

Supraclavicular artery flap in orofacial reconstructions

Supraklavikulárny arteriálny lalok
pri orofaciálnych rekonštrukciách

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ABSTRACT

The article presents the use of the supraclavicular flap and describes the results of reconstructions performed using this method. Supraclavicular flap represents a versatile reconstructive option that offers desirable aesthetic and functional results. It has a short operating time, high reliability and low post-operative monitoring requirements compared to microvascular reconstructions. Although microvascular flaps offer a wider range of reconstructive surgeries, they can also present certain limitations. Regional flap plastic surgery should still be considered in oncology patients with a high risk of recurrence or multiple comorbidities that do not allow reconstruction with free microvascular flaps.

Keywords: supraclavicular flap, fasciocutaneous flap, orofacial reconstruction

ABSTRAKT

Článok prezentuje využitie supraklavikulárneho laloka a popisuje výsledky rekonštrukcií vykonaných pomocou tejto metódy. Supraklavikulárny lalok predstavuje všestrannú rekonštrukčnú možnosť, ktorá ponúka priaznivé estetické i funkčné výsledky. Má krátky operačný čas, vysokú spoľahlivosť a nízku náročnosť na pooperačný monitoring v porovnaní s mikrovaskulárnymi rekonštrukciami. Hoci mikrovaskulárne laloky ponúkajú širšiu škálu rekonštrukčných operácií, môžu predstavovať aj isté obmedzenia. Na regionálne lalokové plastiky treba stále myslieť u onkologických pacientov s vysokým rizikom recidívy alebo viacerých komorbidít, ktoré neumožnia rekonštrukciu voľnými mikrovaskulárnymi lalokmi.

Kľúčové slová: supraklavikulárny lalok, fasciokutánný lalok, orofaciálna rekonštrukcia

Introduction

The possibilities of reconstructing the resulting defects determine the options and radicality of the oncosurgical intervention. Surgical reconstruction requires consideration of a wide range of regional flaps due to the complex architecture of the head and neck. This is essential for achieving optimal outcomes in reconstructive procedures. Once the level of radicality surpassed the reconstructive capacity of local flaps, it became imperative to implement more distant tissue-based reconstructions (Fang, 2014). The great development of reconstruction possibilities occurred mainly in the 20th century. While tubed pedicled flaps were widely used in the first half of the century, the development of musculocutaneous pedicled flaps occurred after World War II. In the area of the head and neck, a mainly pectoralis major myocutaneous flap was used (Aryan, 1979). The evolution of microvascular reconstruction methods, the refining of instruments, and the improvement of perioperative critical care have resulted in a change in emphasis toward the use of free microvascular flaps. This repair technique is now regarded as the gold standard in surgery for

malignant tumors of the head and neck. Although free-flap microvascular procedures are highly refined and intricate, they are also fairly demanding in terms of learning curve, as well as economically and time-consuming. High operational accuracy, sophisticated instruments, extensive working experience, and a large operative team are all needed. If reconstruction using a microvascular flap is not feasible for whatever reason, an alternative that is morphologically and functionally similar to the free flap but less technologically advanced and timely must be found. The purpose of this study is to re-evaluate the use of the supraclavicular flap and discuss the outcomes of reconstructions done using this method.

The principle of reconstruction using supraclavicular artery flap

During the process of selecting a suitable reconstruction method, the site and size of the defect are crucial factors to consider. The length, playability, and size of the defect would all be important considerations when choosing a flap. Following the preparation of the operatory field, it

is imperative to identify the relevant anatomical landmarks and the elliptical outline of the fasciocutaneous site that will correspond to the area needing reconstruction. The trapezius muscle in the posterior area, the deltoid muscle in the lateral region, and the clavicle in the anterior region define the borders of the flap. The triangular region delineated by the clavicle, sternomastoid muscle, and external jugular vein is identified to determine the point of origin of the supraclavicular artery, which branches from the transverse cervical artery. The supraclavicular artery serves as the primary supply of the flap and must be conserved (Fig. 1). The exact trajectory of the artery is established and verified through the utilization of portable Doppler sonography. Angiography CT scans may be utilized in case patient has



Fig. 1: Anatomical demarcation of the flap

Obr. 1: Anatomické vymedzenie laloka



Fig. 2: Flap after subfascial preparation

Obr. 2: Lalok po subfasciálnej preparácii



Fig. 3: Flap after deepitalisation

Obr. 3: Lalok po deepitelizácii

undergone radical neck dissection. The donor site needs to be free of defects such as previous operations, radiotherapy, or trauma. Distal-to-proximal subfascial dissection begins on the lateral side of the flap and goes medially until the supraclavicular vascular pedicle is discovered (Fig. 2). The anatomical position of the supraclavicular artery, combined with the tunnelling method and deepitalization (Fig. 3), allows for reconstruction of regions up to 20 cm away from the donor site (Pallua, 2000). The maximal rotation of the flap is 180 degrees. Beware of the double rotation of the vascular pedicle, which can fundamentally limit the nutrition of the flap. In choosing the tunnelling method, it has been assured that the created space is wide enough to avoid vessel strangulation (Fig. 4). The donor area after retrieval and undermining is stitched, the appropriate primary closure is ensured by preoperative pinch test. The flap is connected into defect area with singular stitches (Fig. 5). The location of the donor area reassures great texture, colour lack of hair, and thickness match compared to facial tissues. This approach can be used to reconstruct defects in the submandibular, mental, and floor of the mouth area. If the anatomical conditions are favorable, the supraclavicular flap can also be used in the reconstruction of defects of the alveolar process of the maxilla and palate, as shown in figure 6 (Shenoy, 2013). The flap's adaptability allows it to be used to repair flaws in areas such as burn contractures, trachea-oesophageal defects, pharyngeal defects, mandibular osteoradionecrosis, and postparotidectomy (Chiu, 2009).

Clinical observation

For the objectives of the research, we retrospectively evaluated a group of 17 patients (14 men and 3 women) who underwent supraclavicular arterial flap reconstruction at our department in two years, from 2021 to 2022. The average age group is 59 years old (range 48 – 79 years). Three candidates for employment of the tunnelling method were rejected as they had received radiation treatment in the neck region, causing post-radiation fibrosis that might possibly impair the peduncle by strangulation of the blood supply. In 10 cases, repair was performed after severe resections of malignant tumours. In 4 instances, the repair included the closure of a defect caused by severe inflammation and subsequent tissue necrosis. In 8 instances, we utilized the supraclavicular flap to rebuild an intraoral defect, and in 6 cases, we used it to restore an extraoral defect. The average size of the skin island surface was 82 cm², and the average operation duration was 59 minutes. Total flap healing was reported in 11 patients, total flap loss occurred in 2 cases, and partial flap loss (skin component) occurred in 1 case.

Discussion

The supraclavicular artery flap is considered a highly versatile reconstructive option in the orofacial region, offering both aesthetic and functional benefits as an alternative to free flap surgery. Reduced operatory duration, enhanced reliability, decreased necessity for prolonged postoperative monitoring, expedited expertise acquisition, and optimized surgical instrumentation. The inclination to replicate

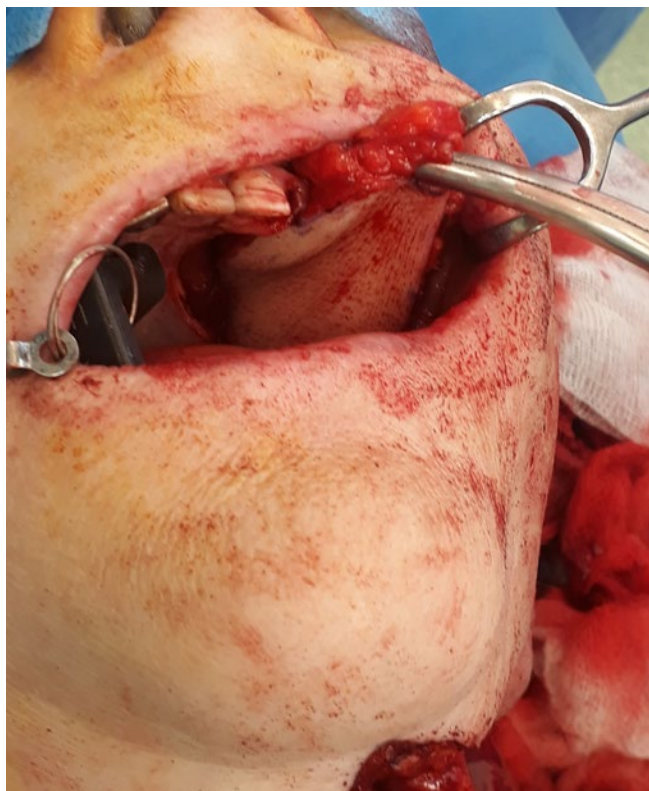


Fig. 4: Adaptation of the flap into the defect after maxillectomy using the tunnelling technique.

Obr. 4: Adaptácia laloka do defektu po maxilektómii použitím tunelovej techniky



Fig. 5: Flap sutured into the defect.

Obr. 5: Lalok našitý do defektu

microvascular flaps is very common. Despite its potential benefits, this approach has certain drawbacks, notably the significant amount of time required for adequate preparation and the occasional need for revisions in the event of minor complications, which can render it less feasible in certain situations. Choosing a regional flap, despite being perceived as a simplistic approach, should still be regarded as a viable option, particularly for oncological patients with a high risk of recurrence or patients with multiple comorbidities. Additionally, its versatility, as previously described, further supports its consideration. The technique of orofacial defect reconstruction using a supraclavicular arterial flap should be part of the reconstructive surgeon's repertoire.



Fig. 6: Complete healing of the flap

Obr. 6: Kompletne vhojený lalok

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