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The myocutaneous trapezius flap revisited: A treatment algorithm for optimal surgical outcomes based on 43 flap reconstructions

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Summary *Background:* Because the vascular anatomy of the trapezius flap is highly variable, choosing the most appropriate flap type and design is essential to optimize outcomes and minimize postoperative complications. The aim of this study was to develop a surgical treatment algorithm for trapezius flap transfers.
Methods: The medical files of all consecutive patients with a myocutaneous trapezius flap reconstruction of the head, neck, and upper back area treated at three different university medical centers between July 2001 and November 2012 were reviewed.
Results: There were 43 consecutive flaps performed in 38 patients with a mean follow-up time of 15 months (range, 1—48 months). Eleven patients had a mentosternal burn scar contracture (12 flaps), 12 patients (13 flaps) presented with cancer, and 15 patients (18 flaps) were suffering from chronic wounds due to failed previous reconstruction ($n = 6$), osteoradionecrosis ($n = 1$), chronic infection ($n = 3$), bronchopleural fistula ($n = 3$), and pressure sores ($n = 2$). The mean defect size was 152 cm^2. Sixteen flaps were based on the superficial cervical artery (SCA; type 2), 16 were based on the dorsal scapular artery (DSA; type 3), one was based on the intercostal arteries (type 4), and 10 flaps were based on both the DSA and SCA. Recipient-site complications requiring reoperation occurred in 16.3%, including one total flap failure (2.6%).

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Conclusions: The trapezius myocutaneous flap is a valuable option to reconstruct various head and neck and upper back defects. Based on our data, a surgical treatment algorithm was developed in an attempt to reduce variation in care and improve clinical outcomes.

Introduction

Although there is ample experience with reconstruction of extensive head and neck defects after oncologic resections, trauma, and burns, it still remains a challenge to achieve acceptable functional and esthetic results. Over the past years, free tissue transfer has come forward as a highly reliable and first-choice method to repair most complex head and neck defects.[1] However, if reconstruction involves external skin defects, the use of locoregional flaps is aesthetically preferable to free flaps because of their closer similarity in skin color, texture, and thickness.[1–3] In addition, sometimes the use of free flaps is contraindicated due to significant preoperative comorbidity, previous surgery, or radiation therapy, which considerably increases the risks of postoperative complications.[1]

The pectoralis major myocutaneous pedicled flap is considered the regional "workhorse" flap for head and neck reconstruction.[4] Recently, however, there has been a revival of interest in the pedicled trapezius flap, which has proven to be a valuable alternative for the reconstruction of various head and neck defects. Four different types of trapezius flaps have been described in literature: the superior, the lateral island, the vertical, and the lower island (posterior) muscle or myocutaneous flap.[5–8] The trapezius myocutaneous flap is an easy to harvest, thin, reliable, well-vascularized, and large flap located far away from the area involved, allowing a wide arc of rotation. Furthermore, the flap can be extended with the use of a tissue expander, providing a thin, large, and pliable skin island with excellent functional and aesthetic outcomes.[9]

Because the vascular anatomy of the trapezius flap is highly variable, choosing the most appropriate flap type and design is essential to optimize outcomes and minimize postoperative complications. The purpose of this article is to describe a surgical treatment algorithm for trapezius flap transfers, based on clinically relevant parameters. This will help reconstructive surgeons to select the most appropriate flap type and design for various external skin defects in the head and neck area, with the ultimate aim to improve clinical outcomes.

Patients and methods

Patient characteristics

This study is a retrospective review of three academic centers (Erasmus MC, Rotterdam, The Netherlands; University Hospital Aachen, Germany; and BWH, Boston, MA, USA). From July 2001 to November 2012, 38 consecutive patients underwent 43 trapezius flap reconstructions. In one 5-year-old girl without any risk factors, a planned transfer of the trapezius flap was aborted due to infection of a previously placed submuscular tissue expander. Consequently, she was excluded from this study.

The hospital records of all these patients were reviewed retrospectively and patient characteristics, operative details, and follow-up data were recorded in a standardized form (Table 1). After data evaluation, a surgical treatment algorithm was developed based on defect size, localization, previous treatment, and complexity.

Flap anatomy

The anatomy of the trapezius muscle has been previously described in detail.[6,10–12] It is a large and thin muscle, with a unique triangular shape and substantial length. It originates from the medial third of the superior nuchal line of the occipital bone, the external occipital protuberance, the ligamentum nuchae, the spinous processes of the seventh cervical vertebra, and all the thoracic vertebrae, and inserts into the lateral third of the clavicle, the medial border of the acromion, and the entire length of the scapular spine.[6] The muscle suspends the shoulder girdle and assists in raising and rotating the shoulder. It is innervated by the accessory nerve.

According to the findings of Haas and Weiglein, there are at least *two* dominant pedicles: the superficial branch of the transverse cervical artery (superficial cervical artery: SCA) and the deep branch of the transverse cervical artery (dorsal scapular artery: DSA), and some minor pedicles (the occipital artery and the intercostal perforators).[10] The anatomy of the transverse cervical artery (TCA) and the DSA in the posterior triangle is highly variable. The TCA enters the trapezius muscle at the base of the neck and descends vertically along the deep surface of the trapezius muscle. It arises directly from the thyrocervical trunk in the majority of cases and runs across the posterior triangle of the neck where it divides into a superficial branch (SCA), which crosses *over* the levator scapulae, and a deep branch (DSA), which runs *deep* to the levator scapulae with its major branch penetrating between the rhomboid muscles. The SCA gives rise to a descending and an ascending branch, which supply the upper and lower portions of the trapezius muscle, respectively.[10] Figure 1 shows the vascular anatomy of the trapezius muscle and depicts the wide range of various trapezius flap classifications in the literature.

Surgical techniques

Four different trapezius myocutaneous flaps have been described in the literature: the superior trapezius, the