Ng Teng Fong General Hospital

MEDIA RELEASE

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A NEW FOOT FORWARD FROM ANOTHER – NEW ORTHOPLASTIC SURGERY AT NG TENG FONG GENERAL HOSPITAL ENABLES 43-YEAR-OLD TO WALK AGAIN

SINGAPORE – Ng Teng Fong General Hospital (NTFGH) has performed an innovative combination of novel surgical procedures to save a severely infected diabetic foot from major amputation. This is the first-ever combined orthoplastic procedure of its kind for treating severe infection and restoring foot structure in Singapore.

This novel orthopaedic procedure, Transverse Tibia Transport (TTT), involves creating a small bone window in the tibia and using a specialised device to stimulate controlled movement of the bone window. This increases blood flow to the affected limb, prevents further tissue death and reduces the need for amputation. This procedure was introduced to Singapore for the first time by the team from NTFGH in May 2024. This technique was crucial in reversing the vicious cycle of progressive gangrene in 43-year-old Lau Ming Jie's (刘铭杰) foot, enhancing vascularization, and aiding in the recovery. The TTT procedure was followed by a reconstruction using a double-barrel free fibula flap, which involved utilising a section of the fibula from Ming Jie's left leg to reconstruct his missing metatarsals. This helps to recreate the foot arches that are necessary for normal walking. With his infection under control and his foot reconstructed, Ming Jie regained the ability to walk on his own. This marked the first time both procedures have been performed locally on a single patient. The success of his treatment not only saved his leg but also signifies a notable achievement in medical practice in Singapore, setting a precedent for future diabetic foot management. It suggests that this method for staged reconstruction, combining a TTT with the free fibula flap can become a useful approach in orthoplastic surgery, offering hope to patients with severe diabetic foot infections, who may have otherwise lost their limbs to a major amputation.

Ming Jie was not aware that he is suffering from Type 2 diabetes. Save the occasional thirst and fatigue after a long day at work, Ming Jie had not felt particularly unwell. He only sensed that something was amiss when his right foot became very swollen after stepping on a metal nail while visiting a renovation site. Subsequently, he developed a high fever and had to be admitted to the Emergency Department. He only found out that he had diabetes after going to the hospital with a severely infected right foot.

Ming Jie went through a series of toe and forefoot amputations as the tissues at his foot progressively turned black due to worsening gangrene. As the gangrene continued to progress despite the operations, it became imminent to amputate below the knee to save the rest of his right lower limb. By the second month of his foot injury, Ming Jie could not walk or stand properly as he was not able to maintain his balance. He got depressed at the prospect of losing his leg.

After undergoing four surgeries, Ming Jie, who was then 42 years old, was referred to the specialised team at NTFGH, which members include Adjunct Associate Professor Chen Yongsheng (Prof Chen), Consultant, Orthopaedic Trauma Surgery, NTFGH and Adjunct Assistant Professor Vigneswaran Nallathamby (Prof Vignes), Head of Division & Senior Consultant, Plastic, Reconstructive & Aesthetic Surgery, NTFGH. Prof Chen began the staged reconstructive process with the TTT procedure. After the procedure, the worsening gangrene was soon halted and the infection quickly came under control. Before long, new healthy tissues started growing on the wound bed. Once the worsening gangrene was halted, the next stage was performed.

Prof Chen, Prof Vignes and their teams carried out the Midfoot Fusion and Application of Circular Frame with a Double-Barrel Free Fibula Osteocutaneous Flap Reconstruction procedure on 19 June. This involved Ming Jie going through a 15-hour surgery to insert a metal circular frame from below his knee, followed by the transfer of a fibular bone flap to reconstruct his missing metatarsal bones. He then underwent rehabilitation post-surgery. In July, Ming Jie started to learn to walk again and in August, the frame was removed. Eventually, he could remove his crutches and start to walk unaided. This significantly improved his quality of life.

Ming Jie underwent the following procedures to reconstruct his infected foot:

1) Transverse Tibial Transport[1]: This novel orthopaedic procedure involves creating a bone window in the tibia and using a device to stimulate bone growth and increase blood flow to the affected area. This technique was crucial in reversing the vicious cycle of progressive gangrene in Ming Jie's foot, enhancing vascularization, and aiding in the recovery. The TTT procedure played a crucial role in Ming Jie's recovery by improving blood circulation to his severely infected foot.

   Overall, the TTT procedure was a pivotal component in the multidisciplinary treatment approach, contributing significantly to the successful outcome of preserving Ming Jie's leg and restoring his mobility.

2) The next stage focused on the thorough cleaning of infected tissues and stabilising the foot using external fixation devices. This step was essential in preparing the foot for subsequent reconstructive procedures.

3) Reconstruction using the Double-Barrel Free Fibula Flap: In addition to the TTT procedure, the team performed a series of complex reconstructive surgeries. Prof Vignes and his team executed a free tissue transfer, moving bone, soft tissue and skin from Ming Jie's healthy leg to the affected one. This intricate microsurgery involved reconnecting tiny blood vessels to ensure the transplanted tissue would survive in its new location. As part of the reconstructive efforts, the team reconstructed the missing second and third metatarsals (i.e. part of second and third toes) using bone from his left fibula.

[1] Transverse tibial transport (TTT) is a medical technique used to treat chronic ischemic conditions of the lower extremities, such as diabetic foot ulcers. It involves the gradual lateral movement of a segment of the tibia to stimulate angiogenesis and improve blood circulation in the affected area. This technique is based on the law of tension-stress, which promotes tissue regeneration by applying controlled mechanical stress to the bone and surrounding tissues. The procedure has been shown to enhance the healing of diabetic foot ulcers by improving local blood flow and encouraging the formation of new blood vessels. It is considered a promising treatment option, particularly for patients with severe or non-healing wounds.

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Ming Jie required extensive rehabilitation during his four-month stay to prevent muscle deconditioning, which was essential for preserving muscle strength and aiding his ability to walk again. This innovative surgical approach reduced the risk of infection, facilitating a smooth recovery and improving his quality of life.

“The innovative surgery was a turning point for Ming Jie. As with many diabetic patients, there remains a risk of future complications, such as new infections or wounds because the transferred skin in Ming Jie's case lacks sensation, which increases the risk of unnoticed injuries and subsequent infections. Efforts have been made to connect a sensory nerve to the flap skin in Ming Jie's case to promote sensation and this process can take one to two years. Continuous monitoring and proactive management of his diabetes are essential to prevent recurrence and maintain foot health,” said Prof Chen. Ming Jie will also require continued physical therapy to strengthen his foot and leg muscles, further enhancing his mobility and preventing muscle deconditioning.

“It was truly a miracle that I can stand on my right foot and walk out of the hospital on my own. I am very grateful for the wonderful care I received from Prof Chen, Prof Vignes and the rest of the healthcare team in NTFGH who helped me to walk again,” said Ming Jie.

Ming Jie’s surgery is a high-risk treatment that would not have succeeded without a multidisciplinary team of healthcare professionals from disciplines including plastic surgery, orthopaedics, vascular surgery, nursing and podiatry, who tirelessly helped and supported him throughout this journey.

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Chinese Glossary

Ng Teng Fong General Hospital (NTFGH)	黄廷方综合医院
Transverse Tibia Transport (TTT)	胫骨横向骨搬移
Adjunct Associate Professor Chen Yongsheng Consultant Division of Orthopaedic Trauma Surgery Ng Teng Fong General Hospital	陈永胜客座副教授 顾问医生 骨科创伤外科 黄廷方综合医院
Adjunct Assistant Professor Vigneswaran Nallathamby Head of Division & Senior Consultant Division of Plastic, Reconstructive & Aesthetic Surgery Ng Teng Fong General Hospital	Vigneswaran Nallathamby 客座助理教授 主任兼高级顾问医生 整形及重建手术科 黄廷方综合医院

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About the National University Health System (NUHS)

The National University Health System (NUHS) aims to transform how illness is prevented and managed by discovering causes of disease, development of more effective treatments through collaborative multidisciplinary research and clinical trials, and creation of better technologies and care delivery systems in partnership with others who share the same values and vision.

Institutions in the NUHS Group include the National University Hospital, Ng Teng Fong General Hospital, Jurong Community Hospital and Alexandra Hospital; three National Specialty Centres – National University Cancer Institute, Singapore (NCIS), National University Heart Centre, Singapore (NUHCS) and National University Centre for Oral Health, Singapore (NUCOHS); the National University Polyclinics (NUP); Jurong Medical Centre; and three NUS health sciences schools – NUS Yong Loo Lin School of Medicine (including the Alice Lee Centre for Nursing Studies), NUS Faculty of Dentistry and NUS Saw Swee Hock School of Public Health.

With member institutions under a common governance structure, NUHS creates synergies for the advancement of health by integrating patient care, health science education and biomedical research.

As a Regional Health System, NUHS works closely with health and social care partners across Singapore to develop and implement programmes that contribute to a healthy and engaged population in the Western part of Singapore.

For more information, please visit www.nuhs.edu.sg.

About the Ng Teng Fong General Hospital

JurongHealth Campus is a part of the National University Health System (NUHS) group, serving the community in the western region. JurongHealth Campus comprises Ng Teng Fong General Hospital (NTFGH) and Jurong Community Hospital (JCH) which were designed and built together as an integrated healthcare hub, with more than 1,000 beds, to complement each other for better patient care, greater efficiency and convenience.

NTFGH and JCH were envisioned to transform the way healthcare is provided, and together with the National University Hospital, National University Polyclinics, Jurong Medical Centre, family clinics and community partners, to better integrate healthcare services and care processes for the community in the west.