

Case Report

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Case Report

# Full-Face Allograft Retrieval in a Multiple Organ Donation in a Controlled Asystole Donor (Maastricht III)

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**Abstract:** Asystole Donation (AD) or donation after cardiac death (DCD) has been shown to be a potential source of transplantable organs. To date, no reports of face procurement with AD has been described, and the "face in first place" with ex-situ perfusion has become the gold standard technique of recovering facial allografts in most of the centers. We report a case of successful total graft face and kidneys procurement from a 47 years old male AD donor. Immediately, after confirmation of death, the "rapid recovery" technique was performed and cannula placed in ascending aorta for face allograft *in situ* perfusion simultaneously to the abdominal team. Total ischemia time from donor cardiac death to face reperfusion in the recipient was 5.5 hours. Excellent function for kidneys and face allograft was reported.

**Keywords:** Face transplantation; Donation; VCA; Asystole; Maastricht III

## 1. Introduction

The first successful partial face transplant was performed in November 2005 in France (1). Until October 2024, worldwide a total of 53 face transplant has been performed (2,3), including the first full face transplant in 2010 (4). Face recovery presents differences from an organizational and logistic point of view. Different approaches have been used when considering face retrieval in a multiorgan donation: procurement of face with intact circulation either at the beginning of the procurement (1) or synchronic *in situ* dissection together with abdominal and thoracic organs (5) or procurement of face allograft at the end of the procurement without intact circulation (3). In the past, most of the face transplantation teams have advocated for a retrieval in heart beating donor with intact circulation, either at the beginning of the operation or during a synchronous procurement.

Herein we present our experience with the retrieval of facial allograft in a controlled asystole donor (Maastricht III). The peculiarity of the case that we describe here is that the donor was a controlled donation after circulatory death (cDCD). The "rapid recovery" (RR) technique was performed for kidneys and complex facial Vascularised Composite Allotransplantation (VCA) procurement and seems that the effect of warm ischemia during the hypotensive phase after the withdrawal of life sustaining therapy (WLST), which characterizes AD, did not interfere in the further good results.

## 2. Case Report

The operation took place in February 2015. A 47-year-old male, dislipemic, and dilated cardiomyopathy with severe systolic dysfunction and severe mitral regurgitation having an

implantable cardioverter defibrillator, was admitted in the Cardiac Intensive Care Unit after sudden cardiac arrest recoverable after 30 min of cardiopulmonary resuscitation. Two days later, a controlled asystole donation was considered because of a devastating brain injury. As no expectation of meaningful survival as determined by the patient's treating physician, consent for withdrawal of ventilatory and organ-perfusion support by the family's patient was obtained, according to the Spanish regulatory framework. Neither lungs nor liver were optimal for donation. However, it was considered to proceed with facial VCA plus kidneys procurement from the current controlled AD.

WLST took place in the operating room and after confirmation of death according to Spanish law and 5 min of non-touch period. Prior to the WLST, the patient was sterile prepped in the standard fashion. Following full heparinization of the donor, rapid thoracotomy and laparotomy were undertaken. Abdominal aorta was cannulated using a 22F cannula and the descending thoracic aorta as clamped. Abdominal organs were perfused with 3L of cold UW solution (Bel-Gen<sup>®</sup> solution, Institut George Lopez, Lissieu, France) and right atrium was opened for drainage. Simultaneously, in the thoracic field, the origin of the ascending aorta was encircled and clamped while a 14F cannula was placed before the origin of the brachiocephalic trunk. The aorta was further cross-clamped in the descending part beyond the origin of the left subclavian artery. Immediately, the facial VCA was perfused through the carotid-jugular system with 2L of cold UW solution (Bel-Gen<sup>®</sup> solution, Institut George Lopez, Lissieu, France) followed by the superior vena cava transection, allowing facial venous system drainage.

The kidneys were procured in standard fashion while the cannula in the ascending aorta was fixed with a purse-string suture and the cold perfusion of facial VCA was maintained slowly throughout the 4h of dissection to avoid rewarming.

The dissection and procurement of the kidneys and the facial allograft was carried out in a synchronous manner.

A full-face allograft was procured including the mandible, temporomandibular joints, maxillary and zygomatic bones. The area of skin, soft tissues and muscles included in the allograft extended from the vertex to the mid neck and the retro auricular area bilaterally. The dissection started from the vertex to the orbital area and laterally to the zygoma. All sensory nerves (supraorbital, infraorbital and dental nerve) and all five branches of the facial nerve were identified and cut at the origin. Osteotomies followed in the maxillary in the zygoma and the glabella performing a Lefort III osteotomy. Dissection proceeded inferiorly to the neck to identify and dissect the external, internal jugular veins and the external carotid artery to the common carotid artery. The internal carotid artery and the internal jugular vein were ligated. At this point, the facial allograft was pedicled on the cervical vessels, which were severed completely freeing the allograft (Figure 1). The dissection was performed with needle point electrocautery and significant vessels were ligated for haemostasis. The face was then packed in sterile contained in the standard fashion and dispatched to the recipient's operating room. The whole procedure lasted 4 hours. At the end of the procedure a custom-made face mask was placed on the donor (6).

The transplantation procedure in the recipient followed the same step-fashion as in previously described face transplantation techniques (4). The first step consisted in the revascularization of the facial allograft to assure that a correct vascularization of the graft prior to the resection of the recipient's facial tissues. To this end, an end-to-end anastomosis between both external carotid arteries was performed. Venous return was achieved with an end to side anastomosis between the internal jugular veins bilaterally. The induction immunosuppression consisted in rabbit antithymocyte globulin rATG (Thymoglobulin; Sanofi, Paris, France) aiming for a total dose of 9mg/kg bodyweight plus prolonged release tacrolimus once daily with intended drug trough level of 10-12ng/mL, Mofetil Mycophenolate at two 1g per day and prednisolone tapering according to our policy. Total cold ischemia time of the face allograft was 5.5 hours.



**Figure 1.** Posterior view of the full-face allograft at the end of the retrieval under a controlled asystole donation. Note that all vessels, nerves and muscles have been identified. The allograft consisted on a full face procurement including mandible, part of the temporal bone, maxillary and zygomas.



**Figure 2.** Complete vascularization was achieved in the recipient. There were not any ischemic area with excellent outcome.

The whole facial allograft showed an excellent and complete arterial perfusion with correct venous return. There were not any ischemic areas of skin, soft tissues or bones. Bleeding was similar to that observed in facial allografts obtained in a heart-beating multiorgan donation with intact circulation. Haemostasis was achieved with electrocautery, bipolar coagulation and ligation of any open blood vessel. The rest of the transplantation was uneventful. The patient showed a full recovery after the operation without any wound problems in the facial allograft. Long term function in the facial allograft has been excellent. All facial muscles have regained normal function. Normal sensation in the trigeminal nerves preceded that of function of the facial muscles. To date, no signs of chronic rejection or other functional or trophic abnormalities have been detected, paralleling those results obtained with previous facial allograft donation with intact circulation.

Kidney function was also reported to be excellent.

### 3. Discussion

Full face allograft procurement in a controlled asystole donation (Maastricht III), including abdominal organs proved to be viable and a safe approach. In our hands, logistics and strategy of multiple organ donation including internal organs was easier than facial allograft procurement in a multiple organ donation in a heart beating donor. The operation was shorter than other previous reports (4.5 hours versus 7.5 in total)(5) without the need for blood products during the procedure. Some VCA transplants centres advocate to limit the ischemia time below 4 hours in order to protect the muscles included in the facial allografts (7,8). Still, there are reports of successful face transplantation with retrieval of face allografts at the end of the multiorgan procurement with longer cold ischemia times (9). This was also our experience. The allograft showed complete viability with excellent facial function after nerve recovery.

This approach proved to be safe and effective with excellent outcome.

We believe that it is a valuable addition to the options of face allograft retrieval in a multiple organ donation. It shall also increase the available pool of donors for vascularized composite tissue allotransplantation.

#### Disclosure

The authors of this manuscript have no conflicts of interest to disclose

**Data Availability Statement:** All data regarding this case report is available in the Electronic Hospital Clinical History of the Patient. According to the European Data Protection Law any confidential information or personal data cannot be disclosed or released to third parties. No personal data is included in this report since it is not relevant for the scientific purpose of the manuscript

### Abbreviation

AD	Asystole Donation
DCD	Donation after Cardiac Death
RR	Rapid Recovery
rATG	rabbit Antithymocyte Globulin
UW	University of Wisconsin
VCA	Vascularized Composite Allotransplantation
WLST	Withdrawal of Life Sustaining Therapy

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