Fu-Chan Wei—Surgeon, Innovator, and Leader of the Legendary Chang Gung Microsurgery Center

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Abstract: Fu-Chan Wei is a world-renowned plastic and reconstructive surgeon. He is clearly one of the most influential and innovative surgeons in the history of plastic surgery. The Taiwanese legend is the innovator of the osteoseptocutaneous fibula flap, which revolutionized the reconstruction of composite bone and soft tissue defects in the jaw and extremities. He has pioneered several perforator flaps, including the free style variety. He has taken toe-to-hand microsurgical transplantation to a whole new level. He is not only recognized for his surgical skills and clinical innovations, but also for his vision, leadership, and teaching. The establishment and development of the famous Microsurgery Center at Chang Gung Memorial Hospital is unparalleled anywhere. The international fellowship program in microsurgery there remains the envy of all microsurgical trainees. Dr. Wei and his colleagues have trained and influenced more than 1,500 surgeons from all over the world. The aim of this video article is to share what we learned by interviewing Fu-Chan Wei at Chang Gung. The story of Fu Chan Wei, his colleagues, and the development of the Microsurgery Center in Taiwan is worth knowing. (Plast Reconstr Surg Glob Open 2016;4:e1042; doi: 10.1097/GOX.0000000000001042; Published online 27 September 2016.)

ON THE WAY TO BECOMING A MICROSurgeon

When Fu-Chan Wei got into medical school in Taiwan, he had no idea what plans the future might have for him. It was his destiny and good fortune to meet Dr. Samuel Nordhoff. Sam had come to Taiwan in 1959 as a missionary doctor. He later became the first superintendent of Chang Gung Memorial Hospital.

Fu-Chan Wei and his colleagues were all touched by Dr. Nordhoff’s gracious attitude toward patients. He considered serving patients an act of honoring God. Dr. Nordhoff assigned Dr. Wei, the newly minted plastic surgeon, to “go abroad to bring home something new.” To young Dr. Wei’s mind, that new thing was not clear, but he was determined to honor his mentor.

Following the footsteps of Dr. Nordhoff, Dr. Wei did a fellowship at the University of Toronto from 1979 to 1981. In that setting, everything was interesting to the ambitious Dr. Wei. However, he fell in love with the new field of microvascular surgery. He imagined its potential application in so many areas. This was his birth as a microsurgeon. He then did a hand and microsurgery fellowship at the

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University of Louisville in 1983. This would further define his path.

After finishing his fellowships in North America, Dr. Wei came back to Taiwan to pay his dues to his people. He began building what would become a world leading center in microsurgery.

THE FOUNDATION OF CHANG GUNG AND ITS FAMOUS MICROSURGERY CENTER

The Chang Gung division of plastic and reconstructive surgery has become a world premier center in reconstructive microsurgery. Surgeons there have performed an unparalleled 17,519 free flaps and 4,031 replantations with a 97–98% success rate, and 2,132 brachial plexus reconstructions. How was this center established? Having the right men, the right vision, and the right facilities, Chang Gung Memorial Hospital was founded in 1976 by the Formosa Plastic Group. (See Fig. 1–3, Supplemental Digital Content 1, which displays a compilation of images and table from the Chang Gung Microsurgery Center. http://links.lww.com/PRSGO/A263.) (See video, Supplemental Digital Content 2, which features an interview with Dr. Fu Chan Wei. This video is available in the Related Videos section of the Full Text article on PRSGlobalOpen.com or available at http://links.lww.com/PRSGO/A264.) They invited Dr. Nordhoff, with his good reputation and love of the people, to become the first superintendent of the hospital. When Dr. Wei’s returned to Taiwan, Dr. Nordhoff supported Fu-Chan’s development of microsurgery at Chang Gung. He began with a heavy load of posttraumatic injuries and reconstructive deformities from head to toe. The volume load rapidly increased and Dr. Wei realized the need for extra hands. This led him to start training microsurgery fellows as early as 1984. He opened the door for younger fellows to go abroad for training and come back to join the ranks. With the training and return of Dr. Hung-Chi Chen and Dr. David Chwei-Chin Chuang, the driving force of microsurgery in Chang Gung tripled. Dr. Wei, Dr. Chen, and Dr. Chuang worked together for years and became friends forever with a harmony rarely seen elsewhere.

Dr. Wei became the chairman of the Department of Plastic and Reconstructive Surgery in 1994. With three established microsurgeons with different fellowship training, Dr. Wei took the bold step of breaking microsurgery into subspecialties for more focused practices and greater possible development. With the advent of distinguished surgeons such as Dr. Chih-Hung Lin and Dr. Ming-Huei Cheng, Dr. Wei further divided his talented group into trauma, head and neck, breast, lymphedema, and peripheral nerve reconstruction teams.

With a solid faculty in place, Dr. Wei changed his personal focus from trauma to head and neck reconstruction, leaving Dr. Lin in charge of the trauma division. This willingness to share, or as Dr. Wei puts it: “To keep smart people around you, you have to give them a share of the cake”, proved invaluable strategy. Dr. Lin, who is now the Chairman, became a world-renowned extremity surgeon. Dr. Chuang is now a recognized world expert in peripheral nerve surgery and facial reanimation. Dr. Cheng has become a major force in lymphedema and breast reconstruction. Most importantly, all these talented surgeons continue to work together as one team under one roof.

Dr. Wei oversaw the establishment of the Microsurgical Intensive Care Unit (MICU) in 1988. This was the first intensive care unit dedicated solely to microsurgical reconstruction. The recently renovated MICU now has 24 beds taken care of by highly trained nurses who are skillful in flap and replant monitoring. Usually, the patient is kept in the MICU for 5 days, and monitored intensively each half hour for the first day, each 1 to 2 hours for the second day, and every 4 hours for the rest of their stay. Undeniably, the MICU is a key factor in Chang Gung’s 97–98% success rate in free flap surgery. It plays a pivotal role in such a center where several microsurgical cases are done daily.

Dr. Wei directed the foundation of the Microsurgery Rehabilitation Center along with the MICU in 1988. He recognized that physical therapy and rehabilitation are mandatory to maximize patients’ gain and functional outcome. Today, 15 therapists provide full care to patients after microsurgical reconstruction.

BECOMING A LEADER IN MICROSURGERY

When and how does someone like Dr. Wei become a legend in microsurgery? It starts with a kind, gentle, and sharing manner. It grows with an amazing list of innovations, scientific papers, and achievements. It matures with international connection and recognition built up over years to culminate in earning the title and respect of being legendary.

When we asked Dr. Wei about his contributions to plastic surgery, he said: “There is nothing new under the sun. I really stand on the shoulders of our great leaders. I absorbed their knowledge and refined it over time until it became new in itself. I presented it in reproducible way that every surgeon could learn and use”.

Dr. Wei is best known for the following major accomplishments. A major innovation was the reliable
skin paddle in the fibula osteoseptocutaneous flap. The fibula was introduced by Ian Taylor in 1975 as an osseous flap. The skin was not commonly included in the flap because of its poor reliability. As a result, the reconstruction of compound extremity defects was usually done in two stages: soft tissue coverage followed by second-stage bone reconstruction. Dr. Wei conducted anatomic studies as early as 1983, published in 1986, in which he clarified the blood supply to fibula skin paddle. He proved that a large skin paddle (14 × 24 cm) could be reliably transferred along with the fibula. (See Fig. 4, Supplemental Digital Content 1, http://links.lww.com/PRSGO/A264.) This innovation rapidly changed previously daunting extremity and mandibular reconstruction by permitting one-stage reconstruction with its superior bone healing, earlier return to work, and reduced treatment cost.

The second major contribution was advancing the esthetic and functional reconstruction of the mandible. With Chang Gung Memorial Hospital as a key referral center, Dr. Wei and his colleagues became heavily involved in mandible reconstruction. The large volume permitted them to maximize the cosmetic and functional outcomes of their reconstructions for better results for their patients. This led them to osseointegrated dental implants and single-stage total mandibular rehabilitation with inferior alveolar nerve repair and osseointegrated dental implants. (See Figs. 5 and 6, Supplemental Digital Content 1, http://links.lww.com/PRSGO/A264.) Chang Gung pioneered osseointegrated dental implants and total "like with like" reconstruction of the mandible. A total of 1,743 osteoseptocutaneous fibula flaps have been performed in Chang Gung (82.3% for head and neck reconstruction).

The third key contribution was the development and refinement of many aspects of toe-to-hand surgery. The microsurgical transplantation of the toe to the hand was first conceived and performed by Buncke, Yang, and Cobbet. Dr. Wei modified the basic technique to make the surgery safer and more reliable by adopting a retrograde dissection which bypasses the anatomic variations in the first web space of the foot. He also proposed the trimmed great toe technique to enhance the shape of the great toe and make it more like a thumb, yet maintain its joint function. (See Fig. 7, Supplemental Digital Content 1, http://links.lww.com/PRSGO/A264.) He modified the technique of combining the second and third toe to minimize donor site morbidity. He innovated other combinations of two or more toe transfers, such as the combined third and fourth toe transfer. He became able to help patients with bilateral metacarpal hands with toe transfers. He added clear, straight forward classifications and reconstruction algorithms. Dr. Wei and his colleagues have even successfully transferred five toes to the hand while maintaining good foot function. (See Fig. 8, Supplemental Digital Content 1, http://links.lww.com/PRSGO/A264.) In Chang Gung, a total of 2,083 toes have been transferred in 1,871 patients with a 97% success rate. (See Fig. 9, Supplemental Digital Content 1, http://links.lww.com/PRSGO/A264.)

Dr. Wei’s fourth major pioneering effort was in perforator flap surgery. He refined and popularized the surgical technique to a degree that the anterolateral thigh (ALT) flaps and other perforator flaps are now the first-line choice for many reconstructions. A total of 5,216 ALTs have been performed in Chang Gung since 1991 (87.5% for head and neck reconstruction). (See Figs. 10 and 11, Supplemental Digital Content 1, http://links.lww.com/PRSGO/A264.) Moreover, he popularized a new revolution in perforator flap surgery with the concept of the free style and pedicled perforator flaps. These have granted surgeons the freedom to raise flaps from everywhere in the body as long as a Doppler signal could be detected. They have also greatly diminished concerns about anatomic variations.

The promotion of the anterolateral thigh flap and the fibula osteoseptocutaneous flap from lower extremity has allowed surgery to be done in a two-team fashion, minimizing surgery time and maximizing surgeon productivity.

Last but not least, Dr. Wei’s commitment to teaching has been a remarkable contribution to microsurgery and humanity. Under his direction, Chang Gung accepts five to six full-time fellows per year. Many local and international visiting scholars come to observe for shorter periods. The different nationalities and training backgrounds of the fellows and observers make the learning experience in Chang Gung diverse and exotic. Surgeons put their differences aside and focus on one thing: advancing microsurgery. With this, the trainees have learned not only premier plastic surgery, but have made international friendships and lifelong bonds. A total of 1,312 fellows and visiting scholars from 71 countries have been trained in the Chang Gung Microsurgical Center since 1984. In this center, many new international leaders of the field have been born. Seventy-five percent of previous fellows have become professors or chairmen. (See Fig. 12, Supplemental Digital Content 1, http://links.lww.com/PRSGO/A264.) (Supplemental Digital Content 2)

All of these many achievements have won him many awards and lectureships. Among them are the very prestigious American Plastic Surgery Foundation Outstanding Achievement in Clinical Research Award and the American Association of Plastic Surgeons’ highest award, the Honorary Award.

CHANG GUNG WIZARDS

Remember upon the conduct of each depends the fate of all

—Alexander the Great.

Dr. Wei always emphasizes the fact that he has managed achievements and fame by being part of an excellent team of surgeons at the Chang Gung Microsurgery Center. It is the interaction and cooperation of all of the superstars that made the Chang Gung team capable of achieving extraordinary results. Of his many wizard colleagues, Dr. Wei pays high tribute to the following individuals.
Hung-Chi Chen, MD, PhD

Dr. Chen is a true master in the art of microsurgery and quite well-known for his impressive work on voice reconstruction by the transfer of the jejunum to esophagus. Dr. Chen currently is the Director of International Medical Service Center in China Medical University Hospital, Taiwan.

David Chwei-Chin Chuang, MD

Dr. Chuang is best known for brachial plexus reconstruction and facial reanimation. His experience of more than 1,500 brachial plexuses in adults and 500 brachial plexuses in children makes him a world expert in this field. He has won many awards such as the Wang Min-Ning National Health Contribution Award in 2000. He is currently president of the World Society of Reconstructive Microsurgery.

Chih-Hung Lin, MD

Dr. Lin is now the Chairman of the Division of Plastic and Reconstructive Surgery at Chang Gung Memorial Hospital. He is best known for his superb microsurgical skills and extremity reconstruction. Dr. Wei considers him the number one world expert in the field of trauma reconstruction.

Ming-Huei Cheng, MD, MBA

Dr. Cheng is currently the Vice Superintendent of Chang Gung Memorial Hospital. He was the Godina Fellow in 2007. He is one of the world’s leading experts in the surgical management of lymphedema and an exceptional master microsurgeon.

Yu-Te Lin, MD

Now the head of trauma division at Chang Gung Memorial Hospital, Dr. Lin is an outstanding hand surgeon and has contributed to the shunt restriction concept to make venous flaps more reliable. He also contributed to the extensor mechanism anatomy of the lesser toes to reduce extension lag in vascularized joint transfer.

Seng-Feng Jeng, MD

Now the Vice Superintendent, and the Chief of the Division of Plastic Surgery at E-Da Hospital, a major medical center in the south of Taiwan, Dr. Feng is Dr. Wei’s first domestic fellow. He is an innovative surgeon with international recognition in head and neck microsurgical and pedicle free style flaps in various reconstructions.

Yur-Ren Kuo, MD, PhD

Dr. Kuo was a Godina fellow in 2009. He is well-known for his contribution in allotransplantation research. A team led by him and supervised by Dr. Wei succeeded in the first hand and forearm allotransplantation performed in Taiwan.

The Craniofacial Team

There is another famous team in Chang Gung that has gained international recognition and contributed significantly to plastic surgery. This craniofacial team has many world-renowned surgeons, such as Yu-Ray Chen, Philip Chen, Lun-Jou Lo, Chien-Tzung Chen, and Zung-Chung Chen. The team practice covers cleft lip and palate, craniofacial anomalies, orthognathic surgery, facial trauma, and ear reconstruction.

PEARLS OF WISDOM FROM DR. WEI

Success comes from courage. One should never fear to attempt. It is crucial that surgeons, especially young ones, have faith in themselves but remain humble and respectful to those who came before. Success is welcomed as long as we are becoming men of value and honor. Our ability to excel comes only from the grace of our patients. Finally, and easier said than done: Do not lose yourself in your work. Your family needs you and your friends need you. Be always well-connected.

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