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關節及肢體重建之新科技及趨勢

New Treading & Technology in Joint and Limb Reconstruction

時　　間：113 年 6 月 22 日(星期六) 09:00~12:00
地　　點：臺北榮民總醫院 中正 18 樓骨科部會議室

08:50-09:00	***Opening Remarks***	
	座長: 邱方遙 醫師 (Fang-Yao Chiu)	
09:00-09:30	惡性腫腫瘤之免截骨生物性重建 Pedicle Freezing by Freezing Tank for Malignant Bone Tumors	吳博貴醫師 Po-Kuei Wu
09:30-10:00	骨質疏鬆是否影響關節手術的預後? 骨骼健康優化或許扮演一個重要的角色 Osteoporosis Influences the Joint Replacement? Bone Health Optimization May Play an Important Role	林育寬醫師 Yu-Kuan Lin
10:00-10:30	***Coffee Break***	
	座長: 吳博貴 醫師 (Po-Kuei Wu)	
10:30-11:00	遠端脛骨生物性重建，從解剖、植骨生物特性到生物力學 From Anatomy to Graft Biomechanics and Biology: Case Studies in Distal Tibia Biological Reconstruction	陳冠林醫師 Kuan-Lin Chen
11:00-11:30	依據年齡而制定的遠端骨肉瘤生物性重建 Biological Reconstruction for Distal Femur Osteosarcoma: Different Strategies for Different Age Groups	王柏涵醫師 Pai-Han Wang
11:30-12:00	當膝關節置換手術遇到關節外畸形的不同處理策略 Innovations in Managing Extra-Articular Deformity in Primary Total Knee Arthroplasty: A Comprehensive Approach	陳昭銘醫師 Chao-Ming Chen

Pedicle freezing by freezing tank for malignant bone tumors

惡性腫腫瘤之免截骨生物性重建

Po-Kuei Wu
吳博貴
Joint Reconstruction,Department of Orthropaedics and Traumatology, Taipei Veterans General Hospital, Taipei, Taiwan, ROC
Therapeutical and Research Center of Musculoskeletal Tumor, Taipei Veterans General Hospital, Taipei, Taiwan, ROC
臺北榮民總醫院 骨科部 關節重建科
臺北榮民總醫院 骨科部 骨骼肌肉腫瘤治療研究中心

Background and Aim:Biological reconstruction of limbs affected by osteosarcoma is frequently assisted by liquid nitrogen cryoablation of resected tumor-bearing bones. In the present study, we have adopted an appropriately designed freezing tank with increased flexibility in positioning to assist pedicle-freezing. We aim to compare the peri-surgical improvements and complications between free-freezing and freezing tank-assisted pedicle freezing.

Methods:A retrospective review of our hospital database was conducted to screen for eligible patients (n=114) who received adjunctive limb salvage treatments for osteosarcoma during June 2017 to January 2019. After excluding patients who received treatments other than cryoablation and autograft biological reconstruction, a total of 41 patients had received free-freezing (n=20) or freezing tank-assisted pedicle freezing (n=21) were deemed eligible. Patient baseline demographics, oncological outcome, union rate and complications were compared between the free-freezing and the freezing tank-assisted pedicle-freezing groups.

Results:The number of osteotomies received was 1.55 per patient (31 osteotomies in 20 patients) in the free-freezing group, whereas it was 0.43 per patient (9 osteotomies in 21 patients) in the freezing tank-assisted pedicle-freezing group. The total number of graft-derived complications including soft tissue failure and structural failure were comparable between the two groups at 1 year after surgery. Three incidences of atrophic nonunion (9.7% of osteotomies) were observed in the free-freezing group, and none occurred in the freezing tank-assisted pedicle freezing group. Tumor progression and early infection occurred in 5% of patients treated by free freezing, and none was observed in those treated by freezing tank-assisted pedicle-freezing.

Conclusion:Freezing tank-assisted pedicle-freezing and free-freezing demonstrated comparable oncological outcome, but pedicle-freezing was associated with shorter time-to-union, lower non-union rate, an improved trend of osteotomy healing and functional recovery.

Biological reconstruction for distal femur osteosarcoma: Different strategies for different age groups

依據年齡而制定的遠端骨肉瘤生物性重建

Pai-Han Wang
王柏涵
Joint Reconstruction, Department of Orthropaedics and Traumatology, Taipei Veterans General Hospital, Taipei, Taiwan, ROC
臺北榮民總醫院 骨科部 關節重建科

Osteosarcoma usually occurs around the metaphysis of the distal femur or proximal tibia and needs wide excision with the adjacent joint and replacement by biological reconstruction or a megaprosthesis.
An advantage of this surgery is that it maintains the adjacent joint and preserves the growth of the residual epiphysis, which provides excellent limb function. Various reconstruction options are available, including allograft, tumor-devitalized autograft, vascularized fibula graft, distraction osteogenesis, and custom-made implants.

Surgical strategy for biological reconstruction after tumor wide excision can be determined by the patient's age and the location of the tumor. Locations of extremity osteosarcomas. Patients with major invasion of tumor across the diaphysis were classified as "diaphysis". "Type I" denotes tumor border does not invade beyond the epiphyseal line or plate and is at least ≥1 cm from these structures; "Type II" denotes tumor is <1 cm from the epiphyseal line or plate ; and "Type III" denotes tumor is invading beyond the epiphyseal line or plate. Type I tumor may be managed by intercalary resection and preserves patient's growing potential. Bone prosthetic composite may contribute to good function and quality of life. However, leg length discrepancy is an issue when facing the younger age group. Osteconcondral reconstruction can be done by pedicle freezing and ligament reconstruction. Tumor recurrence and instability will occur in some percentage. Fusion is an old fashion done by allograft and trident fixation. Few cases survive well and still preserve acceptable leg length discrepancy.

From anatomy to graft biomechanics and biology: Case studies in distal tibia biological reconstruction

遠端脛骨生物性重建，從解剖、植骨生物特性到生物力學

Kuan-Lin Chen
陳冠林
Joint Reconstruction, Department of Orthropaedics and Traumatology, Taipei Veterans General Hospital, Taipei, Taiwan, ROC
臺北榮民總醫院 骨科部 關節重建科

Treating malignant bone sarcoma around the ankle presents significant challenges, with various techniques proposed for management. Reconstruction options include endoprosthesis or biological methods employing allograft or recycled autograft. This study focuses on the long-term follow-up and natural progression of biological reconstruction following wide excision for ankle bone sarcoma.

From 2004 to 2024, consecutive cases of biological reconstruction following wide excision for ankle bone sarcoma were included. A total of 33 patients were included, with a median follow-up duration of 120 months. All patients underwent wide excision, graft reconstruction (either autograft or recycled autograft), and syndesmotic fusion. Initial permanent ankle arthrodesis was performed in 15 cases, with plating-based fixation used in 28 cases and intramedullary nail in five cases. Oncological outcomes, functional status, and graft-related imaging findings were recorded.

Biological reconstruction following wide excision for bone sarcoma around the ankle proves to be a viable option. However, the optimal fixation strategy lacks direct comparison in long-term follow-up studies. This long-term report on the natural course of biological reconstruction around the ankle provides insight into fixation construct planning and future implant design.

Innovations in managing extra-articular deformity in primary total knee arthroplasty: A comprehensive approach

當膝關節置換手術遇到關節外畸形的不同處理策略

Chao-Ming Chen
陳昭銘
Joint Reconstruction, Department of Orthropaedics and Traumatology, Taipei Veterans General Hospital, Taipei, Taiwan, ROC
臺北榮民總醫院 骨科部 關節重建科

Total knee arthroplasty (TKA) remains the gold standard for treating end-stage knee osteoarthritis and other degenerative joint diseases. However, the management of concomitant extra-articular deformities presents a unique set of challenges that require innovative approaches to ensure optimal outcomes for patients. Herein, we would like to review recent advancements in the management of extra-articular deformity during primary TKA, focusing on the integration of navigation, robotic surgery, personalized 3D printing jig design, computer simulation, and concomitant extra-articular osteotomy.

Navigation systems, including image-less and image-based systems, have revolutionized TKA by providing real-time feedback to surgeons, enabling precise implant positioning and alignment. In the context of extra-articular deformities, navigation assists in preoperative planning and intraoperative execution, facilitating the correction of complex alignment abnormalities while preserving bone stock and soft tissue integrity. Similarly, robotic-assisted surgery offers enhanced precision and accuracy, particularly in cases requiring intricate bone resections and ligament balancing to address extra-articular deformities. The combination of navigation and robotics represents a synergistic approach to achieving optimal implant positioning and alignment while minimizing intraoperative variability.

On the other hand, preoperative computer simulation and personalized 3D printing technology have emerged as a valuable tool in the management of extra-articular deformities, allowing for the creation of patient-specific cutting guides and jigs tailored to the individual anatomy of each patient. These custom-made instruments improve the accuracy of bone resections and facilitate the correction of deformities with greater precision and reproducibility. Furthermore, computer simulation enables virtual preoperative planning, allowing surgeons to visualize the desired correction and anticipate potential challenges before entering the operating room. This can be much helpful when performing concomitant extra-articular osteotomy in a single surgical session.

In conclusion, the management of extra-articular deformity in primary TKA requires a comprehensive and multidisciplinary approach, integrating the latest advancements in navigation, robotic surgery, personalized 3D printing jig design, computer simulation, and concomitant extra-articular osteotomy. By leveraging these technologies and techniques, surgeons can achieve optimal outcomes and improve the quality of life for patients with complex knee pathology.

Osteoporosis influences the stem results of total hip replacement? Bone health optimization may play an important role

骨質疏鬆是否影響全人工髖關節術後骨柄的預後？骨骼健康優化或許扮演一個重要的腳色

Yu-Kuan Lin
林育寬
Joint Reconstruction, Department of Orthropaedics and Traumatology, Taipei Veterans General Hospital, Taipei, Taiwan, ROC
臺北榮民總醫院 骨科部 關節重建科

The volume of total joint arthroplasty (TJA) procedures has risen in recent decades. On the basis of 2000 ~ 2014 data, the primary total hip replacement (THR) grows up to 71%, to 635,000 procedures on 2030.

The prevalence of osteoporosis in patients undergoing THR is up to 24.8%, and the prevalence is significantly higher in females (29%) than male. However, only 33% of them are treated for osteoporosis before surgery. The low bone marrow density (BMD) highly corresponds to associated complications after TJA, such as periprosthetic fracture, stem subsidence, and aseptic loosening. Aro HT, et al. mentions less BMD is associated to more stem subsidence. Lee SW, et al mentions osteoporosis decreases the osseointegration of the stem in THR, and it increases the risk of stem subsidence and stem loosening. Due to this, bone health optimization may play an important role for patient before TJA procedures. Anti-osteoporosis treatment prevents early periprosthetic bone loss after uncemented THA and lower all-cause mortality after fracture surgery comparing with patients who don’t receive further treatment.