

THE USE OF ANTEROLATERAL THIGH FLAP (ALTF) FOR FUNCTIONAL TONGUE RECONSTRUCTION WITH POSTOPERATIVE QUALITY OF LIVE EVALUATION

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The use of microsurgery for oral reconstruction of cancer patients, has become standard treatment in restoring oral function. The free anterolateral thigh flap is one of the most preferred options in reconstruction after total, subtotal or hemiresection of the tongue due to squamous cell cancer.

The aim of the study was to present the reconstructive method using anterolateral thigh free flap with evaluation of quality of live.

Material and methods. Clinical material includes 46 consecutive patients with tongue cancer, who underwent complex surgical treatment between 2009 and 2011. There were 36 males and 10 females and the M: F ratio was 3.6: 1. All of them were reconstructed using the anterolateral thigh free flap. The quality of life was evaluated 6 months after completing the treatment, based on postoperative functional and aesthetic status.

Results. The overall flap survival rate was 96%. Surgical complications were observed in 8 patients (17%). Donor site was closed primarily in 42 cases and in remaining 4 skin graft was required. In all 46 cases understandable speech and return to unrestricted diet mastication and swallowing were achieved. The mean follow-up period after treatment was 32 months. Analysis of aesthetic effects evaluated in 23 cases and shows generally very good results. According to average transformed scores the QOL can be characterized as excellent for >90, very good for 76-90, good for 51-75, moderate for 25-50 and bad for <25 points.

Conclusions. Anterolateral thigh flap, with its versatility in design, long pedicle with a suitable vessel diameter, low donor site morbidity, and very good aesthetic effects, could be the ideal flap for functional tongue reconstruction.

Key words: free flap, reconstructive surgery, anterolateral thigh flap

Reconstruction following resection of malignant tongue tumors remains one of the most difficult problems in head and neck oncology. The tongue is a highly functional organ responsible for speech and deglutition. In reconstruction every effort should be made to maximize the functions while providing reliable coverage. In the last ten years, changes in the use of flaps in reconstructive surgery resulted in increased flap reliability. Particular microvascular free flap should be considered when regional tissues are unavailable or inadequate and when use of locoregional tissues results in

functional or aesthetic loss (1). The choice of free flap always depends on ease of harvesting, length of its pedicle, amount of skin and soft tissue as well as donor site morbidity.

In hemiglossectomy defects the remaining tongue has potential to move intelligible as long as it is not tethered. Therefore the goal of reconstruction is to preserve the mobility of the remaining tongue. Usually a thin flap is the flap of choice, and a bulky one should be avoided since it can decrease the mobility of remaining tongue (2). The flap should be width enough to provide surface area restoration and

to recreate the lingual sulcus without tension. The goal for total or subtotal glossectomy is very different from that for hemiglossectomy defects. After resection no meaningful tongue muscle is left intact. Therefore the goal of the reconstruction is to provide enough bulk, to help the new tongue reach the palate for better speech, to move the food through the pharynx and to decrease the risk of aspiration. Quality of life studies have shown that speech, chewing and swallowing are the most important factors for patients undergoing head and neck surgery (3).

Although different types of tongue defects require specific goals to achieve, the anterolateral thigh flap (ALTF) seems to be the best choice for all of them. It can offer thin, pliable, potentially large skin island for hemiglossectomy defects, and for total or subtotal tongue postresective defects it can give adequate tissue bulk regarding to a part of vastus lateralis muscle with possibility of sensory and motor reinnervation.

MATERIAL AND METHODS

Clinical material includes 46 consecutive patients with tongue cancer, who underwent complex surgical treatment between 2009 and 2011 in Cancer Center IMSC in Gliwice. There were 36 males and 10 females and the M: F ratio was 3.6: 1. In all cases the tongue was tumor's primary site. The histologic type of all tumors was squamous cell cancer. Tumors were classified as T3 in 20 patients and as T4 in 26 patients. Regional nodal status was N0-N1 in 28 cases (60%) and N2-N3 in remaining

18 cases. In 26 cases primary tumor was localized in lateral part of the tongue and in remaining 20 cases it crossed the midline. Glossectomy was total in 20 of the patients, subtotal in 11 patients and hemiglossectomy was performed in 15 patients. The tongue was resected together with part of floor of the mouth in 26 patients and with oral part of the pharynx in 6 patients. A modified bilateral neck dissection (I-IV nodes levels groups according to MSC classification) was performed in all patients with preservation of internal jugular vein, accessory nerve and SCM muscle.

Anterolateral thigh free flap (ALTF) was chosen for all postresective defect's reconstruction. The material was divided into two groups. Group A contains the patients where ALT flap was used for hemiglossectomy, in group B ALT was used for total or subtotal glossectomy defects. In our series 44% of flaps were based on (20/46) septocutaneous perforators (group A) which were located in the intermuscular septum between vastus lateralis and rectus femoris muscle, and 66% of remaining flaps (26/46) were based on musculocutaneous perforators which traversed the vastus lateralis muscle (group B). The anterolateral thigh myocutaneous flaps include a longitudinal segment of the vastus lateralis muscle. In 16 cases (35%) anterolateral flaps were sensate, based on the lateral cutaneous femoral nerve which carry sensation from the midlateral part of the thigh (fig. 1). The lateral femoral circumflex artery was anastomosed with facial artery end to end in 42 patient, in 4 patients with superior thyroid artery. The vein was anastomosed with internal jugular vein end to side in 15 cases and with facial vein end to end in

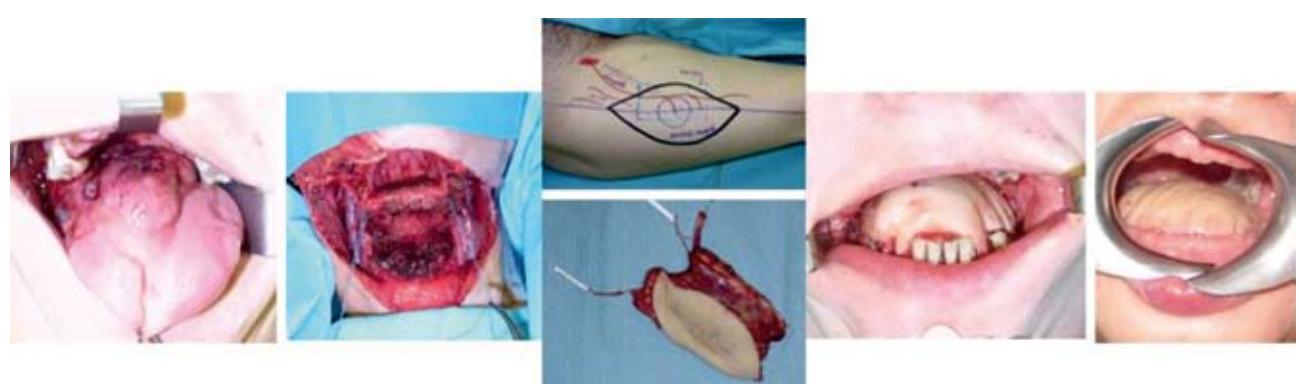


Fig. 1. Total tongue resection with reconstruction using neurovascular ALTF

31 cases. The branch of the lateral cutaneous femoral nerve was anastomosed with hypoglossal nerve end to end in 16 cases. Donor site was closed primarily in 42 cases and in remaining 4 skin graft was required. Adjuvant post-operative radiotherapy was administered in all of patients with the dose ranging from 50 to 70 Gy depending on postoperative histopathological findings. The quality of life was evaluated 6 months after completing the treatment, based on postoperative functional and aesthetic status by scoring system of pain, speech, chew and swallowing, mouth opening, feeling and change of the appearance.

RESULTS

The overall flap survival rate was 96%. Surgical complications were observed in 8 patients. Flaps were transferred successfully in all patients. Venous thrombosis developed in four patients: total flap necrosis occurred in two of these patients, but the flap in the other two patients was salvaged via venous re-anastomosis. Partial necrosis of the flaps skin island developed in three patients. In two of them, minor orocutaneous fistulas occurred with no need of surgical intervention. A major orocutaneous fistula developed in one patient and required surgical treatment. In 4 of the 46 patients who had undergone primary skin closure of the donor site no postoperative complications were found. In one patient, wound infection and marginal skin necrosis developed along the closure line because of high tension. In all 4 patients who received skin grafts, grafts were harvested successfully and no wound infections developed. All patients who had undergone primary skin closure could perform normal activities of daily life, but 16 of them showed some degree of sensory deficit of the anterolateral aspect of the thigh. The mean follow-up period was 32 months (range: 7 to 64 months).

Because some of the patients lived geographically far away from the initial institution, follow-up and QOL was limited in these patients. In 29 cases understandable speech and return to unrestricted diet mastication and swallowing were achieved. All of them produced neotongue movements during articulation and swallowing. Analysis of aesthetic effects shows generally very good results (tab. 1).

According to average transformed scores In the group of 23 patients the QOL can be characterized as excellent for >90, very good for 76-90, good for 51-75, moderate for 25-50 and bad for <25 points. It was judged as excellent in 6 cases, very good in 9 cases and in 8 remaining cases as good.

DISCUSSION

Tongue reconstruction after total or subtotal glossectomy has been a challenging problem. In the early 1970s after total glossectomy primary closure with subtotal mandibulectomy or with a local flap, such as a lip flap or a forehead flap was the most commonly used reconstructive method (4). The anterolateral thigh flap first described by Song et al. (5) has gained popularity in soft-tissue reconstruction. It has some advantages in free-flap surgery, including a long pedicle with a suitable vessel diameter, the availability of different tissues with large amounts of skin, and its adaptability as a sensate or flow-through flap if necessary.

For last decade an evolution of tongue reconstruction has been observed. Because the tongue is a highly functional organ, responsible for speech and deglutation, the goal of its reconstruction is to maximize the function with reliable coverage. Many options have been described, and among them the neurovascular anterolateral thigh free flap is the most commonly used, especially when total tongue has to be reconstructed. In our material it were 16 sensate ALTF. All of them produced neotongue movements during articulation and swallowing. Several recent studies defined the role of sensory reinnervation in tongue flap reconstruction. The neural anastomosis may reduce the degree of Wallerian degeneration and prevent atrophy of reconstructive flaps (6). Biglioli et al. presented a series of neurofasciocutaneous RFFFs, with lingual nerve reconstruction with the use of lateral cutaneous antebrachial nerve. Subjective self-reporting of patient speech performance suggested higher satisfaction with the sensate flaps than with non-sensate flaps (78% vs 43%). Objective assessment by Fanzago test of language articulation revealed higher scores with sensate flaps (44% versus 29%). ALTF is a wide fasciocutaneous flap and it is based on septocutane-

Tabela 1. Analiza całej grupy pacjentów, u których oceniano jakość życia
 Table 1. Analysis of all group of patients with quality of life results

Patients	Age	TNM	Glossec-tomy	Neck dissection	ALTF	Skin island (cm ²)	Surgical site complica-tions	Out-come	Follow up (months)	QOL	
1	59	T3N1	hemigloss.	radical dex.	SOHNDEx	septocutaneous	56	total necrosis	DOD	16	good
				sin							
2	49	T3N0	hemigloss.	SOHNDEx	bilateralis	septocutaneous	56	none	NED	83	excellent
3	54	T3N3	hemigloss.	radical	bilateralis	septocutaneous	24	partial necrosis with minor fistula	DOD	4	good
4	59	T3N1	hemigloss.	SOHNDEx	bilateralis	septocutaneous	20	none	NED	52	very good
5	51	T4N2	total	radical	sin.	SOHNDEx	62	none	DOD	14	good
				dex		sensate ALTF					
6	23	T4N2	total	radical	dex.	SOHNDEx	68	none	DOD	17	very good
				sin		sensate ALTF					
7	54	T4N2	subtotal	radical	sin.	SOHNDEx	56	venous thrombosis (rescued)	DOD	12	good
				dex							
8	49	T4N1	total	radical	sin.	SOHNDEx	62	partial necrosis with minor fistula	NED	38	good
				dex		sensate ALTF					
9	44	T4N1	subtotal	SOHNDEx	bilateralis	musculocutaneous	38	partial necrosis major fistula	NED	37	good
10	72	T3N0	total	SOHNDEx	bilateralis	musculocutaneous	64	none	NED	40	excellent
11	58	T4N1	subtotal	SOHNDEx	bilateralis	musculocutaneous	52	none	DOD	10	very good
12	64	T4N2	subtotal	SOHNDEx	bilateralis	musculocutaneous	75	none	DOD	7	very good
13	68	T3N0	hemigloss.	SOHNDEx	bilateralis	septocutaneous	42	none	DOD	14	excellent
14	48	T4N2	total	SOHNDEx	bilateralis	musculocutaneous	44	none	DOD	34	excellent
						sensate ALTF					
15	53	T4N1	total	SOHNDEx	bilateralis	musculocutaneous	62	none	AWD	20	very good
						sensate ALTF					
16	56	T3N1	hemigloss.	SOHNDEx	bilateralis	septocutaneous	24	none	AWD	19	excellent
17	52	T3N0	hemigloss.	SOHNDEx	bilateralis	septocutaneous	18	none	DOD	16	very good
18	41	T3N1	hemigloss.	radical	sin.	SOHNDEx	20	none	DOD	8	good
				dex							
19	41	T3N1	hemigloss.	SOHNDEx	bilateralis	septocutaneous	22	none	AWD	24	excellent
20	38	T3N2	hemigloss.	SOHNDEx	bilateralis	septocutaneous	16	wound infection	DOD	5	good
21	42	T4N1	total	SOHNDEx	bilateralis	musculocutaneous	68	none	NED	20	very good
22	47	T4N2	total	SOHNDEx	bilateralis	musculocutaneous	84	none	AWD	18	very good
23	48	T4N2	subtotal	SOHNDEx	bilateralis	musculocutaneous	44	none	NED	24	very good

ous and muscle perforators of the lateral descending branch of the lateral circumflex femoral artery and is usually the best choice when larger, complicated defects are encountered because it commands a big skin portion and gives bulk necessary to replace the dead space after resection. Skin portion of this flap can be extendet up to 30x20 cm. Vessels are always large and easily identified.

The ALTF, first described in Asia, has gained rapid popularity in North America, particulary as an alternative to the RFFF (7).

RFFF is an ideal choice in reconstructing simple mucosal or cutaneous defects where thin pliable tissues are required; it is not advised for complicated large defects. RFFF provides thin, pliable fasciocutaneous tissue for intraoral defects. This particular free flap is highly reliable because of large diameter of its artery and veins. The vascular pedicle is ideal with long vessels capable to reach the opposite side of the neck if necessary (8). That characteristic makes it a useful one for intraoral, pharyngeal, and cutaneous defects.

The flap is inset with absorbable sutures usually before microvascular anastomosis. This prevents the bleeding and edema that follow revascularization. It seems to be important to make the flap healing process reliable.

The donor site is primarily closed and there is no deficit in walking. In contrast to the RFFF, there is no noticeable donor site deformity, no loss of a major artery, and no postoperative paresthesia of the arm (9). Although the survival rates of those flaps are comparable, RFFF has higher donor site morbidity. Particular free flap should to be chosen individually, after precise plan of resection based on local advancement of the tumour.

Tongue reconstructions using neurovascular ALTF were reported by Wang et al. (10). The ALTF provides a more bulky flap and had

a reduced incidence of infection. It was found, however, that the more bulky flap limited the mobility of the tongue muscle remnant. Twelve of the 15 patients achieved oral feeding with three cases of significant aspiration. Thirteen of them had intelligible speech after the procedure. Marginal necrosis was cited as the most common complication. No flap loss occurred.

CONCLUSIONS

Anterolateral thigh flap, with its versatility in design, long pedicle with a suitable vessel diameter, low donor site morbidity, and very good aesthetic effects, could be the ideal flap for functional tongue reconstruction.

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