CASE REPORT


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# *Pectoralis major* flap for pharyngocutaneous fistula after total laryngectomy – two different approaches

## Upotreba režnja *pectoralis major* za zatvaranje faringokutane fistule posle totalne laringektomije – dva različita pristupa

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**Abstract**

**Introduction.** The reconstruction of large postoperative defects after oncologic surgery of the head and neck remains challenging. Regional flaps are considered a less expensive reconstructive option compared to free flaps. The *pectoralis major* flap is one of the most versatile choices for the reconstruction of large head and neck defects. **Case report.** We present technical key points for safe harvesting of *pectoralis major* flap for two cases in a university-affiliated tertiary care medical center. Both patients were male, with an average age of 64 years. The defects that required reconstruction in Case 1 were on the lateral neck region and, in Case 2, on the anterior side of the neck. Flaps were used for covering the pharyngocutaneous fistula after total laryngectomy and irradiation. The donor site was closed primarily. Flaps in both patients healed primarily without complications. **Conclusion.** The *pectoralis major* flap has a constant vascular pedicle and can successfully be used for the reconstruction of large head and neck defects. In order to obtain absolute flap survival, the operative technique must be impeccable.

**Key words:**
**fistula; head and neck neoplasms; laryngectomy; pharynx; plastic surgery procedures; surgical flaps.**

**Apstrakt**

**Uvod.** Rekonstrukcija velikih postoperativnih defekata posle onkološke hirurgije glave i vrata i dalje predstavlja veliki izazov. Regionalni režnjevi smatraju se prihvatljivijom rekonstruktivnom opcijom u poređenju sa slobodnim režnjevima. *Pectoralis major* režanj je jedna od najčešće primenjivanih opcija u rekonstrukciji velikih defekata glave i vrata. **Prikaz bolesnika.** Prikazujemo ključne tačke u hirurškoj tehnici podizanja *pectoralis major* režnja kod dva bolesnika lečena u jednom od univerzitetskih centara tercijarne medicinske zaštite. Oba bolesnika, prosečne starosti 64 godine, bila su muškog pola. Defekti koji su zahtevali rekonstrukciju nalazili su se kod prvog prikazanog bolesnika na bočnoj strani vrata, a kod drugog bolesnika na prednjoj strani vrata. Režnjevi su korišćeni za pokrivanje faringokutane fistule nastale posle totalne laringektomije i zračne terapije. Donorsko mesto je zatvarano primarno. Kod oba bolesnika režnjevi su zarasli primarno i bez komplikacija. **Zaključak.** *Pectoralis major* režanj ima postojanu vaskularnu peteljku i može biti uspešno iskorišćen za rekonstrukciju velikih defekata glave i vrata. Da bi režanj preživeo, operativna tehnika mora biti besprekorna.

**Ključne reči:**
**fistula; glava i vrat, neoplazme; laringektomija; farinks; hirurgija, rekonstruktivna, procedure; hirurški režnjevi.**

### Introduction

The reconstruction of large postoperative defects after oncologic surgery of the head and neck remains challenging. Considering different clinical situations, regional pedicle flaps are defined as the "workhorse" compared to free flaps. Microsurgical procedures are demanding and associated with higher complication rates [1]. Pedicle *pectoralis major* musculocutaneous flap (PMMF) is routinely used for head and neck defect reconstruction in centers without proper equipment for free tissue transfer [2]. The flap described by Ariyan in 1979 has been used for more than four decades [3]. It is the most often used flap following laryngectomy and meets the clinical requirements for the treatment of patients with advanced neck disease [4]. This flap exhibits strong resistance to infection and necrosis and also heals rapidly [5]. According to literature data, flap-related complications are classified as major if additional surgical revision is required or minor if

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only conservative wound care is necessary [4, 6]. All patients had given their informed consent prior to their inclusion in the study.

*Surgical tips*

The crucial point in flap modeling is the definition of the arc of flap rotation. After ablative oncologic surgery, the distance from the upper edge of the defect to the midclavicular point should be measured and transferred inferiorly on the anterior chest wall in the pectoral region. Defect size and shape must be tailored in the parasternal region.

The flap harvesting starts with an incision of the skin and subcutaneous tissue along the medioclavicular line and lateral border of the skin island. The dissection through fat all around the skin island must be divergent, including as many perforators as possible (at least 0.8 cm around the skin in all directions, reaching the pectoral *fascia*). Dermofascial sutures are placed at a distance of 2–3 cm along the edge of the skin island to protect the perforators during manipulation of the flap. The skin and subcutaneous tissue lateral from the incision are elevated, reaching the lateral border of the *pectoralis major* muscle, and blunt dissection is performed in the subpectoral plane, reaching medial insertion to the *sternum* and ribs. The *pectoralis* muscle is incised medially and laterally from the vascular pedicle under continuous, direct visual control of the pedicle. Muscle pedicle is wide 2 to 3 cm. The pedicle of PMMF must be detached from the clavicle on one or both sides. The approach to the pectoral paddle is also possible through the "defensive incision", which preserves perforators from an internal mammary artery, with the preparation of the PMMF performed after raising a deltopectoral flap. That is done to allow future use of the ipsilateral deltopectoral flap [7]. The subplatismal tunnel in the clavicular and cervical region for flap transfer must be four fingers wide, avoiding compression of the pedicle. Flap fixation starts with suspension sutures of the muscle part of PMMF for muscles at the defect with polypropylene non-absorbable 3–0 stitches. After the proper suspension of PMMF, the skin island is sutured for the mucosal layer without the removal of dermo-fascial stitches. This maneuvre protects musculocutaneus perforators.

The case report of two patients with pharyngocutaneous fistula (PCF) after laryngectomy has been approved by the institutional Ethics Committee, and written consent was obtained from both patients. Data collected include demographic data, site of fistula, indication and type of flap, flap complication, and hospital stay.

**Case report**

*Case 1*

A 62-year-old male patient was presented to the Otorhinolaryngology Clinic with a transglottic tumor with vocal cord fixation on the right side and a palpable neck mass on the ipsilateral side. After diagnostic imaging was done, which showed the paraglottic space involvement, the patient was scheduled for a biopsy, and a diagnosis of G2 stage squamocellular cancer was obtained. The patient was then scheduled for total laryngectomy and bilateral neck dissection. The pathohistological findings [tumor, node, metastasis (TNM) staging] correlated with clinical findings, and the disease was staged as T3N2bM0. Postoperatively, the patient received 60 Gy irradiation therapy with cisplatin and 5-fluorouracil chemotherapy. The PCF occurred one month after irradiation, following total laryngectomy (Figure 1). Regarding the flap anatomy, we used a musculocutaneous PMMF. The flap was used for secondary reconstruction, more precisely, for skin resurfacing. The pharyngeal wall was closed primarily, and the musculocutaneous flap was used for the reconstruction of skin defects in order to cover the exposed carotid artery. The wound healed primarily without residual fistula. The donor region was closed and healed primarily after flap harvesting; there were no complications. Figure 2 shows the postoperative result after the transposition of the *pectoralis major* flap. The hospital stay lasted for 12 days.

**Fig. 1 – Case 1: Pharyngocutaneous fistula occurred one month after irradiation, following total laryngectomy.**

**Fig. 2 – Case 1: Definitive postoperative result. The transposition of musculocutaneous *pectoralis major* flap for secondary reconstruction of skin defect in order to cover the exposed carotid artery.**

*Case 2*

A 66-year-old male patient was presented to the Otorhinolaryngology Clinic with dysphagia and hoarseness. Clinical examination revealed a necrotic mass in the left *pyriform fossa* and left aryepiglottic fold with arytenoid infiltration. After the biopsy showed a G3 stage squamocellular carcinoma, the patient opted for low-dose fractionated radiotherapy and chemiotherapy. On the follow-up after oncological treatment, the disease was in partial remission. Therefore, the patient underwent salvage total laryngectomy and partial pharyngectomy with radical neck dissection on the left side and elective lateral neck dissection on the right side. With the preservation of hypopharyngeal mucosa of 5 cm, a decision was made intraoperatively for primary reconstruction of the neopharynx. The pathohistological TNM staging of the carcinoma was T3N2cM0. Five days postoperatively, a PCF occurred in the anterior neck region (Figure 3). PMMF was used for secondary pharyngoplasty. Regarding the flap anatomy, we used a turned-in musculocutaneous flap with a skin island for resurfacing the pharyngeal wall and a partial thickness skin graft for skin reconstruction (Figure 4). The reconstruction was competent without residual fistula, and the skin graft healed primarily. After flap harvesting, the donor region was closed and healed primarily; there were no complications (Figure 5). The hospital stay lasted for seven days.

In both patients, a protective nasogastric feeding tube was in place for three weeks.

## Discussion

The primary goal of reconstructive procedures for head and neck defects, especially for PCF, is to restore the patient's premorbid level of functionality and quality of life [8]. The use of PMMF is indicated mostly after oncologic surgery. The mean age of our patients was 64 years. That is in accordance with the studies reporting the use of PMMF in elderly patients aged 57.2 to 76.5 years, on average [9].

There are some controversies regarding the defect closure after pharyngolaryngectomy. The PMMF can be used for reconstruction after a huge resection of the pharyngeal wall and laryngectomy as a patch pharyngoplasty, as a primary procedure, and for secondary reconstruction for postlaryngectomy PCF, or after neck irradiation and subsequent skin loss. Some studies state that the *pectoralis major*

**Fig. 3 – Case 2: Pharyngocutaneous fistula occurred in the anterior neck region five days after total laryngectomy.**

**Fig. 4 – Case 2: Definitive postoperative result. A turned-in musculocutaneous *pectoralis major* flap, with skin island (patch pharyngoplasty), was used along with a partial thickness skin graft for skin reconstruction.**

**Fig. 5 – Case 2: The donor region of the *pectoralis major* flap, closed and healed primarily.**

does not reduce the long-term risk for the development of PCF (27.1% incidence) and is associated with a higher mortality rate (2.1%) [8]. However, recent reports favor the use of PMMF for primary patch pharyngoplasty [10]. In our two patients, pharyngoplasty healed without complications and without late fistula formation. The low complication rate may be attributed to adequate vascularisation by abundant perforators supplying overlaying skin [11]. Therefore, PMMF may be transferable into an infected recipient area and also be used after necrosis of microvascular flaps and in the cases where free flaps are contraindicated (patients not suitable for long procedures, with inadequate recipient vessels or those that underwent high-dose radiotherapy in recipient region) [1, 11]. Radical neck dissection combined with the use of PMMF is feasible for the treatment of giant cervical metastatic cancers that have invaded the skin (salvage surgery), especially for the protection of the carotid axis [12]. Patch pharyngoplasty with skin graft for anterior neck skin appears to be an elegant way of using a PMMF to reconstruct the pharynx. We perform this approach routinely.

The first flap has to be inserted in the defect area to provide a tension-free inset of the flap [13]. Most surgeons transfer the flap to the head and neck through the supraclavicular subplatysmal tunnel without any incision of the overlaying clavicle [14]. In both cases, we performed the same transpositioning of the flap.

Some authors advocate that PMMF may yield unsatisfactory functional and cosmetic results due to donor site morbidity and limitations related to bulk and fibrosis of the proximal muscle stalk [1]. Other key aesthetic factors include the position of the nipple, depression in the upper chest, and the appearance of the chest skin. These are addressed by modifying the incision site and proper reconstruction [15]. We did not register donor site dehiscence, although, in some series, it reaches 8% [16]. Regarding the closure of the donor site, most authors perform the primary closure, but in some cases, the donor site may require coverage with a skin graft [12]. We did not use skin graft for the donor region. Overall complication rates reported vary from 13% to 35.5% [3]. In our series, it was 0%. Despite the high complication rate, the second flap is rarely indicated [14]. Total flap failure ranges from 0% to 2.4% [3, 5, 6, 17]. We did not register either flap loss or partial flap loss, but referred incidence rates ranged from 2.3% to 4.8% [17, 18].

## Conclusion

PMMF has passed the test of time and is still considered a valuable tool for PCF reconstruction. Despite the limited number of patients, our study supported the statement that PMMF is a reasonable choice of reconstruction as a salvage procedure after PCF. PMMF can be harvested without any special instrumentation and presents a valuable resource in the armamentarium of reconstructive oncologic surgery.

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