Hand Surgery in Thailand

Sunyarn Niempoog[1] Kiat Witoonchart[2] Woraphon Jaroenporn[3]

[1]Department of Orthopaedics, Faculty of Medicine, Thammasat University, Pathumthani, Thailand
[2]Department of Orthopaedics, Lerdsin Hospital, Bangkok, Thailand
[3]Department of Orthopaedics, Police Hospital, Bangkok, Thailand

Address for correspondence Sunyarn Niempoog, MD, Hand and Microsurgery Unit, Department of Orthopaedics, Thammasat University, Pathumthani 12121, Thailand (e-mail: sunyarn@hotmail.com).

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Abstract

Modern hand surgery in Thailand started after the end of World War II. It is divided into 4 phases. In the initial phase (1950-1965), the surgery of the hand was mainly performed by general surgeons. In 1965-1975, which was the second phase, many plastic surgeons and orthopaedic surgeons graduated from foreign countries and came back to Thailand. They played a vital role in the treatment of the surgery of the hand and set up hand units in many centers. They also contributed to the establishment of the "Thai Society for Surgery of the Hand," which still continues to operate. In the third phase (1975-2000), there was a dramatic development of microsurgery because of the rapid economic expansion. There were many replantation, free tissue transfers, and brachial plexus surgeries in traffic and factory-related accidents. The first hand-fellow training program began in 1993. In the fourth phase (since 2000), the number of hand injuries from factory-related accidents began declining. But the injury from traffic accidents had been increasing both in severity and number. Moreover, the diseases of hand that relate to aging and degeneration had been on the rise. Thai hand surgeons have been using several state-of-the-art technologies such as arthroscopic and endoscopic surgery. They are continuing to invent innovations, generating international publications, and frequently being invited as speakers in foreign countries.

Keywords
- hand surgery
- microsurgery
- Thai
- Thailand
- history

Introduction

The surgery of the hand in Thailand started from World War II by general surgeons. After the development of the hand unit from the department of orthopedic and plastic surgery, the surgery of the hand was then performed and supervised by hand surgeons. In the phase of microsurgery, plastic surgeons reduced their roles to include only flap and soft tissue coverage. The surgery of the hand and microsurgery of extremities are mainly performed by orthopaedic surgeons.

History

Since 1950, the surgery of the hand in Thailand was performed by general surgeons. After the establishment of the Orthopaedic surgery and Department of Plastic Surgery, surgery of the hand was well recognized and dramatically developed. The history of Surgery of the hand in Thailand is divided into 4 phases.

1. The initial phase or the founding of the Orthopaedic and Plastic Surgery department in Thailand; 1950-1965.

Both orthopaedics and plastic surgery were still part of general surgery. Many Thai surgeons were trained by well-known foreign hand surgeons.

2. The establishment of Hand Surgery unit; 1965-1975.

The establishment of Hand Surgery unit in several medical centers by Thai surgeons who graduated from overseas, mostly European countries and United States.

3. The development of the Microsurgery; 1975-2000.

Thailand's rapid economic expansion had resulted in an increasing number of factory-related accidents, especially amputated fingers and mutilated injuries. A dramatic increase in traffic accidents including brachial plexus injuries and complex injuries of limbs were observed. Thus, the microsurgical skill of Thai surgeons was widely developed.

4. The present phase; 2000-present

The incidence of machine-related hand injuries had been decreasing. However, the incidence of traffic accidents such

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as open fracture with soft tissue lost and brachial plexus injury are still numerous due to the considerable number of motorcycle accidents. The strict helmet law enforcement in 1992, led to an increase in the survival rate of the more severe brachial plexus cases. With the advancement in national healthcare along with behavioral changes, surgery of the hand tends to shift to soft tissue procedures for sports injury and degenerative conditions including arthroscopic and endoscopic surgery. At present, each medical center has well-trained hand surgeons, a fellowship training program, academic conference, international journal publications, and several innovations.

The Initial Phase: 1950 to 1965

The beginning of modern medicine in Thailand started in 1888 at Siriraj hospital. Fuang Satyasanguan was the first Thai orthopedic surgeon who was trained in the United States before WWII. Together with Lim Koonvisal, who was a plastic surgeon, he started surgery of the hand in 1950. Their main procedures were soft-tissue coverage including skin graft and flap. Natee Rukspollmuang received a scholarship from the Royal National Orthopaedic Hospital, Institute of Orthopaedics, London University, for training under Prof. CB Wynn Parry and Prof. H Seddon. He started to perform nerve operation and tendon transfer procedures. Nukool Prinyarnussorn established a burn unit with various soft-tissue coverage techniques. In 1959, after graduating from England, Vasant Chongchet treated many factory-related hand injuries in Vajira Hospital. Chuchat Utarothai from Police General Hospital used intramedullary nail to treat humerus, forearm, and hand fractures after receiving training under Prof. G Kuntscher and Prof. Zubretsky in Germany. Thereafter, he set up a tendon bank in 1960. Thamrongrat Keokarn from Phramongkutklao Hospital (Army hospital) was the first Asian who received a Diploma American Board of Orthopaedic Surgery from the USA in 1964. He trained under Prof. CC Campbell at Albany Medical College, New York, which was a cutting edge orthopedics training center at the time. During that time, he also was trained under Prof. LR Straub who founded the Hand Surgery Service and Comprehensive Arthritis Program at Hospital for Special Surgery, Cornell University, and Prof. E Kaplan at New York University School of Medicine which was famous for his anatomic studies. He published many studies such as squamous cell carcinoma of nail bed. He was trained under Prof. JW Littler who founded the Hand unit at St. Luke-Roosevelt Hospital in New York, as well. With all the training, he was one of the most experienced hand surgeons. Before he finished the training, he helped Prof. E Kaplan establish the Hand Unit at Albany Medical College and the Hand Symposium for orthopedic residents.

The Establishment of Hand Surgery Unit: 1965 to 1975

There were several orthopedic and plastic surgeons who graduated in the field of hand surgery from abroad. In 1971, Vivat Visuthikosol, a plastic surgeon, established the first hand surgery training center in Thailand at Ramathibodi Hospital. With Arthi Kruavit as his first resident. Surasak Muangsombut established the hand and microsurgery division at Department of General Surgery, Siriraj Hospital. Charoen Chotigavanish joined Fuang Satyasanguan as a consultant in the Department of Orthopaedic Surgery, which was about to separate from the Department of General Surgery in Siriraj Hospital in 1964. Two years later, he received training at The State University of New York (SUNY), USA. He was trained under some well-known hand surgeons such as Prof. W White and Prof. Prof. LR Straub. He received the Diploma American Board of Orthopaedic Surgery in 1972. He had many publications including hand surgery-related topics.

In 1973, Pongsak Vathana received the Diploma American Board of Orthopaedic Surgery and came back to work at the Department of Orthopaedics, Lerdsin Hospital. He had treated numerous upper limb injuries. Most of the patients were workers in factories. The treatment had significantly improved due to his training under Prof. D Riordan at Tulane University which was famous for corrective surgery and tendon transfer among leprosy patients. In this era, Prapadang Hospital was able to perform surgery for leprosy patients by virtue of the efforts of Ake Thardtong and Chamlong Mungkarndi. They had worked with Prof. P Brand who had vast experience with leprosy patients. There were many surgeons who worked at the hospital such as Sommart Keorochana and Arthi Kruavit who later worked at Ramathibodi Hospital.

In this time period, there were frequent gatherings of hand surgeons for academic purposes, who could be considered the founders of the Thai Society for Surgery of the Hand, such as the following:

Thamronggrat Keokarn from Phramongkutklao Hospital.
Surasak Mungsombut and Charoen Chotigavanish from Siriraj Hospital.
Chamlong Mungkarndi from Priest Hospital.
Vivat Visuthikosol from Ramathibodi Hospital.
Vinai Parkpian from Chulalongkorn Hospital.
Vasant Chongchet from Vajira Hospital.
Ake Thardtong from Prapadang Hospital.
Nakorn Suvanprakorn from Klang Hospital.
Suthee Sudasna from Chiang Mai Hospital.
Pongsak Vathana and Prateep Bhokakul from Lerdsin Hospital.

These surgeons attended the joint conference from the 17 to 19 March, 1976, at Phramongkutklao Hospital under the name Society of Hand Surgery. In 1977, Chamlong Mungkarndi, as the priest hospital director at that time, held the meeting to officially establish the "The Thai Society for Surgery of the Hand." The first committee (1977–1979) included (►**Fig. 1**) the following:

Chamlong Mungkarndi, Prateep Bhokakul, Pongsak Vathana, Charoen Chotigavanish, Vivatana Visuthikosol, Surasak Mungsombut, Vasant Chongchet, Nakorn Suvanprakorn, and Dumronk Thanachanant who designed the society logo (►**Fig. 2**) was designed by Dumronk Thanachanant.

There were three joint conferences of four societies which were The Thai Orthopaedic Association, The Royal College of

Fig. 1 The first committee of the "Thai Society for Surgery of the Hand." Surasak Mungsombut, Nakorn Suvanprakorn, Vivat Visuthikosol, Vasant Chongchet, Pongsak Vathana, Charoen Chotigavanish, Chamlong Mungkarndi, and Prateep Bhokakul.

Fig. 2 The logo of the Thai Society for Surgery of the Hand.

Physiatrists of Thailand, Thai Rheumatism Association, and Thai Society for Surgery of the Hand in 1977 at Ramathibodi Hospital, 1978 at Chulalongkorn Hospital, and 1979 at Priest Hospital. In these joint conferences, there were academic lectures, research presentations, and group discussions.

The objectives of the Thai Society for Surgery of the Hand involved meeting, exchanging experiences, and strengthening knowledge pertaining to the surgery of the hand to residents and surgeons not only the meeting and exchange experience but also aims to strengthen the knowledge of the surgery of the hand to residents and surgeons who are responsible for the hand surgery. There were many activities including Interhospital Hand Conference which was held once a month in every hand center.

This activity was one of the activities held by The Thai Orthopaedic Association that has been continuing until now.

The Development of the Microsurgery: 1975 to 2000

There were established hand units in many medical centers, resulting in the increase of knowledge and experience involving hand surgery skill.

Microsurgery was the state-of-the-art technique at that time, which was employed to treat the machine-related hand injury and traffic injury. The first digit replantation in Thailand was done by a general surgeon Nouvarat Censarn in 1969 at Vajira hospital. Since 1976, microsurgical technique was also used in orthopedic surgery and plastic surgery to correct various conditions, for example, the free flap coverage/reconstruction and penile replantation for penile amputation as philandering punishment by humiliated wives.

In 1978, the first traumatic hand injury course was held at Ramathibodi Hospital. The lecturers included hand surgeons, physiatrists, anesthesiologists, and physiotherapists to complete the treatment of hand injury. They also published a book of traumatic hand injury in 1980. This course has been continuing annually to date.

In 1978, Korku Chiengthong received a scholarship for training under Prof. RWH Pho in Singapore. In 1979, he went to visit Prof. S Tamai who was the first surgeon performing digit replantation at Nara University. He then went back to work with Suthee Sudasna in order to work as hand surgeon and trained orthopedic residents at Chiang Mai Hospital.

In 1981, Chusakdi Suwansirikul from Phramongkutklao Army Hospital finished training with with Prof. W Epping at Hand Surgery Department, University of Hamburg, Germany. Prof. W Epping was a coworker of Prof. D Buck-Gramcko, one of the most famous hand surgeons in congenital malformation field. After he received Facharzt fur Orthopadie, he went back to work with Choosilp Kunathai who received the Columbo scholarship to be trained at University of Sydney, Australia, in 1986 under Prof. ER.Owen who was one of the pioneer in Microsurgery.

Chusakdi Suwansirikul initiated the treatment of distal radioulnar joint with Lowenstein operation (Sauve–Kapandji operation). He also reported the treatment of Dupuytren's contracture in a Thai patient. The disease was once believed only to be found in the Western population.

In 1983, Kiat Witoonchart finished microsurgical training at Singapore General Hospital under Prof. SK Tan, then in 1989 with Prof. Y Ikuta in Hiroshima University, Japan. He thereafter worked in Lerdsin Hospital. He performed free tissue transfer, brachial plexus reconstructions, and reported the treatment of congenital pseudarthrosis of the forearm with vascularized bone graft in Journal of Hand Surgery.[1] In 1983, Adisorn Patradul from Chulalongkorn University received the Lee and Shaw Foundation scholarship to visit Prof. RWH Pho at the University of Singapore. He thereafter

performed numerous digit replantations[2], venous flap, and vascularized toenail flap for traumatic nail loss.[3]

In 1984, Preecha Chalidapong went to work with Prof. K Tsuge at Hiroshima University, Japan. He also visited Dr. T Hara and Dr. Y Akasaka in Hiroo Hospital in Tokyo to learn about the treatment of brachial plexus injury in 1987. At that time, the result of the treatment of brachial plexus injury was not very satisfying. Most of the patients could not use their limbs after the treatment. He adapted the techniques to improve the outcome of the treatment such as intercostal nerve transfer to biceps without nerve grafting,[4] muscle transfer to mobilize to the affected shoulder.

In 1987, Panupan Songcharoen from Siriraj Hospital went to visit Prof. AO Narakas in Switzerland to learn about brachial plexus surgery and neurotization technique. He reported 520 cases of brachial plexus operations in Thailand.[5] Formerly, the treatment usually used long nerve grafts which had an unpredictable result. He started to use phrenic nerve and spinal accessory neurotization,[6] contralateral C7 neurotization,[7] and functional free muscle transfer which had better results. Saranatra Waikakul who also worked at Siriraj Hospital reported digital replantation of 1018 digits[8] and the comparative study between the spinal accessory and intercostal nerve for elbow flexion.[9]

In 1989, The Thai Society of Reconstructive Microsurgery was founded by Surasak Muangsombut, Werayudt Chaopricha, Arthi Kruavit, and many more hand surgeons. Prof. Tamai designed the logo for the Society (►**Fig. 3**). The Thai Society of Reconstructive Microsurgery along with Preecha Chalidapong and Korku Chiengthong conducted the first microsurgery course at Chiang Mai Hospital in 1993. The course was held every year until the economic crisis in 1997.

In 1992, many doctors came from abroad, Yongsakdi Liengudom was the first Thai clinical fellow at Christine M. Kleinert Institute for Hand and Microsurgery, Kentucky, United States. After that, many Thai surgeons went to study at the center including Saichol Wongtrakul, Pravit Kitidumrongsook. Together with Wanchai Sirisereewan, Tanehtsak Wudhapitak, and Apikit Srisermphoak, he set up the double microsurgical team as standard in microsurgical operation to reduce surgeon's stress and fatigue.

Fig. 3 The logo of The Thai Society of Reconstructive Microsurgery.

Werayudt Chaopricha worked with Nopadol Wora-Urai in the microsurgical field in Phramongkutklao Army Hospital, after finished training under Prof. S Tamai in Japan and Prof. JR Urbaniak at Duke University, United States. He performed experimental toe to thumb in rats. Somsak Leechavengvongs trained at Bichat Hospital in Paris with Prof. Alnot and Prof. Oberlin in 1992. He transferred a part of the ulnar nerve to nerve to biceps (Oberlin procedure)[10] and reported highly satisfying results in patients who had brachial plexus injury (upper arm type). He also invented a new procedure to treat paralysis of shoulder abduction by transferring a branch of the radial nerve to the axillary nerve which was worldwide accepted.[11]

In 1994, Pasakorn Chaiwanishsiri at Nopparat Rajathanee Hospital went to study with Prof. Yu Zong Jia, Prof. Zeng Bing Fang, and Prof. Jiang Pei Zhu at Shanghai 6th people Hospital, Second Medical School, Shanghai, China and came back to perform several replantations and toe transfers.

The Present Phase: 2000–To Date

There is a great diversity among surgery of the hand and the number of hand surgeons in Thailand.

In 2001, the health care system in Thailand greatly improved, resulting in patients being able to access better health care service. There was an increasing number of hand surgeons which aided in decentralizing to rural areas. Changing of people's behavior and technology led to increased hand activities such as using computer, telephone and participation in sports such as boxing or yoga. This, in turn, led to changes in the practice of hand surgery from trauma and congenital malformation to degenerative and chronic injury; not only microsurgery but arthroscopy was also employed. There were many publications such as the following:

- The arthroscopic and endoscopic surgery from Vajira Hospital reported the needle and knife technique suture.[12] The HRH Princess Maha Chakri Sirindhorn Medical Center studied the lateral elbow pain from arthroscope.[13]
- The treatment of carpal tunnel syndrome with endoscopic carpal tunnel release together with flexor digitorum superficialis (FDS) opponensplasty from Thammasat Hospital.[14] The study of hypothenar fat pad fat versus conventional open release in primary carpal tunnel syndrome from Ramathibodi Hospital.[15]
- There were studies about trigger finger such as the randomized control trial (RCT) study about the dosage of steroid injection[16]and the injection of hyarulonic acid.[17]
- About the hand surgery innovation Sittichoke Anantaseri invented "A-knife"[18] for the surgery of trigger finger. Sunthorn Wongsiri invented Minisure blade and retractor

for carpal tunnel release[19] and Sunyarn Niempoog invented the true interlocking metacarpal nail[20] (►**Fig. 4**).

- For the brachial plexus injury and nerve transfer, there were reports about obstetric brachial plexus injury from Rajavithee Hosptal.[21] The latest nerve transfer techniques from Lerdsin Hospital.[22-25] The report of end to side neurorrhaphy for elbow flexion from Lerdsin and Siriraj Hospital.[26,27] The report of double motor nerve transfer for all-finger flexion in cervical spine cord injury from Chiang Mai Hospital.[28]
- For free-flap coverage, Kanit Sananpanich and Jirachart Kraisarin from Chiang Mai Hospital reported the descending geniculate artery-free flap[29] Thepparat Kanchanathepsak from Ramatibodi Hospital reported the lateral antebrachial neurocutaneous flap.[30] The resurfacing of thumb with neurovascular island flap from Pravit Kitidumrongsook[31] from Chulalongkorn hospital. Surasak Jitprapaikulsarn from buddhachinaraj hospital also reported the use of combined medial gastrocnemius and hemisoleous flap for tibial coverage.[32]
- For the treatment of fracture, Queen Savang Vadhana Memorial Hospital reported the dynamic external fixation in proximal interphalangeal (PIP) joint fracture dislocation.[33] The use of a 3D model of titanium to replace the elbow fracture from Arkaphat Kosiyatrakul and Suriya Luenam[34] from Phramongkutklao Hospital and the distal radius fracture from Woraphoon Jaroenporn and Jaruwat Vechasilp from Police General Hospital.[35]
- For congenital hand anomaly, Surut Jianmongkol form Konkaen University reported the treatment of congenital metacarpal synostosis with bone blocked.[36] Pobe Luangjarmekorn reported single-stage radialization and pollicization for the radial longitudinal deficiency with thumb hypoplasia.[37]
- For the Private Hospital section, Wichit Siritatamrong and his team set up the microsurgery team at Chularat 3 Hospital, which is now famous for the treatment of traumatic hand injury **(►Fig. 5).**

Training program and international meeting

The hand fellow training program was officially set up in 1993 at Siriraj Hospital with Sumroeng Nati as the first fellow in Thailand. At present, there are 8 fellow training centers in Thailand (Ramathibodi Hospital, Siriraj Hospital, Chulalongkorn Hospital, Thammasat hospital, Lerdsin Hospital, Chieng Mai Hospital, Phramongkutklao Hospital, and Bhumibol Adulyadej Hospital). There was restart of microsurgical courses again in 2009 at Thammasat Hospital (►**Fig. 6**), soft tissue and flap coverage at Chiang Mai Hospital, and arthroscopic surgery at Siriraj Hospital.

For the international meetings, the Thai Society for Surgery of the Hand held the following events in Thailand: In 1991, there was the International Hand Surgery at the Sofitel Hotel, Bangkok with Charoen Chotigavanish as the president. There were many well-known hand surgeons such as Prof. G Foucher (France), Prof. J Taleisnik (United States), Prof. TJ Herbert (Australia), Prof. T Hara (Japan), and Prof. A Gilbert (France).

In 2006, Thailand was the host of the Annual Meeting of Asia Pacific Federation of Society for Surgery of the Hand (APFSSH) at Shangri-La Hotel, with Panupan Songcharoen as the president and many well-known hand surgeons attending such as as Prof. K Doi (Japan), Prof. MA Tonkin (Australia), Prof. A Gupta (United States) (►**Fig. 7**).

Since the Thai hand surgeons have abundant experience with regard to brachial plexus injury cases, in 2012, the Brachial Plexus Cadaveric Dissection Course was held for the first time in Asia at Chulalongkorn University, with Adisorn

Fig. 5 Case of hand surgery in clinical practice at Chularat 3 Hospital.

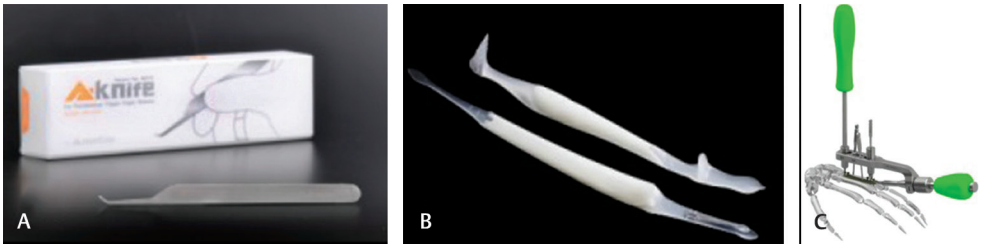

Fig. 4 The sample of Thai innovations. (**A**). A knife, (**B**). MiniSURE for small incision carpal tunnel release, (**C**). Metacarpal locking nail with aiming device.

Fig. 6 The microsurgery course at Thammasat Hospital in 2009.

Fig. 7 The 6th Asia Pacific Federation of Society for Surgery of the Hand (APFSSH) in Bangkok in 2006.

Patradul as the president and Somsak Leechavengvongs as the exclusive secretary (►**Fig. 8**). There were well-known hand surgeons such as Prof. YK Tu (Taiwan), Prof. A Bhatia (India), Prof. A Muset (Spain) and many more applicants that exceed the acceptable capacity. In 2015, the course was held again at Siriraj Hospital with Panupan Songcharoen as the president and Saichol Wongtrakul as the executive secretary. The well-known surgeons who attended the course were Prof. JA Bertelli (Brazil), Prof. WD Xu (China), Prof. K Doi (Japan). The 3rd Brachail plexus course was held again in 2018 at Lerdsin Hospital with Preecha Chalidapong as the president. The oversea speakers included Prof. C Oberlin (France), Prof. YK TU (Taiwan), Prof. A Bhatia (India), Prof. Chye Yew Ng (England) and Prof. A Lim (Singapore).

The surgery of the hand usually consumes a lot of time and the compensation is quite insufficient, especially in public hospitals. Thus, the popularity among young surgeons is not at the top. Nowadays, there are many fellowship training centers which can train around 14 to 15 hand surgeons annually. The surgery of the hand has been continuing to prosper, starting from orthopedic and plastic surgery to hand and microsurgery. This progression was initiated by many foreign countries such as USA, England, France, China, Japan, Singapore, and more. Together with

Fig. 8 Thailand's 1st Brachial Plexus Cadaveric Dissection Course 2012 at Chulalongkorn University, Bangkok.

the people of Thailand accumulating knowledge, skill, and innovations, many more publications have created a phenomenal impact on the hand surgery society, which has benefited people from across the world.

Conflict of Interest

None declared.

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