

Microsurgical reconstruction of oral defects with free flaps for patients with oral cancer: an 8 year experience with 153 consecutive cases

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SUMMARY

Objective. Oral squamous cell carcinoma (OSCC) is a common type of cancer affecting people worldwide, with still large proportion of patients diagnosed with the disease in the advanced stage. Due to free vascularised tissue transfers, radical cancer treatment and immediate reconstruction are feasible as a one-stage procedure. The aim of this paper is to evaluate retrospectively our experience with free flap reconstruction of oral defects for patients with oral malignancies in advanced stages.

Material and Methods. During the 8-year period, 153 patients with oral cancer had undergone simultaneous extirpation of tumor with or without suspicious lymph node removal and reconstruction of the defect with free flap. A total of 157 free-flap reconstructions had been performed for 153 patients. Accordingly, 116 patients had reconstruction of oral soft tissue defect, but 37 patients had complex soft tissue and bone defect reconstruction.

Results. 132 patients had successful free flap surgery with uneventful post surgery period. Flap success rate was 96.8%. Donors site was closed primarily in 58 cases, skin graft was used in 102 cases. Five patients (3.2%) died during post surgery period. Average hospital stay was 20,5 days (from 8 till 44 days). There was no statistically significant correlation found between the patient's age and hospital stay, but hospital stay increased with tumor size ($p>0.05$).

Conclusion. The application of the best possible reconstruction method that contributes to the fulfillment of expectations and provision of a good functional and esthetical result is enabled by setting proper, realistic reconstruction goals. Microvascular reconstruction with free flaps for oral defects is a safe method with a very high success rate (96.8%).

Key words: oral cancer, oral reconstruction, free flap.

INTRODUCTION

Worldwide, an estimated 644,000 new cases of head and neck cancers are diagnosed each year, with two-thirds of these occurring in developing countries. More than 90% of head and neck cancers are squamous cell carcinomas, which originate from the mucosal surfaces (1). Oral cancer is a serious

malignant disease, which usually begins as a rough patch, ulcer, or lump affecting the oral cavity with a significant tendency to metastasize to the cervical lymph nodes. The incidence of oral squamous cell carcinoma (OSCC) is three-fold higher in men, with prevalence exceeding 3% of all malignant tumors, and overall five year survival rate of around 60% (2). Remaining asymptomatic for long time OSCC often is diagnosed at advanced stages. Resection of tumor is the cornerstone of management. Surgical defect closure is usually simple in early stages of cancer, while it becomes challenging in advanced stages.

Historically, regional flaps have been the mainstays of reconstruction for surgical defects after ablation of cancer in advanced stages. The medially based deltopectoral flaps were introduced and widely used in the head and neck reconstruc-

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tion during the 1960s (2). The main disadvantage of the deltopectoral flap is the need to form an oral fistula and close it during a second operation. The pectoralis major musculocutaneous flap has gained more popularity than the deltopectoral flap in head and neck reconstruction since the 1980s (3). Unfortunately, sometimes the pectoralis major musculocutaneous flap is too bulky and the position of the nipple at the donor site becomes distorted which causes esthetical problems (4).

Over recent (two – three) decades, microsurgical free flap transfer has played the leading role in reconstruction of head and neck defects. Free flaps provide a wide variety of reconstruction options including complex tissue transplants. The aim of this paper is to evaluate retrospectively our experience with free flap reconstruction of oral defects for patients with oral malignancies in advanced stages.

MATERIAL AND METHODS

All vascularized tissue transfers were performed during the period from November 2008 to December 2016. During the 8-year period a total of 153 patients with oral cancer had undergone the treatment (Table). All patients had simultaneous extirpation of tumor with or without suspicious lymph node removal and reconstruction of the defect with free flap. 129 patients were males (82%) and 28 females (18%). Average patient age at time of surgery was 58 years (form 30 till 85 years). 19 patients had cancer located on the floor of the mouth, 61 patients had cancer located on the floor of the mouth with tongue, buccal or lip involvement. 20 patients had tongue location and 16 patients had upper or lower lip and buccal involvement. 23 patients had mandible involvement, 2 patients had maxilla involvement. 16 patients had a tumor located on the floor of the mouth with mandible, lip and/or buccal involvement.

A total of 157 free-flap reconstructions were performed for 153 patients. With regard to donor site selection, the first choice of radial forearm flap was used in 83 patients, followed by the free fibula in 35 patients, lateral arm flap in 34 patients, anterior-lateral thigh flap in 2 patients. Parascapular flap, scapula and vascularized iliac crest was performed in one case each.

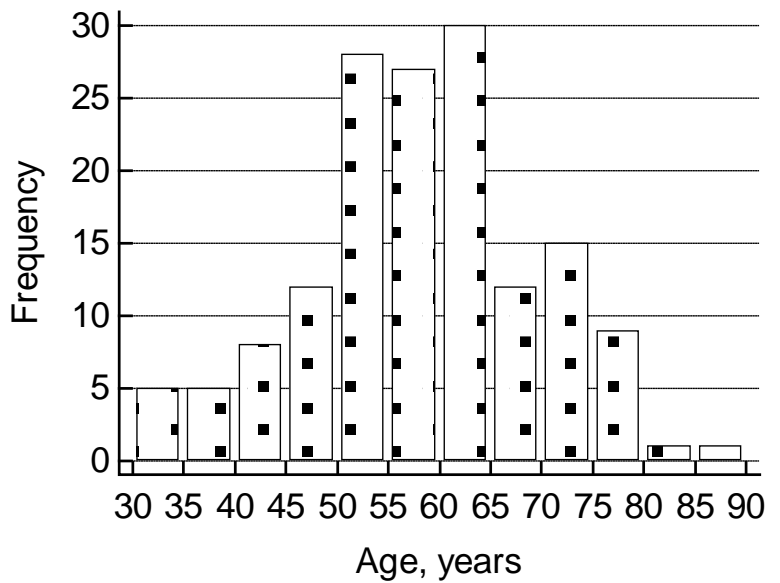


Fig 1. Histogram of patients' age

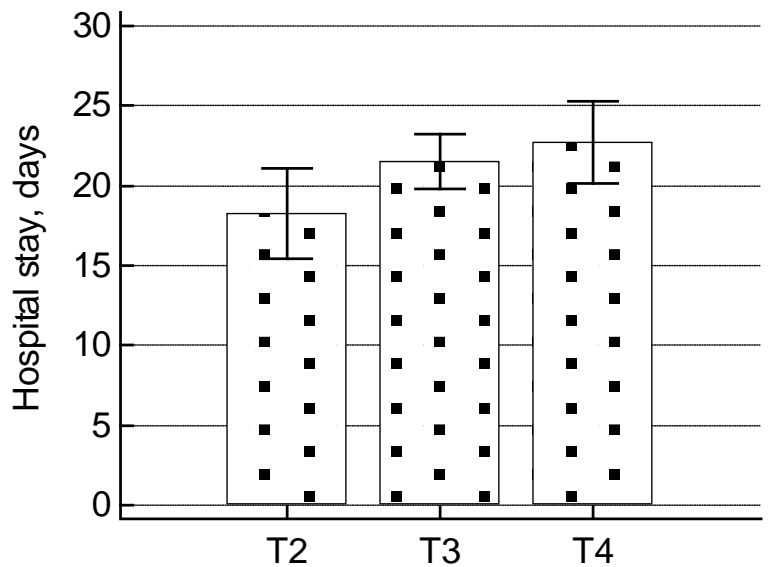


Fig 2. Histogram of patients' age

Accordingly, 116 patients had reconstruction of oral soft tissue defect, but 37 patients had complex soft tissue and bone defect reconstruction. Simultaneous two-flap transplantation was performed in two cases.

Table. Patient's data according to the size and extent of the main tumor

	T2	T3	T4
Patients N (%)	22 (14.38%)	81 (52.94%)	50 (32.68%)
Node involvement N0/N1/N2/N3	7/8/7/0	33/31/16/0	19/10/20/1
Age M (SD)	57.14 (11.01)	58.81 (10.71)	56.16 (11.46)
Sex (M/F)	16/6	67/14	40/10
Hospital stay	18.26 (7.12)	21.50 (7.24)	22.68 (8.81)

RESULTS

132 patients had successful free flap surgery with uneventful post surgery period. Flap success rate was 96.8%. Donors site was closed primarily in 58 cases, skin graft was used in 102 cases. Five patients (3.2%) died during post surgery period, on average 8th post surgery day (from 6 till 11). Vascular thrombosis of the flap was observed in six cases (3.8%). Salvage surgery was done in all six cases. After revision and reanastomosis flap recovery was in one case. Five flaps were lost despite revision. Four flaps had vascular problems, one flap was lost due to infection (3.2%). Second flap as salvage surgery after flap loss was done in two cases. Partial flap necrosis was experienced in four cases, and hematoma requiring surgery – in 14 cases. Average hospital stay was 20.5 days (from 8 till 44 days). We found no statistically significant correlation ($p>0.05$) between patient's age and hospital stay (Figure 1), however, the hospital stay increased with the tumor size (Figure 2).

DISCUSSION

The pedicle flaps used previously required multiple stages; moreover, the flaps were too bulky and donor site caused esthetical problems. The time concepts did not advised immediate reconstruction (5). Introduction of free flaps fundamentally changed oral reconstruction concepts. Free vascularised tissue transfers allow more radical cancer treatment and immediate reconstruction as a one-stage procedure (6). This method has now been adopted at many institutions worldwide (7). In this study all cases were performed as immediate one-stage defect reconstructions. Our study supports the above-mentioned one-stage approach. It provides more reasonable and easier options for reconstruction. Besides, very important is the fact that a patient is not left with considerable functional disability. Soft tissue defects can be reconstructed by almost all available fasciocutaneous free flaps. Radial forearm has become "the work horse" for many institutions. Easy harvesting, thin, pliable tissue provides good functional and esthetical results (8,9). Our study shows that radial forearm flap is the most commonly used flap for soft tissue reconstruction. There also has been observed an increased interest in reconstruction of sensation of the flap with promising results (10), while Markkanen-Leppänen *M et al.*, 2005 concluded that swallowing outcome had not been related to sensation, and their study did not support the need for sensate flaps (11). In 2005, Shibahara T et al reported no taste perception

detected in the regions of the tongue reconstructed with forearm flaps. However none of the patients showed any serious taste disorder, leading to assume that compensatory taste perception must occur in other regions of the oral cavity (12).

In recent years lateral arm flap, anteriolateral thigh flap have become alternative solutions for oral reconstructions with good functional outcomes. Lateral arm flap has very low donor site morbidity, but there is a limitation in flap size, pedicle length, vessel diameter require more demanding surgery. We have found lateral arm flap useful for small and medium soft tissue defect reconstructions. Advantage of this flap is fast, easy harvesting, possibility of two-team approach and very low morbidity of the donor site. Disadvantages of flap are limited length of pedicle, relatively small vessel diameter and mostly only one concomitant vein for vessel anastomosis. Anteriolateral thigh flap (ALT), once flap harvesting becomes a familiar procedure, with its versatility, long pedicle and low donor site morbidity provides good functional and esthetical results (13). ALT flap is useful in selected patients for large soft tissue defect reconstruction.

Several vascularized bone grafts have been used for mandible or maxilla reconstruction. The vascularized rib has enough length for mandibular reconstruction purposes, but the bone is too thin to insert osseointegrated implants for complete dental restoration (14). The vascularized iliac crest provides a great amount of corticocancellous bone, but bulkiness of soft tissue makes questionable its usefulness (15). Nowadays free fibula become gold standard for mandibular and maxilla reconstructions (16-19). Free fibula flap provides sufficient bone amount, its anatomy enables sculpturing the necessary shape of the transplant and provides reliable soft tissue coverage as well. Two-team approach can be done due to the convenient location. One of the main disadvantages of the free fibula is the height of the bone. Use of double barrel described by Bahr *et al.*, in 1998 allows to obviate this disadvantage (20). Vertical distraction is another method providing the solution for bone height increase.

Free fibula was the first choice for mandibular reconstruction in this series. Our study shows that it is reliable, safe and versatile flap. Despite the recommendations of some authors regarding the use of angiography routinely in order to evaluate the vascularity of fibula, we do not support angiography as a routine method unless there is an evidence of advanced peripheral vascular disease (21). The problem might be skin perforator, which is absent in rare cases. Two flap reconstruction usually is the

only option left in those cases. Two barrel reconstruction is useful in patients where non-edentulous mandible is present. We found donor morbidity as a major problem for free fibula flap. In particular cases scapular flap has advantages over free fibula for maxilla reconstruction which is more complex and may require 3D modelling (21).

CONCLUSIONS

Prior to choosing the applicable reconstruction type, determination of reconstruction goals is of great importance. The application of the best pos-

sible reconstruction method that contributes to the fulfillment of expectations and provision of a good functional and esthetical result is enabled by setting proper, realistic reconstruction goals. Microvascular reconstruction with free flaps for oral defects is a safe method with considerably high success rate (96.8%). It provides wide range of reconstruction options not only for isolated soft tissue or bone defects, but for complex tissue defects as well.

STATEMENT OF CONFLICTS OF INTEREST

The authors state no conflicts of interest.

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