(19)

子宮移植之臨床經驗與最新發展-台灣未來展望

Uterine Transplantation: Clinical Experience and Recent Advances - Future Directions for Taiwan

時　　間：115 年 6 月 27 日(星期六) 13:00~17:30
地　　點：臺北榮民總醫院 中正樓 18 樓骨科部會議室

13:00-13:30	***Opening Remarks***	陳怡仁部長 Yi-Jen Chen
	座長：曾令民 副院長 (Ling-Ming Tseng) 許博欽 副校長 (Bor-Ching Sheu)	
13:30-14:30	子宮移植受贈者手術之技術演進與臨床成果 Technical Evolution and Outcomes of back-table technique and recipient surgery for uterine transplantation	Giuliano Testa MD, MBA, FACS (美國)
14:30-15:00	免疫抑制劑於子宮移植之應用 Immunosuppressive Strategies in Uterus Transplantation	黃瑩瑀藥師 Ying-Yu Huang
15:00-15:15	Discussion	賴宗炫主任 Tsung-Hsuan Lai
15:15-15:30	***Coffee Break***	
	座長：陳國瑚 理事長 (Kuo-Hu Chen) 顏家瑞 副署長 (Chia-Jui Yen)	
15:30-16:30	子宮移植之手術創新與免疫策略：機器手臂輔助活體捐贈子宮切除術及受贈者長期免疫監測 Uterine Transplantation: Surgical Innovation in Robot-Assisted Living Donor Hysterectomy and Immunosuppressive Strategies with Long-Term Monitoring in Recipients	Liza Johannesson MD. PhD. (美國)
16:30-17:00	大動物異體子宮移植：臺北榮民總醫院之動物模型經驗 Allogeneic Uterine Transplantation: Animal Model Experience in Taipei Veterans General Hospital	趙偉廷醫師 Wei Ting Chao 郭芳成醫師 Fang-Cheng Kuo
17:00-17:15	Discussion	蔡昕霖教授 Hsin-lin Tsa
17:15-17:30	***Closing Remark***	洪煥程理事長 Huann-Cheng Horng

Technical evolution and outcomes of back-table technique and recipient surgery for uterine transplantation

子宮移植受贈者手術之技術演進與臨床成果

Giuliano Testa

Baylor University Medical Center, Annette C. and Harold C. Simmons Transplant Institute, Living Donor Liver Transplantation, USA

Texas Christian University and the University of North Texas Health Science Center School of Medicine, Medical Education, USA

Background: Uterine transplantation (UTx) has emerged as a viable treatment for women with absolute uterine factor infertility. Advances in surgical techniques, particularly in back-table preparation and recipient surgery, have been critical to improving graft viability and reproductive outcomes.

Objective: To evaluate the technical evolution of back-table techniques and recipient surgical procedures in uterine transplantation and assess their impact on clinical outcomes.

Methods: A review of reported clinical cases and surgical protocols was conducted, focusing on innovations in graft preparation, vascular anastomosis, ischemia time reduction, and postoperative management. Comparative analysis of early and recent UTx procedures was performed to identify improvements in surgical efficiency and patient outcomes.

Results: Refinements in back-table techniques, including meticulous vascular dissection and optimized preservation methods, have significantly reduced ischemic injury. Advances in recipient surgery, such as minimally invasive approaches and improved vascular anastomosis strategies, have enhanced graft survival rates. These developments have contributed to increased success in menstruation restoration and live births following transplantation.

Conclusion: Continuous technical advancements in both back-table preparation and recipient surgery have substantially improved the safety and efficacy of uterine transplantation. Further standardization and innovation are expected to enhance long-term graft function and reproductive success.

Keywords: Back-table technique; Graft survival; Recipient surgery; Uterine transplantation; Vascular anastomosis

Uterine transplantation: Surgical innovation in robot-assisted living donor hysterectomy and immunosuppressive strategies with long-term monitoring in recipients

子宮移植之手術創新與免疫策略：機器手臂輔助活體捐贈子宮切除術及受贈者長期免疫監測

Liza Johannesson

Baylor University Medical Center, Annette C. and Harold C. Simmons Transplant Institute, USA
Texas Christian University, Department of Surgery, USA

Background: Uterine transplantation (UTx) has evolved from an experimental procedure to a clinically viable treatment for absolute uterine factor infertility. Milestones in surgical innovation, including robot-assisted living donor hysterectomy and improved immunosuppressive strategies, have significantly influenced graft survival and reproductive outcomes.

Objective: To analyze the evolution of uterine transplantation with emphasis on robot-assisted living donor hysterectomy, immunosuppressive protocols, and their impact on long-term clinical and reproductive outcomes.

Methods: A narrative review of clinical cases, surgical advancements, and longitudinal studies was performed. Emphasis was placed on the transition from open to minimally invasive and robotic donor surgeries, developments in immunosuppressive regimens, and recipient monitoring protocols. Outcomes assessed included donor morbidity, graft survival, rejection incidence, and live birth rates.

Results: The evolution of UTx has demonstrated marked improvements in both surgical safety and efficacy. Robot-assisted donor hysterectomy has reduced intraoperative complications, minimized blood loss, and enhanced recovery. Advances in immunosuppression, including individualized and reduced-intensity regimens, have lowered rejection rates while maintaining graft function. Long-term follow-up indicates sustained graft viability, restoration of menstruation, and increasing numbers of successful live births, reflecting improved overall outcomes compared to early UTx experiences.

Conclusion: Continuous evolution in surgical techniques and immunosuppressive management has transformed uterine transplantation into a more reliable and effective clinical option. These advancements have led to improved donor safety, better graft outcomes, and enhanced reproductive success, supporting the ongoing development and standardization of UTx programs.

Keywords: Graft outcomes; Immunosuppression; Robot-assisted hysterectomy; Surgical evolution; Uterine transplantation

Allogeneic uterine transplantation: Animal model experience in Taipei Veterans General Hospital

大動物異體子宮移植：臺北榮民總醫院之動物模型經驗

Wei-Ting Chao

趙偉廷

Department of Obstetrics and Gynecology, Taipei Veterans General Hospital, Taipei, Taiwan, ROC

Department of Obstetrics and Gynecology, School of Medicine, National Yang Ming Chiao Tung University, Taipei, Taiwan, ROC

Institute of Clinical Medicine, National Yang Ming Chiao Tung University, Taipei, Taiwan, ROC

台北榮民總醫院 婦產科

國立陽明交通大學醫學院 婦產科

國立陽明交通大學臨床醫學研究所

Background: Uterine factor infertility (UFI) remains a major challenge in reproductive medicine. Uterine transplantation (UTx offers the only clinical solution enabling these patients to achieve biological gestation and childbirth. This study aims to establish and share the preliminary surgical experiences and postoperative care protocols of an allogeneic uterine transplantation model using swine at Taipei Veterans General Hospital.

Methods: Two female swine (approximately 33 kg) were utilized to establish an allogeneic uterine transplantation model, designated as the donor and the recipient. In the donor swine, meticulous dissection of the uterine graft—including the uterine arteries, primary veins, and internal iliac branches—was performed prior to total hysterectomy and subsequent euthanasia. The retrieved graft underwent ex vivo flushing with cold organ preservation solution for cold ischemic protection. Concurrently, the recipient swine underwent a total hysterectomy, followed by orthotopic allogeneic uterine transplantation within the pelvic cavity. Microsurgical techniques were employed for vascular anastomosis (bilateral arterial and venous reconstruction) to secure graft perfusion. Standardized anesthesia, perioperative immunosuppressive modulation, and antibiotic prophylaxis were administered, followed by intensive postoperative monitoring of vital signs, wound healing, and behavioral recovery.

Results: A standardized large animal model for orthotopic allogeneic uterine transplantation was successfully established. The critical benchmarks of the procedure relied heavily on the precision of vascular isolation from the donor and the patency of microsurgical anastomoses in the recipient's pelvic cavity. Preliminary findings demonstrated that comprehensive preoperative preparation, combined with refined microvascular techniques, significantly minimized cold ischemic time and secured adequate graft perfusion. Intensive postoperative monitoring and structured pharmacology (including immunosuppression, multimodal analgesia, and prophylactic antibiotics) were essential for optimizing short-term survival outcomes in this porcine model.

Conclusion: The porcine allogeneic uterine transplantation model is a technically demanding yet highly invaluable platform for clinical translation. Our institutional experience validates the surgical feasibility of orthotopic transplantation and provides a foundational milestone for advancing into future clinical human trials of uterine allotransplantation.