  - Thermal shrinkage for chronic volar plate instability of thumb MCP joint in 2006.
- Treatment for scaphotrapeziotrapezoid joint ganglion in 2014.
- Besides the above innovative ideas and practice, Dr. PC Ho was granted with the Whipple Prize at the Congress of the Federation of European Societies for Surgery of the Hand in Antwerp in 2012 to honor his achievement in wrist arthroscopic surgery. Prof. PC Leung was honored as the IFSSH Pioneer of Hand Surgery in 2013. Prof. SP Chow was honored as the IFSSH Pioneer of Hand Surgery in 2016.

## Trend of Hand Surgery and Future Perspectives

Hand surgery in Hong Kong was born with microsurgeries. Throughout the years, although there was a dramatic drop in the number of severe traumatic hand injuries which needed replantation or microvascular reconstruction, hand surgeons are still well-equipped with the skills of microsurgery as traumatic hand injuries can come up from time to time. After witnessing the beauty of saving a finger by just repairing small blood vessels, the concept of respecting, preserving, and restoring any tiny anatomy should be the integral part of a hand surgeon. With fewer emergency traumatic hand cases that hand surgeons need to handle daily, we have more time to work on reconstructing the defects anywhere in the body, including those resulted from trauma, infection, tumor, or congenital anomalies, with or without microsurgical techniques. Hand surgeons tend to work on a wider array of diseases. By reviewing the operations of the Hand and Microvascular Surgery Division in PWH performed in the past 15 years, there were more than 2000 types of operations. The numbers of total hand operations and the traumatic hand injuries were similar throughout the years. But more traumatic hand injuries resulted from sports injury. More distal replantations were done. The numbers of burns, brachial plexus injury, and congenital anomalies decreased in the initial 5 years, while that of wrist surgeries tripled throughout the 15 years. With better design of finger joint prosthesis, finger joint replacement surgery also witnessed an increasing trend. The microsurgery concept of respecting and preserving anatomy also gave birth minimal invasive surgeries, such as percutaneous release for trigger finger and Dupuytren contracture, endoscopic carpal tunnel release, wrist, finger and elbow arthroscopic surgeries, etc. Moreover, the concept of meticulousness and sophistication in skill enabled almost all articular problems of upper limb to be managed arthroscopically. Arthroscopic surgeries in hand and upper limb had an upsurge in development in Hong Kong in the 2000s. This further met the higher demand of the better educated and wealthy population who demanded faster rehabilitation, faster recovery, and better cosmesis. In the past few years, navigation and computer-aided surgeries have been launched in tumor resection, bone deformity osteotomy correction, and fracture fixation in the upper limbs. Supramicrosurgery of free style flap or perforator flap coverage, lymphatic surgery, endoscopic flap harvest, innovative

arthroscopic and reconstructive surgery, including new implant designs and materials, have been adopted for years.

Hand surgery should not be an organ or tissue subspecialty. It is a multidisciplinary subspecialty. The skills of tissue handling, concepts of perfect goal, meticulousness, and preserving, restoring and reconstructing make a hand surgeon an all-rounder. We should not only collaborate with the subspecialties within orthopedics. Collaboration with nonorthopedic specialty is crucial. One wishes to witness more collaborations with the rheumatologists who could help their patients with hand problems by early referrals. Physicians dealing with hemiplegia and upper limb paralysis could also realize that cervical nerve root crossovers or peripheral nerve rewiring might do a lot of good and start joint managements with hand surgeons. Collaboration with nonmedicine disciplines is in progress, such as designing myoelectric or mechanical orthosis and prosthesis with

engineers, computer or navigation planning with biomedical engineers, brain remodeling and neuroregeneration with neuroscientist, etc.

Hand surgery in Hong Kong has a strong and deep-rooted foundation in the history of orthopedic development. Future development of hand surgery should also be allied with the advances in orthopedics, including navigational systems, robotics, orthobiologics, tissue engineering, material science, etc.

#### **Conflict of Interest**

None declared.

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