

Abstract

The recent history of face transplantation includes a few chronological key issues that promoted the development of face VCA in the past few years. In November 2004, following an increasing scientific, social and mass media interest, the Royal College of Surgeons in London released the “Working Party Report on Face Transplantation”, which concluded that at that point further basic science, psychological and translational research was necessary to implement the discipline in human clinical practice. At that moment in time, though, the University of Louisville had published a series of documents pointing out the ethical and scientific relevance of face transplantation in selected patients.

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The same year, the CCNE (Comité Consultatif National d’Ethique) in France was in favour of the

implementation in clinical practice of a partial human transplantation, although expressed its reserve for an integral, full-face transplantation. Few months later, in October 2005, the Ethics Committee of the Cleveland Clinic granted permission for a face transplantation to Dr. Siemionow’s team (world expert and pioneer in experimental face transplantation) to perform face transplantation in humans. In 2005, the American Society of Plastic Surgery (ASPS) produced a similar document to that of the Royal College of Surgeons in London, serving as a clinical guide, recommending the practice of human face programmes in gradual increments. Soon afterwards, human face transplantation became a reality in Amiens, France, where doctors (Dr. Bernard Devauchelle and Dr. Jean Michel Dubernard) within a multidisciplinary



Fig. 2.1 The world's first human face transplantation. The lower third of the face, including the lips and oral commissures, was transplanted

team performed the world's first partial human face transplantation (Fig. 2.1). The intervention was performed on a woman who had suffered the attack of a domestic dog, sustaining the loss of the lower part of her face. Initial and midterm report on the intervention granted the success of the transplantation, followed by good to excellent documentation of sensory and functional recovery. The medical community and society in general had a favourable response to this transplantation. Following this first case, subsequent favourable ethical reports for face transplantation programmes were achieved in the Netherlands (University Hospital Utrecht) and in the UK (Royal Free Hospital, Dr. Peter Butler). At this point in time, a general acceptance was observed on the immunological survival of face transplants, sensory and functional recovery, with a technique far superior to conventional reconstructive surgery.

Few reports on successful face transplantation followed this initial experience. In April

2006, Dr. Shuzhong Guo, at the Xijing Hospital in Xian (China), performed the world's second partial face transplantation in a male patient affected by a traumatic deformity on the lower face caused by a bear's attack. Results were similar to that obtained in the first face transplantation. Other partial face transplantations followed: neurofibromatosis and wound shot injuries to the face in Paris (Dr. Lantieri), wound shot injury to the face in the USA (Dr. Siemionow), electrical burn injury (Boston, Dr. Pomahac) and postoncological deformity and neurofibromatosis in Spain (Valencia, Dr. Cavadas; Seville, Dr. Gomez-Cia). In April 2009, the first partial face and double hand transplantation is attempted (Dr. Lantieri, Paris). Although initially successful, the operation failed few weeks afterwards due to infection and septic shock.

Face transplantation made the final step forward in March 2010. For the first time in the world, the first full face transplantation was performed. The operation was successful, and it resolved many technical, scientific and ethical questions unsolved until that moment. The recipient, a 30-year-old male patient affected by a severe posttraumatic injury from a gunshot injury to the face received a full face transplant (skin, muscle, lips, eyelids, lachrymal apparatus, mucosa, palate, upper and lower teeth, nerves, etc.) that included all face bones (Dr. Barret; Barcelona, Spain). The operation was successful, and the patient regained his pre-morbid status a few months after his operation. This operation changed the approach to face restoration through face transplantation. From that moment on, face transplantation will be performed following aesthetic units with strict reconstructive tenets. Therefore, full-face transplantation will be performed in those patients affected by severe deformities covering different aesthetic units, reserving partial ones for strict aesthetic units.

Currently, a total of 26 face transplantations have been performed worldwide (France 10, USA 7, Spain 3, China 1, Belgium 1, Turkey 3, Poland 1) covering 13 different institutions in the world.

2.1 Vascularised Composite Tissue Allotransplantation

Face transplantation is a perfect example of composite tissue allotransplantation (CTA), more recently termed as vascularised composite tissue allotransplantation (VCA). The progression in reconstructive surgery has made this type of transplantation reconstruction a reality. Composite tissue allotransplantation began in 1998 in human clinic, when a team performed the first human hand transplantation in France. Following this, other parts of the body, including the abdominal wall, limbs, genitals, tendons, larynx, muscles, nerves, tongue and face, have been attempted throughout the world. This is an emerging subspecialty in the field of transplantation (Fig. 2.1). These VCA are distinct from traditional solid organ transplantations (kidneys, liver, heart, lungs, pancreas); however, they have in common the same tenets of transplantation surgery, namely, the necessity of a vascular pedicle for survival and the requirement for an intense immunosuppression regime to prevent rejection. The former

makes an important and relevant difference from allotransplantation of isolated tissues (skin, bones, tendons, etc.), which are used as nonvascularised tissues, being used in clinical practice for many years. Face and hand VCA have been included in an independent classification (Gordon type III) that differs from other types of transplants (Table 2.1), which is based on the surgical complexity and the rehabilitation and psychological impact. Currently, it is accepted that there exist 13 different types of vascularised composite tissue allotransplantation, depending on the combination of tissues, the amount of skin and its antigenicity, making Banff classification a necessity but a lively changing scoring system.

VCA has changed the reconstructive paradigm in plastic and reconstructive surgery. There exist millions of patients with different types of deformities not amenable for a full functional reconstruction with traditional techniques. Common examples are catastrophic deformities to the face (with loss of eyelids, lips, tongue and larynx) and unilateral and bilateral limb amputations. This new field of transplantation has come

Table 2.1 Modified Gordon CTA classification system based on relative complexity

Type	Complexity	Allografts	Characteristics
I	Low	Flexor tendon	1. Absent skin
		Tongue	2. Reduced antigenicity
		Uterus	
		Vascularised nerve	
II	Moderate	Abdominal wall	1. Contain skin
		Face subunit (ear)	2. Absent or less challenging rehabilitation
		Genitalia (penis)	
		Larynx	
		Scalp	
		Trachea	
III	High	Upper extremity (hand)	1. Requires multidisciplinary transplant team
		Face	2. Complex rehabilitation 3. Significant psychological obstacles 4. Complicate cortical reorganisation
IV	Maximum	Concomitant CTA	1. High mortality risk
		Face/hand(s)	2. Extreme difficulty
		Face/tongue rehabilitation	

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to reality following an extensive experimental research that has been translated to human clinic. All published data, regarding experimental work, and the human multidisciplinary approach have proven that a robust team approach in a tertiary hospital setting can produce excellent outcomes, which are technically, psychologically and ethically acceptable.

2.2 Objectives in Face Transplantation

Face transplantation is still evolving, being on its initial phases of development worldwide. Therefore, it is still considered a clinical experimental venture. The implication of these considerations is that it is a new technique with unknown long-term results, especially considering its longevity and chronic rejection. Consequently, the indication for face transplantation has to be made on a case-by-case basis by a multidisciplinary team.

Current objectives of face transplantation include:

1. The introduction of a new method of restorative surgery for patients that present with severe catastrophic face deformities, caused by severe burns, trauma, congenital deformities or tumours, having in common the utilisation of microsurgical techniques and plastic surgery methodology for the transplantation of composite face tissues (Fig. 2.2)
2. To obtain optimal outcomes, both functional psychological and aesthetic, with “restitutio ad integrum” of the deformed structures
3. Optimal reconstruction of the face, with complete restoration of the missing anatomy, not amenable for reconstruction with any other traditional technique(s)
4. To produce the necessary outcomes for the reintegration of the patient into society, family and work market

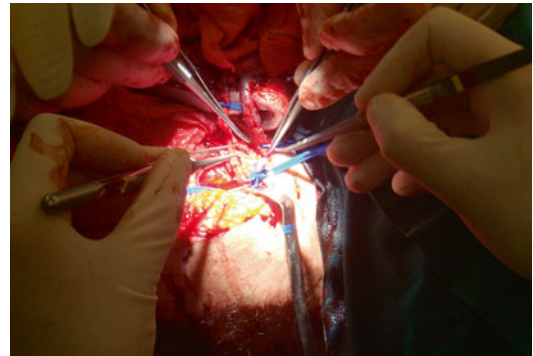


Fig. 2.2 Microsurgical techniques are necessary to perform human face composite tissue allotransplantation

As in many other areas of plastic surgery, the line between what is desirable, necessary and ethical is very subtle.