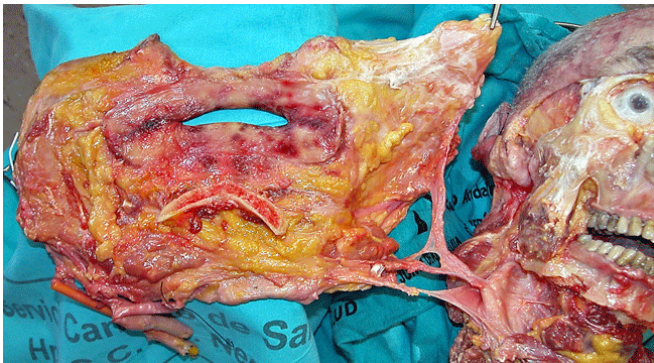


**Figure 4:** Experimental model of a full face transplant in cadaver. (a) External and (b) internal view of the allograft



**Figure 5:** Experimental model of a partial face transplant in cadaver

nerve. This has ensured the full allograft vascularization by preserving muscle-cutaneous perforating vessels between facial muscles and skin component [Figure 4].<sup>[35]</sup>

FAT design has varied depending on tissue components involved, which determines the extent of each surgical procedure.<sup>[36]</sup> Most allografts included cheeks, nose, eyelids and lips, and in some cases the tongue and parotid glands have been transferred. At least half of them contained bone (maxilla and/or mandible, including teeth), which requires open osteosynthesis.<sup>[37,38]</sup>

Despite the complexity of the procedure, surgical primary failure has not been documented, which can be explained by head and neck rich vascularisation and the capability of the teams involved in the procedures.<sup>[39-41]</sup> A significant blood loss has been described during the procedure requiring transfusions.<sup>[42]</sup>

The restoration of the circulation allograft is achieved with relatively few vascular anastomoses. Most anastomosis was performed in large diameter vessels to minimize the risk of thrombosis. Complete revascularization of the face has proved to be possible from the anastomosis of one vascular pedicle,<sup>[43]</sup> and vascular viability of the maxilla, palate and mandible.<sup>[34]</sup> Most teams opted for a bilateral connection of the external carotid or facial arteries. The venous drainage was mainly channeled through the connection of the external jugular, facial or thyrolinguofacial trunk

veins [Figure 5].<sup>[44]</sup> Almost all anastomoses were performed using conventional end-to-end or end-to-side microsurgical techniques.

Regarding facial nerve neurotomy, some teams have accessed to nerve via parotidectomy, performing the nerve connection at recipient main trunk also including the parotid glands in the allograft.<sup>[21]</sup> Other teams have performed the anastomosis at peripheral facial nerve branches doing an intra-parotid nerve dissection<sup>[45,46]</sup> connecting only distal branches to the parotid gland.<sup>[1,47]</sup> Regarding sensory nerves, most teams connected infraorbital and mental nerves<sup>[48-51]</sup> while the supraorbital nerve neurotomy is preferably carried out in full FT.<sup>[35,36,52,53]</sup>

## PRE-TRANSPLANT CONSIDERATIONS

In all cases a brain death donor is required besides the consent of the family. Donors and recipients are matched on the basis of race, sex, blood type, human leukocyte antigen and skin color.<sup>[54,55]</sup> A full psychological evaluation before including the recipient as a candidate on a FT program is essential.<sup>[56]</sup> Evident contraindications are psychological disorders that impair the ability of the recipient to follow the immunosuppressive protocol. Informed consent prior to the FT requires a clear understanding of the risks of surgery, immunosuppressive therapy and potential allograft rejection.

### Recovery strategy of allograft

The cold ischemia period since vascular disconnection of allograft from donor until reperfusion is one of the most important aspects as the rapid removal and transference into recipient is required. In the context of a multi-organ donation, most FT teams have removed “the face in the first place” after cardiac arrest and before organ removal. In worldwide experience to date, most of allografts have been removed from beating heart donors in brain dead. In order to reduce cold ischemia period if multiple organ donations, surgical teams prepared the removal procedure by dissecting most of allografts under maintenance of circulation before clamping.<sup>[1,39,57-59]</sup> If recovery and insertion of allograft are performed in different hospitals, allograft transport should be done in a secure manner in an organ preservation solution, and as quickly as possible to limit the time of ischemia tissues.<sup>[60,61]</sup>

### FT indications

The most common indication was to restore the lower two thirds of the face, especially the perioral and periorbital central zone, including in some cases the forehead, eyelids and scalp, as well as maxilla, mandible and teeth.<sup>[62]</sup> Inclusion criteria of patients in FT programs vary from one center to another. To date only those patients with extensive tissue damage in which conventional reconstruction procedures previously failed have been included.<sup>[49,63,64]</sup>

Most frequent indications were severe burns (including









