Technical Note
Reconstructive Surgery

Including the platysma muscle in a cervicofacial skin rotation flap to enhance blood supply for reconstruction of vast orbital and cheek defects: Anatomical considerations and surgical technique

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S. G. Hakim, H. C. Jacobsen, H. H. Aschoff, P. Sieg: Including the platysma muscle in a cervicofacial skin rotation flap to enhance blood supply for reconstruction of vast orbital and cheek defects: Anatomical considerations and surgical technique. Int. J. Oral Maxillofac. Surg. 2009; 38: 1316–1319.

Abstract. The surgical technique introduced in this work describes a modification of the rotation skin flap that includes the platysma muscle in order to improve the blood supply of the flap. This modified rotation flap enables sufficient reconstruction of extended regions following ablative surgery of the head and neck. The anatomy and clinical application of a bilayer cervicofacial skin-platysma rotation flap is described in 6 patients. Flap design ensures sufficient blood perfusion mainly via the occipital artery, the superficial cervical artery and the transverse cervical artery; venous drainage is achieved by the external jugular vein and by randomised vascularisation. The surgical procedures led to sufficient and successful reconstruction of the orbital and cheek region. Further oncological management, such as neck dissection and total parotidectomy could be performed through the flap approach because of the adequate exposure of neck structures. Due to the sensory supply reaching the flap dorsally, sensibility in the reconstructed region could be regained in all patients. This modified skin-platysma rotation flap represents an appropriate surgical technique for safe and simple closure of vast orbital and cheek defects with enhanced blood supply, which enables the extended mobilization required after ablative surgery of the orofacial region.

Keywords: cheek rotation; cervicofacial bilayer flap; orbital defect; platysma muscle; blood supply.

Accepted for publication 21 July 2009
Available online 15 August 2009

Ablative surgery of the orbit and the cheek region may result in large multilayer defects. Reconstruction of these anatomical units represents a challenging problem, especially if bony structures or adjacent natural cavities, such as the paranasal sinus, have been exposed, opened or resected.

Depending on the volume of tissue lost, local flaps such as the cutaneous cheek rotation flap,[6] transposition flaps from the forehead region, randomised and axial

flaps raised from the cervical or thoracic skin and muscles (e. g. deltopectoral skin flap, pectoralis major musculocutaneous flap)[3,9] have limited indications if the defect size and localisation compromise flap design.

Although free microvascular tissue transfer may be an acceptable solution, especially in multilayer defects, differences of skin colour and structure of the harvested tissue may make them conspicuous. Free tissue transfer is therefore a second choice in midfacial reconstruction, especially in elderly patients with limited general condition.

Once large defects have reached a considerable thickness and have denuded bony structures or exposed natural cavities, local rotation or transposition flaps are insufficient for reconstruction. In these cases, skin mobilisation to close the defect has to be extended onto the thoracic region leading to a new secondary defect. This also has to be closed, mostly by a partial or full-thickness skin graft, resulting in a tertiary defect. To avoid this sequel, rotation of the whole neck surface may be indicated. This procedure displays a simple rotation of a randomised cutaneous skin flap, so necrosis of flap borders resulting from subsequent extended mobilization of the skin may occur. The larger the defect to be closed, the greater the risk of inappropriate wound healing.

In this paper, the authors describe the anatomy and surgical principle of a bilayer cervicofacial rotation flap for reconstruction of large orbital and cheek region, which displays modification of the cheek rotation flap. Six cases of orbit and cheek reconstruction using this method are described.

Anatomical considerations and flap design

The flap consists of two areas of different thickness, a whole platysma-skin section in the cervical region and a fasciocutaneous superficial muscular aponeurotic system (SMAS) section in the facial region, the randomised blood supply of which derives from musculocutaneous perforators penetrating the platysma muscle.

The junction of both parts has to be located as cranially as possible to ensure the blood supply, but must not be extended to avoid damage to the branches of the facial nerves. For this purpose subplatysma dissection has to be turned to SMAS-dissection at the inferior border of the mandible body. To achieve this, dissection may be carried out from cranial direction as well as just beneath the superficial fascia leading to the junction of the two flap components. The platysma cervicofacial rotation flap is a dorsally pedicled flap, which completely depends on the vascularity coming from the posterior lateral neck (Fig. 1).

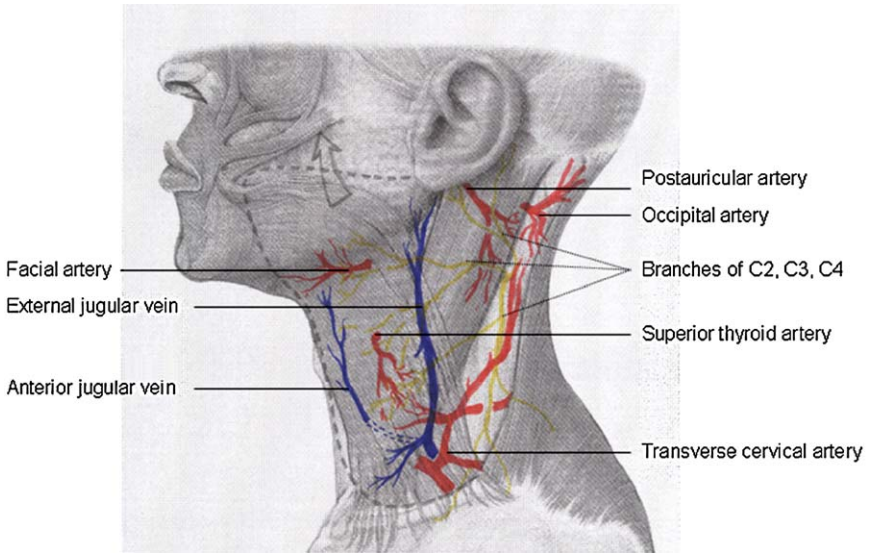

Fig. 1. Vascular and sensory supply of the bilayer cervicofacial flap coming from the lateral neck.

For flap-raising, skin and platysma are incised about 1 cm above the clavicle extending to the midline of the neck crossing the jaw at the nasolabial fold.

A skin-platysma flap is raised from the caudal border and dissected cranially including the superficial lamina of the superficial fascia, as well as the external jugular vein, which runs just below the platysma. Inclusion of this vein, which is left intact as cranially as possible, enhances the venous drainage of the flap.

The marginal branch of the facial nerve, which courses immediately beneath the muscle can be identified at the inferior border of the mandible body, at this stage dissection has to be continued subcutaneously, just beneath the superficial fascia. Mobilisation is carried out in the sense of rotation to close the defect.

If the defect is located more cranially, a cut-back dorsally to the supraclavicular incision may be recommended. In this case the external jugular vein, which penetrates the flap at its dorsocaudal border, may be exposed and preserved.

After rotation, unequal wound borders implicate skin excess at the anterior neck, which can be easily closed directly. Further mobilisation of the upper chest skin facilitates closure of the skin.

Clinical application

An 87-year-old female with an infiltrative basal cell carcinoma of the lower lid involving the whole orbit was referred by her ophthalmologist. Computer tomography showed an invasion of the orbital structures including the orbital floor and the medial orbital wall. Resection of the tumour resulted in a 5 × 7.5 cm sized defect of the orbit as well as an opening of the maxillary sinus (Figs. 2 and 3). The cervicofacial flap was raised and the defect was closed by rotation. The maxillary sinus was drained into the adjacent nasal cavity via a silicone tube. Wound healing was uneventful and aesthetic and functional results were satisfactory (Fig. 4).

Five further patients (Table 1) underwent the same procedure for reconstruction of the orbit and cheek region. One patient with squamous cell carcinoma of the lower lid and lymph node metastasis in the parotid gland underwent a total parotidectomy and complete functional neck dissection including posterolateral lymphadenectomy through the flap's access.

Discussion

The platysma muscle is a remnant of the *panniculus carnosis* within the subcutaneous tissue of the neck. The muscle lies superficial to the muscular fascial sheath of the neck. Blood supply to the overlying skin does not arise from true musculocutaneous perforators, and the muscle does not have an axial blood supply. The muscle and overlying skin receive blood from a variety of sources.

The blood supply to the platysma and anterolateral neck was studied by Hurwitz et al., who demonstrated that the upper medial neck is supplied by the facial and