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Research Letter

Efficacy of the Anterolateral Thigh Flap for Head and Neck Reconstruction

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ABSTRACT

Background: Head and neck cancers are increasing in Africa, and head and neck defects commonly result from the excision of cancers. Although global studies have reported that the use of anterolateral thigh flaps (ALTF) can safely restore form and function, there are no reports from Africa regarding the efficacy of ALTF in managing these cancers. We report on the experience with the ALTF in the treatment of these cancers from a tertiary academic center in Johannesburg, South Africa.

Methods: The study was a retrospective review of all patients admitted to our institution and who underwent ALTF over 5 years between January 2014 and December 2018. Inclusion criteria were head and neck patients who were 18 years or older, fit for a lengthy operation, and with stable medical conditions. Thirty-three patients met the criteria for the study.

Results: Most patients (n=24) were male with squamous cell carcinoma (78.8%) of the oral cavity. Seven patients suffered complications either at the recipient or the donor site. At the donor site the complication was partial loss (12.1%) of the skin graft. At the recipient site complications were low and included vascular compromise (6%), dehiscence (3%), or complete flap loss (3%). However, there was a total flap survival in 97% of patients.

Conclusion: Reconstruction using the ALTF had a low complication rate and excellent flap survival. These results encourage frequent use of this method of reconstruction for head and neck defects.

Keywords: SCC head and neck, thigh flap, free tissue transfer

INTRODUCTION

Reconstruction for head and neck cancer requires an appropriate flap that can restore both form and function.(1) There has been an increase in head and neck cancer in Africa (2) which has been attributed to smoking, major changes in lifestyle and diet, and potential influence of infections such as Human Immunodeficiency Syndrome (HIV).(2,3) Head and neck cancer is now the 4th most common cancer in South Africa, 90% of which is squamous cell carcinoma. (4) Many patients present at an advanced stage of the disease, attributed in part to a lack of healthcare facilities and poor socioeconomic circumstances.(2)

Surgical challenges in managing such cancers result from the excision of the primary lesion with a circumferential margin of healthy tissue. This frequently leaves a mutilated and disfigured area (**Figure 1**), requiring reconstruction to restore function with an aesthetically acceptable result.

Flap reconstructions for head and neck cancer have advanced since the 1970s. Pedicle flaps such as deltopectoral, pectoralis major, and latissimus dorsi flaps have been replaced by microvascular free tissue transfer.(5,6) The latissimus dorsi flap was popularised in 1970, and the free radial forearm flap was first reported in 1978. However, the anterolateral thigh flap **(**ALTF) is now the preferred donor site for soft tissue reconstruction of head and neck cancer patients admitted to our institution. The reasons for selecting the ALTF include versatility in design, size, and pliability by thinning or bulking as required. Furthermore, a long pedicle with a suitable vessel diameter is also available. The ALTF is easy to harvest with a two-team approach, has less donor site morbidity, and, importantly, patients prefer it as the scar remains hidden. However, it must be recognised that the ALTF donor site has potential shortcomings such as lateral thigh paraesthesia, musculoskeletal dysfunction, hypertrophic scarring, wound dehiscence, seroma, hematoma, compartment syndrome, and partial muscle necrosis.(7)

To our knowledge there is no published data on the outcomes of the use of ALTF for head and neck reconstruction in South Africa. Thus, the current study aimed to describe the ATLF process and assess the efficacy and

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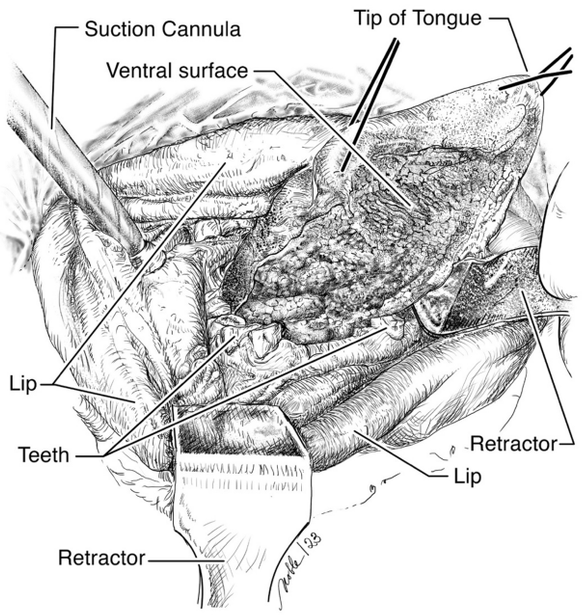


Figure 1: Post squamous cell carcinoma excision – mouth floor defect

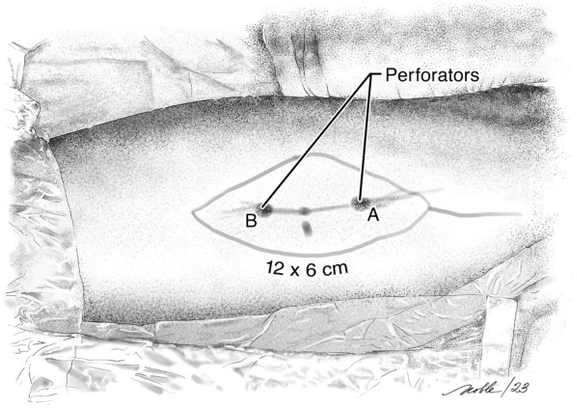


Figure 2: Donor site pre-operation flap markings.

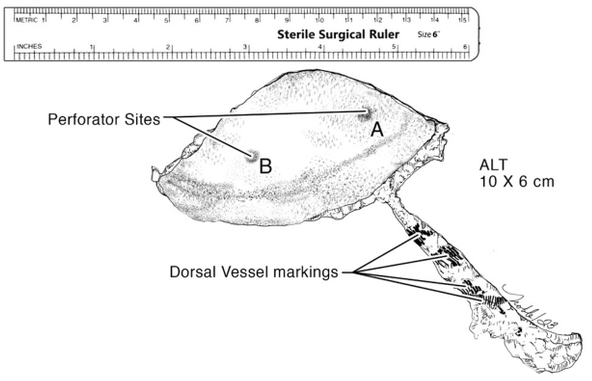


Figure 3: Harvested flap with dimensions. Donor site vessels with markings on the dorsal surface to prevent twisting. Two perforators are captured in the flap.

outcomes of ALTF in head and neck injury patients at the head and neck unit of our institution.

METHODS

This was a prospective research study involving 33 patients with different head and neck pathologies, including squamous cell carcinoma (n=18), dermatofibrosarcoma protuberans, ameloblastoma, adenocarcinoma and dermatofibrosarcoma protuberance (n=3), were included in the study. Other criteria for inclusion were, patients 18 years or older, fit for a lengthy procedure, and with well-controlled medical conditions. Excluded were patients with minor defects and patients with psychiatric conditions. The study was conducted at the Head and Neck Unit of Plastic Surgery at Charlotte Maxeke Johannesburg Hospital, a tertiary public hospital in Johannesburg South Africa, over 5 years from January 2014 to December 2018.

Flap Preparation

The ALTF consists of the fasciocutaneous tissue between the rectus femoris's medial border and the vastus lateralis's lateral border on the anterolateral aspect of the thigh. Care was taken to identify the long descending branch of the lateral circumflex artery and at least two of the three perforators, which may be myocutaneous or septocutaneous, as confirmed by a Doppler probe.(8) When the perforators were found and a suitable length of the lateral circumflex femoral artery was defined (**Figures 2** and **3**), the artery was divided, and the flap was freed. The lateral circumflex femoral artery was anastomosed to the branches of the external carotid artery and the vein to the internal jugular vein using the standard microvascular technique.(9) In the oral cavity, the ALTF provided bulk for the tongue, mouth floor, and sulcus (**Figure 4**).

Postoperative monitoring in the ICU was mandatory for early detection of complications such as vascular compromise.

Statistical analysis

Data were imported from the Excel spreadsheet to Stata 17.0. The Shapiro-Wilk test was used to determine the normality of data distribution. Continuous data normally distributed are represented as mean and standard deviations (SD). Non-normally distributed data are expressed as the median and interquartile range (IQR). Categorical data are represented as frequencies and percentages.

Approval to conduct the study was obtained from the Human Research Ethics Committee (HREC) of the University of the Witwatersrand.

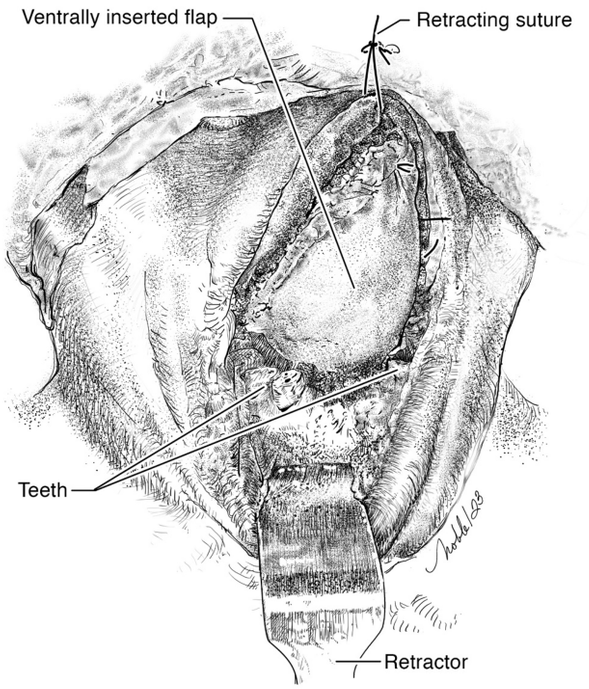


Figure 4: Post squamous cell carcinoma excision – mouth floor defect closed with anterolateral thigh flap

RESULTS

Of the 33 patients, 24 (72.7%) were men and 9 (27.3%) women with a mean age of 56 (55.89±12.77) years (range 28–78). Nineteen (57.6%) patients were smokers, 15 (45.5%) had morbidities such as hypertension (n=8, 24.24%), diabetes (n=4, 12.12%), peripheral vascular disease, chronic obstructive pulmonary disease (COPD) and HIV. Squamous cell carcinoma was the underlying pathology in 26 (78.78%) patients.

Table 1 describes the anatomical sites for reconstruction of the oral, face, scalp, and neck injuries/defects. The donor site for ALTF was the right thigh in 24 patients, and the remainder was the left thigh. No patient had lip involvement.

The donor site was closed primarily in 16 cases, while a skin graft was required in 17 patients. Complications occurred in seven (22%) patients. Partial loss of the skin graft in four cases was treated conservatively. Three patients suffered significant complications at the recipient site, with vascular compromise in two and dehiscence of the flap in one. All three complications occurred in the floor of mouth cancers. Importantly, all three patients had comorbidities such as hypertension, diabetes, HIV, and smoking, which all increased the rate of complications, and one patient had a form of squamous cell carcinoma of the tongue. Four patients had a skin graft loss in terms of minor complications. All the complications from the donor site were considered minor, while those from the flap recipient site were considered major (**Table 2**).

Table 1: ALT flap distribution for anatomical defects

Variable	Frequency (n=33)	Percentage
Anatomical site		
Face	10	30.3
Neck	1	3.3
Oral cavity	17	51.5
Scalp	5	15.2

Table 2: Anterolateral thigh flap: Graft success and minor and major complications

Variable	Frequency
Total number of successful thigh skin grafts	17 (51.5%)
Normal closure without skin graft	16 (48.5%)
Donor site complications:	
MINOR COMPLICATIONS	
Partial loss of split skin graft	4 (12.1%)
Recipient site complications	
MAJOR COMPLICATIONS	
Vascular compromise	2 (6.1%)
Dehiscence of flap	1 (3%)
Complete flap loss	1 (3%)

Most patients (n=31) stayed in the ICU for two days, while two had only overnight stays. The mean total hospitalisation was 38 days (34–44 days).

BMIs were not recorded since all 33 patients had difficulty eating due to their injuries, and none were overweight.

DISCUSSION

Head and neck defects led to the search for a flap that would optimally meet the demand for restoration of form and function. The free radial forearm flap was previously used for these defects, but it sacrifices important vessels to the hand and leaves a noticeable donor scar. The free radial forearm flap has been primarily replaced by the ALTF, which provides a large flap of differing tissue components and can replace volume loss as effectively as the latissimus dorsi flap.(10,11) In restoration of speech and swallowing after glossectomy, there is no functional difference in outcome between the ALTF and the free radial forearm flap. (10,12)

The multiple tissue composition of the ALTF meets the complex requirements for reconstruction at different sites. A de-epitheliased segment of the 'paddle' provides lining and cover within the oral cavity and the ALTF provides bulk for the tongue, the floor of the mouth, and the sulcus while being pliable, and bulk can be reduced as required. (13) There are no newer developments in the workhorse

flaps mentioned above, nor are there any newly developed techniques superior to those just described.(14)

The current study analysed the use of ALTF flaps for head and neck defects at different sites after oncological resection and after the mandatory confirmation of clear margins obtained from intraoperative pathology. It is the first study to assess the outcomes after repair of head and neck defects with this technique in South Africa. Overall, in concert with studies internationally, our overall graft survival was 97% and a rate of 12% for minor complications.

How the donor site skin closure is managed depends on the flap size and in this study 17 (51.5%) patients required a split skin graft. Donor site complications occurred in four patients healing with conservative management. Yoshiro et al. (2018) recommend that split skin graft should be avoided in obese patients and smokers.(15)

Admission to the ICU after free flap reconstruction is mandatory to closely monitor the flap and the patient's general status; the first 48 to 72 hours being critical. Two patients had vascular compromise necessitating emergency 'relook.' The cause of the vascular compromise was anastomotic failure. In both cases, the anastomosis was redone. However, only one of the flaps survived, while the other flap resulted in a total flap loss, needing a contralateral ALT flap as a salvage flap. The patient with flap dehiscence required secondary suturing.

We found that the long pedicle of the ALTF was able to reach the recipient vessels for scalp defects as the large amount of soft tissue in this flap provided cover for extensive calvarial defects. It is essential to discuss with the general surgeon the extent of resection, pedicle length required, and identification of harvested vessels including its diameter. The value of capturing many perforators within the flap is universally recognised as more than one perforator in the flap increases vascular reliability. In most cases, 'couplers' were used to anastomose two veins and reduce the disparity in their diameter. Marking of the pedicle on one side of the pedicle is important to ensure the correct orientation of vessels and prevent twisting.

LIMITATIONS

Although this was a prospective study, its limitation is the small sample size of only 33 patients. A longer study period with more patients is ongoing. Also, the generalizability of the results is somewhat limited as our study was conducted at a single tertiary public academic hospital and performed by a single plastic surgeon. Therefore, it is uncertain whether such findings could be extrapolated to other hospitals and other surgical experiences.

CONCLUSION

This study confirms the advancement achieved with microvascular head and neck reconstruction, with anterolateral thigh flap as the workhorse flap optimizing both form and function and thus enhancing the patient's quality of life. We have found it to be highly versatile, with an excellent flap survival and a low complication rate. The use of the anterolateral thigh flap is recommended for head and neck defects.

Declaration of conflict of interest: The authors declare no conflict of interest.

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