Perforator free flaps in head and neck reconstruction: a single-center low-volume experience

Annelies Weckx, MD, DMD,[a] Natalie Loomans, MD, DMD,[b] and Olivier Lenssen, MD, DMD[a]

Objective. The aim of this article is to investigate the results of free-flap reconstructions in the head and neck area in a secondary low-volume institution and compare these with the literature.

Study Design. A retrospective study was performed of all patients who underwent free-flap reconstructive surgery in our institution from January 9, 2011, to July 12, 2015, by one young surgeon in a one-team approach. The types of flaps applied, defect sites, pathology, anastomotic details, success and complication rates, lengths of stay, and patients' ages and comorbidities were analyzed.

Results. A total of 97 patients received 100 free flaps. Perforator flaps comprised 85% of the total (63% anterolateral thigh, 22% fibular). Thirty-six percent of free flaps were performed in patients who received previous chemotherapy radiation to the head and neck. Free-flap survival was 96%.

Conclusion. From our data, it seems that free-flap surgery not only is a safe and successful technique in tertiary academic hospitals, but also can be performed in smaller institutions, even in salvage situations and in patients with comorbidities. Therefore, we believe that free tissue transfer is predictable in all centers when performed by skilled microsurgeons and well-trained nursing teams. (Oral Surg Oral Med Oral Pathol Oral Radiol 2017;123:429-435)

Over the past decades it is has become clear that free-flap reconstructions in the head and neck area can offer equal success rates and functionality and have comparable economic impact to pedicled or transposition flap reconstructions.[1] However, literature regarding flap outcome in low-volume institutions is scarce. Additionally, low-volume studies often cover a whole range of free flaps for reconstruction sites over the entire body. Specific results about head and neck reconstructions in small centers are not widespread. In this study, we aim to report the results of free-flap surgery, and in particular, perforator flap reconstructions, in a secondary low-volume institution and compare this with the literature.

In many institutions, the free flap of choice for head and neck reconstruction is still the radial forearm free flap (RFFF),[2-7] although since the end of the 1990s, a global trend toward perforator flaps has been seen. The anterolateral thigh flap (ALTF) was first described by Song et al.[8] in 1984, but in the beginning was predominantly done in larger hospitals in the Far East.[7,9-11] The main reason for its recent global popularity is the finding that cases without a sizable perforator constitute less than 1% of cases, while it was previously thought that this occurred in up to 5% of cases.[6,12,13] Additionally, technical advances allowing for safer dissection were made, thus increasing the evidence for its success.[13] Nowadays, the ALTF has become the workhorse for reconstructions in the head and neck area for many microsurgeons worldwide,[7,14] yet the RFFF, as it is less challenging to harvest, is still being used globally. For bony reconstructions, the fibular flap (FF) is most often used, in addition to the deep circumflex iliac artery flap (DCIA) and the scapula free flap.

Free-flap surgery used to be performed mainly in larger tertiary and teaching hospitals. It is only recently that smaller secondary centers have also implemented these procedures with higher success rates. Therefore, we report on 100 free-flap reconstructions that were performed over a period of 4 years at our regional hospital in Belgium by one surgeon in a one-team approach.

MATERIALS AND METHODS

In this retrospective analysis, we investigated the medical records of all patients who underwent free-flap reconstructive surgery at the author's institution (ZNA Middelheim, Antwerp, Belgium) between September 2011 and December 2015. All these reconstructions were performed by the same surgeon (OL) in a one-team approach.

Statement of Clinical Relevance

Free (perforator) flap reconstructive surgery is not only a safe and successful technique in tertiary referral centers, but can also be reliably performed in smaller secondary hospitals when microsurgeons and nursing staff are properly trained.

[a]Department of Oral and Maxillofacial Surgery, ZNA Middelheim, Antwerp, Belgium.
[b]Department of Oral and Maxillofacial Surgery, GZA Sint-Augustinus, Antwerp, Belgium.
Received for publication Jul 11, 2016; returned for revision Nov 5, 2016; accepted for publication Nov 25, 2016.

2212-4403/$ - see front matter
http://dx.doi.org/10.1016/j.oooo.2016.11.010

Clinical data collected from the medical records included age at surgery, site of tumor/reconstruction, pathology, flap type, anastomotic vessels, type of anastomosis, previous radiotherapy, dose of previous radiotherapy, primary or secondary reconstruction, flap survival, patient survival, complications and complication rate, active smoking status at time of surgery, use of anticoagulants, history of cardiovascular disease and diabetes, length of stay, and the possibility of starting adjuvant chemotherapy within 6 weeks after surgery. Ethical approval was not applicable for this retrospective study.

Complications after free-flap surgery were divided into major and minor complications, according to Singh et al.[15] and Bianchi et al.[16] Major complications were those that needed revision surgery; minor complications could be resolved conservatively.

The setup of the surgical team was consistent over the investigation period. This team consisted of the head surgeon (OL) with an assisting surgeon or surgical resident. The operative procedure and postoperative protocol were not altered significantly over the investigation period.

For ALTF and FF, pencil Doppler was used at the beginning of the surgery to indicate the perforators. For FF, additional preoperative angiography−computed tomography scan of the legs was performed to rule out anatomic abnormalities. All the FFs were harvested with a perforator skin island; this refinement of the classic fibular flap was also described by Chana et al.[13] as an osteomyocutaneous peroneal artery perforator flap (PAP). In cases of bony reconstruction (FF or DCIA), a 3-dimensional print of the mandible or midface region was made to visualize the region of resection. Subsequently the reconstruction plates were bent and adapted preoperatively on this 3-D model to reduce the duration of the surgery and therefore also limit the ischemic time.

At the start of the surgery, antibiotics (2 g amoxicillin + 200 mg clavulanic acid) were administered and continued for 72 hours (4 × 1 g amoxicillin + 100 mg clavulanic acid). Anticoagulant therapy was not administered during surgery. Anastomosis of the artery was performed first, followed by the vein. All anastomoses were sewn manually with Ethilon 9-0 (Johnson & Johnson, Diegem, Belgium). At the end of surgery, all patients were tracheotomized and the cannula was secured with a cranial suture of Vicryl 1 (Johnson & Johnson). Pressure on the pedicle was minimized by correct positioning of the patient and avoiding circular bandages around the neck. Postoperatively, the flap was monitored every hour for the first 24 h clinically by capillary refill and the pedicle with percutaneous Doppler ultrasound. The flap was monitored once every 4 h for the next 48 h and every 12 h thereafter. Patients received a prophylactic dose of low-molecular-weight heparin during their hospital stay (2850 IU anti-factor Xa).

RESULTS

The files of 97 patients (male = 56, female = 41; mean age 61 ± 13 years, range 19-85 years) were retrieved, accounting for a total of 100 free flaps.

Three patients received 2 flaps: the first patient received a DCIA after a failed FF for a mandibular reconstruction; for the second patient, 2 FFs were raised for reconstruction of a complete mandible; and in the third patient, 2 free flaps had to be harvested, FF after resection of a mandibular squamous cell carcinoma (SCC) and ALTF 2 years later, after resection of a second primary in the contralateral oropharynx.

The most commonly raised free flaps were ALTF (63%) and FF (PAP) (22%), accounting for 85% of perforator flaps (Table I).

The majority of reconstructions were for tongue (28%), mandible (23%), and floor of the mouth (FOM) (19%) defects. Nearly all reconstructions of the tongue and FOM were done using the ALTF (46/47). For mandibular defects, the FF was predominantly used (21/23).

In 84% of cases, SCC in the head and neck region was the reason for resection and reconstruction (Table II).

Of all reconstructions, 63% were performed because of a primary tumor, 26% because of a recurrent tumor (salvage surgery), and 6% after resection of a second primary. The remaining 5% were reconstructions after resection of osteoradionecrosis (ORN) of the jaw or a pathologic fracture (summary in Table III). The free flaps were raised by primary intention in 95% of cases and by secondary intention in 5%.

A total of 36% reconstructions underwent preoperative radiation therapy in the head and neck area.

The free-flap survival rate was 96%. Failures occurred due to venous thrombosis (2%, 2 ALTF), arterial failure (1%, 1 FF) and perforator failure (1%, 1 ALTF). Since all failures occurred after the period of intensive flap monitoring, no flap salvage was attempted. Three out of 4 flap failures occurred in previously irradiated patients.

At the recipient site, 3 major complications were identified: 1 full-skin island fail (FF), with return to the operating room after 2 days to remove the necrotic skin; 1 partial flap failure (ALTF), with return after 21 days to excise the necrotic flap ends; and 1 venous congestion (ALTF), for which surgical exploration was performed after 1 day. In all 3 cases, the vascular pedicle appeared normal. The venous congestion was then resolved by application of medical leeches.

Minor recipient complications were encountered in 14% of cases: 1% full (FF) and 3% partial (1 FF,