

Update in Plastic Surgery: Facial Transplantation

Ioan LASCAR, MD, PhD, FICS; Dragos ZAMFIRESCU, MD, PhD

„Carol Davila” University of Medicine and Pharmacy, Clinic of Plastic Surgery and Reconstructive Microsurgery, Bucharest Emergency Hospital, Bucharest, Romania

Face transplantation has been considered utopic and nearly impossible because of the complexity of the blood supply as well as ethical, psychological, and social implications. However, facial allotransplantation has become a clinical reality, and technical aspects have been managed successfully. In this article, we have summarized available outcome data on the world's experience with face transplantation.

In contrast to visceral solid-organ transplants, a vascularized composite tissue allograft (CTA), or vascularized composite allograft (VCA) is not a single tissue, and is histologically heterogeneous. It is a neurovascularized module of nonvital tissues which include structural, functional and aesthetic units. CTAs are composed of a large spectrum of ectodermal tissues: epidermis and epidermal derivatives such as nails and hair, nerves and mesodermal tissues such as dermis, muscles, bones, articular cartilage, ligaments, tendons and paratenon and other supportive and connective tissues, adipose tissue, vessels (1).

So far only 141 VCA transplantation were carried out on human patients: 72 hand transplantations (30 patients with unilateral transplantation and 21 patients with bilateral hand transplantations), 9 abdominal wall transplan-

tations, 8 bone and vascularized articulations transplantations, 7 peripheral nerves, 2 tendons, 23 larynx, 1 right abdominal muscle, 1 tongue and a lobe made of the cephalic cervical skin and 2 ears, 18 faces.

Facial transplantation is a single, complex operation intended to transform severely deformed features to near-normal appearance and function with the use of techniques that conventional plastic surgery cannot match. Since 2005, a total of 18 patients have received transplants with promising results. Two male recipients died because of transplant-related problems. Most facial transplantations have been designed to restore partial-face defects; full face transplantations include the forehead, eyelids, nose, lips, chin, and cheeks, with or without underlying bone (2).

The indications for transplantation were traumatic facial injury, neurofibromatosis, and facial deformity after tumor resection. Traumatic injuries included animal bites, shotgun blast injury, burns, and falls. Two male recipients died because of transplant-related problems.

According to facial transplantation reports (3), the preferred vessels for arterial anastomoses were the external carotid arteries and their branches, such as external maxillary and facial arteries. The preferred vessels for venous anas-

Address for correspondence:

Dragos Zamfirescu - Bucharest Emergency Hospital, 8, Calea Floreasca, district 1, Bucharest
E-mail: dragoszamfirescu@gmail.com

tomoses were the facial and external jugular veins and the thyrolinguofacial trunks. Both arterial and venous anastomoses were performed using conventional end-to-end microsurgical techniques.

After successful vessel repair, the next step was coaptation of the sensory and motor nerves. As reported (3), the trigeminal nerve is the main sensory nerve and the facial nerve is the main motor nerve repaired during face transplantation. Sensory recovery of face composite tissue allotransplantation was reported in all patients as nearly perfect at 3 to 8 months after transplantation. There was almost no difference between the results of sensory reinnervation after transplantation when compared with the results reported for the free tissue transfers and direct nerve repair cases. Motor recovery following composite tissue allotransplantation was slower and often less optimal when compared with the sensory recovery outcomes.

The donation of the complex tissue that constitutes a face is novel with many concerns, both for the recipient and for the donor's family. For the patient, the match needs to be compatible both immunologically and cosmetically. Thus, a "good match" means that the donor is of the same gender and skin color as the patient and also meets a number of clinical criteria, including a negative cross-match for antibodies that might trigger graft rejection.

For the donor's family, it is crucial to take special care of the psychological aspects of this special donation and to involve ethicists. Because the face is the body part most closely tied to a person's identity, donating the face of a deceased loved one carries unique emotional burdens. □

CONCLUSIONS

Facial allotransplantation is the most complex microsurgical and functional reconstruction currently available to plastic surgeons. It is clear that, following anatomical reconstruction of facial deficits in one surgical procedure, facial transplantation is expected to restore both the functional and aesthetic deficits and to improve psychological and social conditions of this unique group of patients. Despite important adverse events and a short follow-up, recent studies provides further support for the concept that full-face transplantation is able to restore functional defects and to resurface major deficits with the use of conventional immunosuppression and early glucocorticoid withdrawal. However, because face transplantation is still regarded as an "experimental," high-risk procedure carrying a death rate of approximately 11 percent, the selection process and patient inclusion criteria should be evaluated carefully.

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