The First Composite Face and Maxilla Transplant

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The Technical and Anatomical Aspects of the World's First Near-Total Human Face and Maxilla Transplant

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Objective: To discuss the technical and anatomical analysis and design of an osteocutaneous allograft transplant incorporating the donor maxilla and the execution of the operative protocol during the transplant.
Methods: The Cleveland Clinic reported the world's first successful combined face and maxilla transplant in December 2008. Unlike the 3 prior face transplants, this surgical procedure was done as a salvage operation in a patient who had undergone 23 major reconstructive procedures. The additional complexity due to significant postoperative scarring and recipient vessel depletion presented a unique challenge in this case. The extensive 3-dimensional losses of facial structures in multiple tissue planes required a Le Fort III osteomyocutaneous allotransplant incorporating the donor maxilla.
Results: We report the first successful transfer of a complete bony framework and soft-tissue envelope. The allograft has shown excellent integration and no long-term rejection. The traditional conception based on anatomical studies suggested this transfer would require independent dissection of the internal maxillary vascular system. This was not required in our patient whose allograft was based solely on the facial arterial system and its arcades.
Conclusions: Successful near-total face and maxilla allograft transplant can be accomplished based on the facial arterial system and its arcades. This presents a novel method for reconstructing massive facial injuries with significant involvement of the facial skeleton.

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Commentary by Wayne F. Larrabee, MD, and Peter A. Hilger, MD

". . . To be human again."—Face transplant recipient.

THE THOUGHT-PROVOKING ARTICLE[1] BY ALAM AND colleagues from the Cleveland Clinic, reported in the November/December issue of the *Archives of Facial Plastic Surgery*, is based on the operative procedure protocol he authored and his role as the primary microvascular surgeon in the first composite tissue face and maxilla transplant. In his keynote presentation at the most recent meeting of the American Academy of Facial Plastic and Reconstructive Surgery,[2] Alam emphasized that he wanted to tell a story—a story of a woman who lost her humanity and identity when her husband destroyed her face with a rifle blast. The cataclysmic nature of her injury and associated loss of form and function leading to her isolation from human interaction are apparent in photographs taken after numerous surgical interventions using traditional reconstructive techniques (FIGURE).

This patient's simple wish "to be human again" was achieved not through a heroic effort by an isolated surgeon but as Alam acknowledged, a team effort with members recruited from virtually every field in medicine, and the outcome exemplifies what the best surgeons and other physicians have to offer patients. As health care reform dominates public discussion, it is healthy for the public and policy makers to see what an integrated and committed health care team can do with physician leadership. Alam's colleague, Siemionow, also at the Cleveland Clinic, has worked tirelessly for years to assemble the team that has made a quantum leap in care and redefined expectations for facial transplantation surgery.

For more than a generation, physicians and patients have seen the success and improved quality of life associated with solid organ transplantation and no longer see treatment success as noteworthy or an ethical dilemma. The research

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achievements, development of transplant programs, and ethical debates associated with these procedures have faded from public perception. But the extension of these principles to composite facial tissue transplantation has rekindled debate and prompted media attention.[3] The media interest is understandable, given the drama, courage, surgical sophistication, commitment to a cause, and ethical implications affiliated with the care of this facial transplant recipient.

However, several important questions remain. What is different about this transplant? Why was it performed when traditional reconstructive techniques have provided acceptable results for decades? Indeed traditional procedures had been used, but were met with repeated failure resulting in this opportunity, and some would say mandate, for transplantation. Differences between solid organ transplantation and this pioneering venture exist at practical, philosophical, and emotional levels. The technical aspects, as highlighted in the article by Alam et al,[1] are far more complex with the composite tissue allografts (CTA) requiring integration of both the donor and recipient tissues at bony and soft tissue interfaces as well as anastomosis of vessels and sensory and motor nerves. Success would be judged by restoration of form and function. In addition, the antigenicity of skin is far greater than solid organs and the transplant specialists are required to prevent rejection and minimize the risk of infection and development of malignancy. The practicality and success of CTA have increased with more specific techniques of immunosuppression that have fewer adverse effects.[4] Recent animal research in maxillary allotransplantation will further improve understanding of immunologic response and growth properties after these procedures.[5]

The philosophical and emotional considerations surrounding this facial transplant are even greater in some ways than the technical ones. As Darwin noted,

> The movements of expression in the face and body, whatever their origin may have been, are in themselves of much importance for our welfare. They serve as the first means of communication between the mother and her infant; she smiles approval, and thus encourages her child on the right path, or frowns disapproval. We readily perceive sympathy in others by their expression; our sufferings are thus mitigated and our pleasures increased; and mutual good feeling is thus strengthened. The movements of expression give vividness and energy to our spoken words. They reveal the thoughts and intentions of others more truly than do words, which may be falsified.[6]

The human face is so central to an individual's identity that it is understandable that at a deep level this patient felt less than human prior to her transplant.

The technical success resulted in the transformation of this patient, who could return to society and develop intimate and practical relationships with others that define who each person is. Yet the technical success of the procedure created new emotional and spiritual challenges. From a traditional biological perspective, this face transplant patient is now a chimera. This thought fails to appreciate the spiritual nature and is an affront to her character and courage. However, the patient and the donor's family who generously offered this gift will never see her as she was but a person of greater character born through her courage, the expertise of a skilled team, and the humanity of a donor and her family.

As the nation struggles with patient care, health care reform, limited resources, and technological advances, surgeons and other physicians are still left with the human mandate to do the right thing for each individual patient. For this first composite face and maxilla transplant to succeed there had to be the right patient with requisite courage, the right medical team, and the right donor.

Figure. Preoperative and 7-Month Postoperative Images of the Patient

Reprinted from the *Archives of Facial Plastic Surgery*.[1]

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