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VIEWPOINT

Quality Improvement in Facial Transplantation: Standard Approach for Novel Procedures

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With 40 procedures reported to date, facial transplantation (FT) is a viable reconstructive option for patients with severe facial defects.[1] A major challenge of FT is developing patient-specific reconstructive strategies, as facial defects can vary widely in potential candidates. This variability and the limited number of procedures performed to date have made the standardization of approaches to FT particularly difficult. The improvement of any process, including FT, relies heavily on standardization if long-term sustainability is to be achieved, and patient safety must remain a top priority in the early stages of surgical innovation. Through teamwork optimization, surgical simulation, methodical use of surgical technology, and the application of efficient perioperative algorithms (Table 1), the senior author (E.D.R) has performed 2 FTs under institutional review board approval. The first was performed in March 2012 and consisted of a total face, double jaw, and tongue transplant in a patient who sustained ballistic midface injury.[2] The second was performed in August 2015 and consisted of a total face, eyelids, ears, scalp, and skeletal subunit transplant in a patient who sustained high surface area burns.[3] Both distinct facial defects were addressed successfully by FT; surgeries and recovery occurred without incident. The patients present excellent aesthetic, functional, and quality of life outcomes.[2,3]

Table 1. Standardized Processes in Clinical Facial Transplants Performed by Our Surgical Team

Standardized Approaches in FT		
Surgical Procedure and Team	**Surgical Technology**	**Workflow**
Allograft procurement	Computed tomography–guided virtual surgical planning	Face and multiorgan procurements
Allograft transplantation	3D printed bone cutting guides	Donor hospital transfer
Donor and recipient surgical teams	Allograft fluorescent angiography evaluation	Perioperative nursing

STANDARD APPROACH TO FACIAL ALLOGRAFT PROCUREMENT, TRANSPLANT, AND SURGICAL TEAM

Seventeen mock cadaveric FTs were performed in preparation for both procedures.[2,3] Furthermore, 2 research allograft procurements were performed in brain dead donors.[2,3] These rehearsals allowed real-time high-fidelity simulation, objective outcomes evaluation, and ensured surgical refinement through repetition. In each simulation, donor and recipient surgical teams work together to reinforce team dynamics and optimize performance before clinical FT.

METHODICAL USE OF SURGICAL TECHNOLOGY

Computerized surgical planning was incorporated into every simulation opportunity and subsequently integrated into both clinical FTs.[2,3] Three-dimensional (3D) models generated from craniofacial computed tomography scans (Fig. 1) are used to identify optimal sites of osteotomy. In addition, personalized cutting guides are designed and 3D-printed for improved intraoperative accuracy.[2,3] During surgery, facial allograft perfusion assessment using indocyanine green fluorescent angiography was performed, before transection of allograft source vessels, and upon completion of the procedure to ensure adequate blood flow.[2,3]

WORKFLOW STANDARDIZATION

Standardization of logistical processes that are critical to FT was implemented, including an algorithm for asynchronous face and multiorgan allograft procurement from brain dead donors[4] and an algorithm for the safe transfer of multiorgan donors to the FT team's home institution in collaboration with the local organ procurement organization.[4] These algorithms focus on ensuring the integrity of lifesaving solid organ allografts, enhancing surgical team safety, and improving communication between donor and recipient teams. Finally, perioperative nursing workflows have been developed in our most recent series of FT simulations.[5]

Through constant and objective self-evaluation, we continue to identify opportunities for process improvement. Our experience serves as proof of concept that exhaustive planning, process standardization, and quality

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Fig. 1. Methodical use of surgical technology and optimization of team dynamics. A, Computerized surgical planning and design of bone cutting guides for precise guidance of osteotomies. B, Team-based surgical planning and simulation. (*Printed with permission from and copyrights retained by Eduardo D. Rodriguez, M.D., D.D.S.).*

improvement are possible for novel surgical procedures with limited worldwide experience.

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DISCLOSURE

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