

Experience in Oral Cancer Reconstruction in a Tertiary Care Center of Nepal

Rohan Pradhan, Sangam Rayamajhi, Samit Sharma, Sushant Rai, Bikesh Rajbhandari, Himalaya Niraula, Jayan M Shrestha, Ishwar Lohani

Author(s) affiliation

Department of Plastic Surgery,
Maharajgunj Medical Campus,
Tribhuvan University Teaching
Hospital, Institute of Medicine,
Maharajgunj, Kathmandu, Nepal.

Corresponding author

Sangam Rayamajhi, MS, MCh
sangamrayamajhi@gmail.com

Submitted

Oct 3, 2022

Accepted

Nov 27, 2022

ABSTRACT

Introduction

Oral cancer is one of the most common malignancies in Nepal. Most patients have locally advanced disease during their initial presentation, necessitating substantial resection and leaving significant deformity. Functional and anatomical restoration of these defects is crucial. This study analyzed the clinical presentation of oral cancer, surgical management, and encountered complications in the Nepalese context.

Methods

This was a single-center retrospective study of oral cancer reconstruction performed at Tribhuvan University Teaching Hospital, Kathmandu over four years period (September 2018 - September 2022). Demographics, clinical presentation, comorbidities, treatment, and complications were recorded and analyzed.

Results

Out of the analysis of 36 cases of oral cancer, most of the patients were in the fifth decade of life with male to female ratio of 3:1. The most common primary site involved was buccal mucosa (38.88%). Twenty-two cases (61.11%) were in the locally advanced stage. Tobacco chewing was a common entity in personal habits. Surgery consisted of eighteen pedicled, sixteen free flaps, and five local flaps. Pectoralis major myocutaneous flap was the commonest flap performed (38.46%). The overall complication rate was 58.33%. Orocutaneous fistula was the commonest (22.22%). The partial flap loss occurred in 8.33% (15.1%) and the total flap loss occurred in three free flaps.

Conclusion

The difficulties experienced in OC reconstruction were high complication rates, multiple redo surgeries, and extended hospital stays. Despite these challenges, all of our patients were released from the hospital with stable wound coverage. Furthermore, the study will provide a platform for a better understanding of the oral cancer reconstruction scenario in the context of Nepal.

Keywords

Free flaps, oral cancer; pedicled flaps, reconstruction

INTRODUCTION

Oral cancer (OC) is one of the most common malignancies worldwide. It is highly lethal with a mortality rate that approaches 50%. About 90% of oral cavity cancers are squamous cell carcinomas (OSCC).¹ The male: female ratio ranges from 2:1 to 4:1. In the context of Nepal, OC is the sixth most prevalent cancer with an estimated risk of 4.9/100,000 while the estimated death risk was 3.4/100,000.² The increasing incidence of OSCC in Nepal can be attributed to the high prevalence of tobacco, areca nut, alcohol consumption, and poor oral hygiene.^{2,3}

Surgery is the usual course of modality to manage cancer, but owing to socioeconomic and other variables, the majority of patients have a locally advanced tumor when they arrive, necessitating significant removal of mucosa, muscle, bone, and skin.⁴ Due to the functional and anatomical needs of the defects, it may not always be possible to follow the reconstructive ladder starting with skin grafts and ending with free flaps. Microvascular free flaps have made it possible for reconstructive surgeons to import composite tissues that better meet the needs of the defect than prior approaches. The significance of this increases when restoring bone deformities. Reconstruction of these defects is essential to ensure the functional consistency of various oral cavity structures, aesthetics and allow for timely adjuvant treatment.⁵ This study aims to analyze OC patients in terms of their clinical presentation, surgical management, and encountered complications in the Nepalese population.

METHODS

A retrospective analysis was conducted among case records of all patients with OSCC, who underwent surgery and reconstruction at Tribhuvan University Teaching Hospital (TUTH) between September 2018 and September 2022; after receiving approval from the Institutional Review Committee. Relevant data regarding the study were evaluated including patient demographics, clinical presentation, various reconstructive options adopted, intra and post-operative complications, and length of hospital stay.

Data were collected, summarized, and analyzed using IBM SPSS Statistics (version 20.0). Descriptive statistics including mean, standard deviation, and percentage were calculated. Independent t-test were performed to determine statistical significance. For all statistical tests $p < 0.05$ was considered as significant.

All included patients who underwent flap reconstruction were discharged with stable defect coverage. Patients with advanced cancer who are inoperable and receiving definitive or palliative

radiotherapy (RT) or concomitant chemotherapy and RT were excluded from the study.

RESULTS

Among 36 patients admitted, 27 (75%) were males and 9 (25%) were females. Male to female ratio was 3:1 with a mean age of 50.83 ± 11.73 years. Most of the patients (13, 36.1%) were in their fifth decade of life.

The most common primary sites involved were the buccal mucosa (13, 38.88%) and the tongue (eight, 25%) with or without the floor of mouth complex and mandible being involved. All 36 patients exhibited some type of addiction, and 32 (88.89%) of them admitted to using khaini and gutkha as chewing tobacco with regular use of alcohol. Among the population under study, smoking alone was responsible for (25, 69.44%). The most common primary symptoms during an initial presentation by patients were ulcer/growth in the mouth (24, 66.7%), and bleeding from the tumor (11, 30.5%). (Table 1)

Most patients had a good performance status – the Eastern Cooperative Oncology Group 0 or 1, among them 12 (33.3%) had hypertension,

Table 1. Demographics and clinical presentation

Characteristics	Number (%)
Primary site of tumor	
Buccal mucosa	13 (38.88%)
Tongue	8 (25%)
Retromolar trigone	5 (13.88%)
Floor of mouth	4 (11.11%)
Alveolus	2 (5.6%)
Lip	2 (5.6%)
Smoking /Alcohol usage	
Smoking	25 (69.44%)
Smoking + Alcohol	15 (41.66%)

Table 2. TNM staging

Clinical stage	Number (%)
Clinical T stage	
T1	5 (13.9%)
T2	13 (36.1%)
T3	11 (30.6%)
T4	7 (19.4%)
Clinical N stage	
N0	14 (38.89%)
N+	22 (61.11%)
Clinical TNM stage	
Early (Stage I - II)	14 (38.89%)
Advanced (Stage III-IV)	22 (61.11%)

Table 3. Reconstructive modalities used

Clinical stage	Number
Pedicled flap	
Pectoralis muscle	15
myocutaneous flap	3
Deltopectoral Flap	
Free Flap	
Radial forearm free flap	8
Anterolateral thigh flap	5
Free fibula osteocutaneous flap	3
Local flap	
Nasolabial flap	2
Eslander flap	1
Limberg flap	1
Karapanzic flap	1
Primary closure	5

nine (25%) had diabetes mellitus and seven (19.4%) had comorbidities such as heart disease, hypothyroidism, anemia, and COPD. Most tumors were either T2 or T3 and 22 (61.1%) had nodular positive status. The tumors were well to moderately differentiated in 29 (80.6%) of the cases. (Table 2).

After the resection of the tumor with adequate margin, various reconstructive modalities were used (Table 3). In five (13.88%) of patients, primary closure was accomplished when the defect was 25%–30% of the volume while some form of reconstruction was required in the remaining 31 (86.11%) of the patients. Pedicled flaps (Pectoralis major myocutaneous flap (PMMC) and deltopectoral flap (DP)) together constituted 18 (46.15%) of the total reconstructive modalities. Local flaps were used in 5 cases (12.89%) which were used in combination with PMMC flap except in one case of lip carcinoma for which a karapanzic flap was done. There were a total of 16 (41.02%) microvascular free flaps used, among which the free radial forearm flap (RFFF) was the most common followed by the Anterolateral thigh flap (ALT) and the free fibula osteocutaneous flap (FFF).

Complications were experienced by 18 patients. Out of 39 flaps, 16 flaps (41.02%) had flap-related complications. 6 (33.33%) out of 18 pedicled flaps and 6 (37.5%) out of 16 free flaps had complications. There were three cases (7.69%) of total flap necrosis (TFN) (all free flaps (two ALT + one RFFF)). One free flap (RFFF) was salvaged after re-exploration and vessels re-anastomosis. Partial flap necrosis (PFN) was encountered in 3 out of 35 flaps (15.09%) (Two pedicle flaps + one free flap). Orocutaneous fistula (OCF) was seen in 22.22% of the patients. For convenience, we have categorized them as major OCF if the general anesthesia-based surgical procedure and/or hospitalization for an extended

Table 4. Complications

Clinical stage	Number (%)
Flap related complications	
Total flap loss	3 (8.33%)
Partial flap loss	3 (8.33%)
Oro-cutaneous fistula	
Major	3 (8.33%)
Minor	5 (13.89%)
Clinical TNM stage	
Early (Stage I - II)	14 (38.89%)
Advanced (Stage III-IV)	22 (61.11%)
Seroma	2 (5.55%)
Hematoma	2 (5.55%)
Infection	1 (2.7%)
Donor site complication	
Partial graft loss	2 (5.55%)

period of time is required for its management. Major OCF was reported in three (8.33%). Minor OCF were categorized as needing only a few surgical procedures like minor debridement and resuturing, which was seen in five (13.88%) of the patients. Similarly, complications such as seroma (2 cases), Hematoma (2 cases), surgical site infection (1 cases), and partial graft loss at the donor site (2 cases) were also observed (Table 4).

DISCUSSION

In this study, most of the patients were in their fifth decade of life (range: 27-73 years) with a mean age of 50.83 ± 11.73 years. According to study done in the Nepalese³ as well as in the western population⁶, most of OSSC occurred in the sixth to seventh decade of life. The male:female sex ratio was 3:1, while many large-scale epidemiological studies claimed that the ratio fluctuates based on the disease's site from 2:1 to 15:1.¹⁻³

The most common site of OSSC was buccal mucosa (38.88%), then followed by the tongue (25%). Only 2 cases (5.6%) of each of the alveolus and lip were reported. According to western data, OSSC most frequently develops on the tongue and the floor of the mouth. However, in the countries where chewing tobacco and areca nuts are popular, the buccal mucosa and retromolar trigone were reported as the most common site.^{1,5} This pattern was noticed in our setting. The majority of OSSC patients were in advanced stage III and IV accounting for (10, 27.8%) and (12, 33.3%) of the total cases respectively. Similarly, a comparable finding of OSCC distribution in the Nepalese population as stage I (2.7%), stage II (10.6%), stage III (18%), and stage IV (49.7%) were observed.¹

The majority of patients had pedicled flap

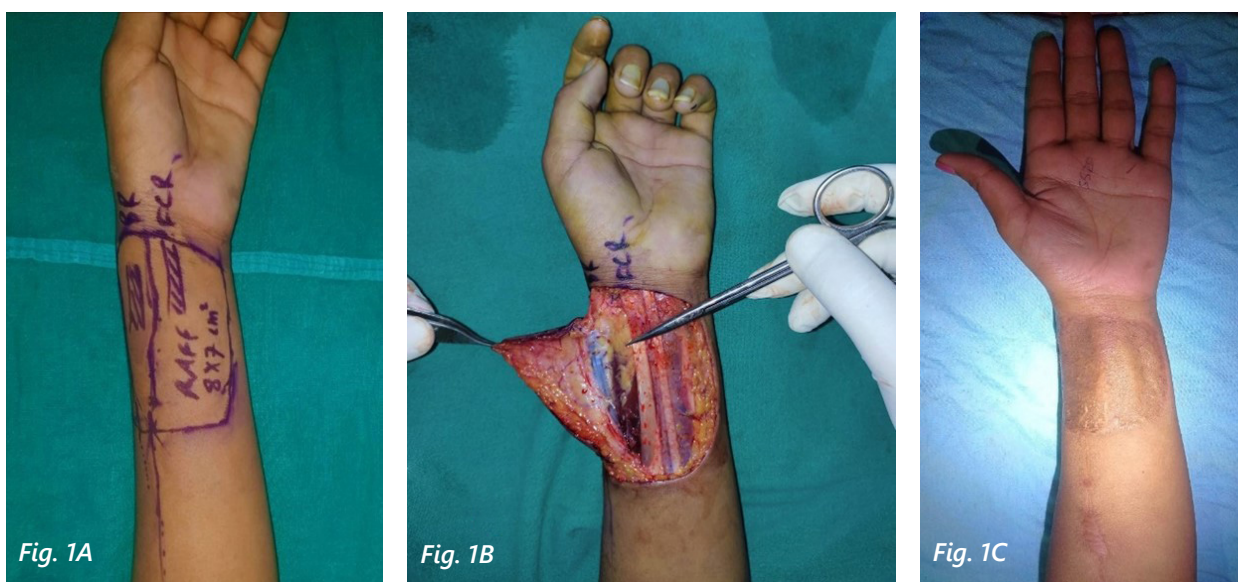


Figure 1. A. RFFF design. Figure 1B. Intraoperative picture. Figure 1C. Post-operative picture of donor site with well-settled graft with stable coverage.

reconstruction. The PMMC was the workhorse of the pedicled flap group, being utilized alone or in conjunction with other flaps in 15 of the 36 cases (41.66%). Twelve cases were done as primary reconstructive modalities. The remaining were done after the failure of free flaps; of which 1 was done in combination with the Nasolabial flap and another one with the Eslander and Limberg flap due to PFN of the PMMC. The advantage of PMMC in OC reconstruction are good reach to the oral cavity, considerable soft tissue volume with sizeable skin paddle that can be easily and rapidly harvested with a reliable pedicle. However, due to its drawbacks, including a higher complication rate such as PFN of skin paddle, too bulky in some circumstances, and distortion of the chest wall; free tissue transfer is widely being popular.⁷ However, one significant conclusion that can be drawn from the current study is the potential of PMMC to be used as a salvage procedure following free flap failure or in complications such as OCF. In our series, 3 cases (20%) of PMMC were done as salvage procedure implying that PMMC is a useful technique when free tissue transfer cannot be performed, or when patients have artery anomalies, has compromised general status due to extremes of age, or have medical comorbidities. In addition, PMMC can be considered as an eventual alternative following free flap failure since it is more cost-effective for patients who are economically challenged which is particularly in accordance with our setting. Similar observations were reported by the Western⁸ as well as an Indian literature⁹ of PMMC being used as a salvage procedure in 38% and 7.33% respectively in their series, further reassuring our finding.

In the analysis of seventy-three cases of PMMC reconstruction performed in an American population, TFN in 12.3% of cases and PFN in 12.3% of cases were observed.¹⁰ The twenty-four cases of PMMC reconstruction in a Chinese population with a complication rate of 62.5%, 2 cases of TFN, and 5 cases of PFN were reported.¹¹ Similarly, another western literature reported TFN in 1.5% of cases, PFN in 7%, and dehiscence in 13% of cases in their series of 133 cases of PMMC reconstruction.⁷ However, no cases of TFN were observed in our study. PFN was observed in 2 cases, accounting for 13.33% of all reconstructive surgeries utilizing PMMC and, 5.12% of all reconstructive procedures conducted. Minor OCF was observed in 4 cases, accounting for 10.25% of all conducted reconstructive surgeries and, 26.66% of all reconstructive procedures utilizing PMMC. Our results were comparable with the above-mentioned studies. DP was used in only 3 cases of the study population (8.33%) of which two of them were used as a secondary reconstructive modality for the management of major OCF. The complications encountered were uneventful.

RFFF has been the universal flap for oral cavity reconstruction and is especially indicated for defects of the retromolar trigone, floor of the mouth, and buccal mucosa.^{12, 13} RFFF was used in 8 of the 36 cases (22.22%). TFN was observed in 1 case accounting for 12.5% of the entire RFFF group and 2.5% of the total reconstructive modalities. Flap survival was 88.5%. A study done in a Taiwanese population reported a flap survival rate of 92% in their series of 38 RFFF reconstructions which is consistent with our finding.¹³ Furthermore, he also

noted patient-related donor site complications such as Unaesthetic appearance (8%), reduced grip strength (11%), and partial graft loss at the donor site (11%). In our study, donor site complication was minimum with only 1 case having partial graft loss needing re-graft. During our flap harvest, we use the standard approach of dissecting the flap from the ulnar side until the medial border of the Flexor carpi radialis tendon (FCR) is encountered where we dive into the sub-fascial plane and include the radial vessel in the lateral intermuscular septum. This approach tends to preserve fascial covering over vital structures and thus minimize donor site morbidity with good graft take. (Figure 1)

FFF was part of reconstruction in only 3 cases (8.33%) under our study. Though no case of TFN was observed. Complication occurred in 2 cases, where one case underwent flap re-suturing for minor OCF and reconstructive plate readjustment, and another patient underwent DP flap coverage for major OCF. In one case partial graft loss was observed at the donor site needing re-graft. Another study in the Taiwanese population observed a higher risk of TFN and other complications in bone-containing free-flaps for jaw reconstruction as compared to only soft-tissue reconstruction.¹⁴ As only a few cases were there so we were unable to draw any statistically significant conclusions. This might be because of the steeper learning curve of using a composite bone flap in our setting. Similarly, ALT was part of reconstruction in 5 cases (13.88%) under our study. Two of them underwent TFN (12.5%) and one PFN (6.25%) in the free flap group.

For microvascular anastomoses in head and neck microsurgery, our preference has been to dissect the branches of the external carotid system and then, usually perform an end-to-end anastomosis with facial, lingual artery, or superior thyroid artery. Mandatory anastomosing of two veins of which one of the venous anastomosis has usually been the end-to-side into the internal jugular vein which has been increasingly used with functional radial neck dissection. About 4 patients (31.25%) in the free flap set required re-exploration for doubtful viability among them we were only able to salvage one case of RFFF. Thrombosis of the venous side of the anastomosis was the most frequent cause we observed. Since 1980's, microsurgical reconstruction has been the primary method of coverage of such defects. Success rates have been exceptionally high, above 90%.^{15, 16} However, in our study, 6 (37.5%) of free flaps had complications with 3 (18.75%) TFN. This is relatively high which might be fallacious because of the advanced nature of the disease and extensive surgeries done. In addition, only with a decade of microsurgical experience, manpower, and resource-limited setup, we consider it as our learning curve.

The incidence of postoperative complications in our study was observed to be quite higher (58.33%) than the incidence of complications reported by several literatures.¹⁷⁻²⁰ The most common complications in our study were OCF and flap necrosis seen in 22.22% and 8.33% of the patients, respectively. A study done in Brazilian population reported the incidence of postoperative complication to be 47% with OCF observed in 9.1% of the cases and flap necrosis was seen in 20.9% of the cases.¹⁸ Seroma, infection, and hematoma have also been reported in studies^{19, 20} which were also encountered in our study. Hospital stay for patients following oral cancer surgery tends to be long, because of the requirement of multiple surgeries, the presence of comorbidities, and post-operative complications. The average hospital stay was 27.91 ± 13.61 days. We observed that the average hospital stay in the free flap group (36.62 ± 13.55 days) was significantly longer than the other group (25.53 ± 8.95 days), which may be due to the increased trend of flap re-exploration, redo operations, and prolonged postoperative ventilation in the free flap group.

A relatively short study period and a small sample size are the limitations of our study. For achieving clinically relevant conclusions, a similar study with a longer study period is necessary.

CONCLUSION

The PMMC was the major oral cancer reconstructive modality used in this study, of which a fifth was used as a salvage procedure after the failure of free flaps. The choice of free tissue transfer in our setting remains RFFF, with a good flap survival rate and minimum donor site morbidity. Nearly a third of our flaps encountered some form of post-operative complications, with an overall incidence of 58.33%. The difficulties experienced in OC reconstruction were high complication rates, multiple redo surgeries, and extended hospital stays. Despite these challenges, all of our patients were released from the hospital with stable wound coverage. Furthermore, the study will provide a platform for a better understanding of the oral cancer reconstruction scenario in the context of Nepal.

ACKNOWLEDGEMENT

The authors would like to thank The Department of Head and Neck surgery for their valuable cooperation and providing us with the required data.

FINANCIAL SUPPORT

The author(s) did not receive any financial support for the research and/or publication of this article.

CONFLICT OF INTEREST

The author(s) declare that they do not have any

conflicts of interest with respect to the research, authorship, and/or publication of this article.

REFERENCES

- Gajurel R, Gautam DK, Pun CB et al. Trends and clinicopathological characteristics of oral squamous cell carcinomas reported at a tertiary cancer hospital in Nepal during 1999 to 2009. *Clin Exp Dent Res*. 2020 Jun; 6(3):356-362.
- Bray F, Ferlay J, Soerjomataram I et al. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin*. 2018; 68(6):394-424.
- Shrestha G, Siwakoti B, Mulmi R et al. Trend of Head and Neck Cancers in a National Tertiary Cancer Hospital of Nepal from 2012 to 2017. *South Asian J Cancer*. 2021 Dec 31; 10(4):236-240.
- Ratnagiri R, Jena S, Parvathi P et al. Reconstruction in head-and-neck cancers - analysis of the learning curve. *Natl J Maxillofac Surg*. 2018 Jul-Dec; 9(2):191-195.
- Chakrabarti S, Chakrabarti PR, Desai SM et al. Reconstruction in oral malignancy: Factors affecting morbidity of various procedures. *Ann Maxillofac Surg*. 2015 Jul-Dec; 5 (2):191-7.
- Shiboski CH, Shiboski SC, Silverman S Jr. Trends in oral cancer rates in the United States, 1973 1996. *Community Dent Oral Epidemiol* 2000; 28: 249 56.
- Baek SM, Lawson W, Biller HF. An analysis of 133 pectoralis major myocutaneous flaps. *Plast Reconstr Surg* 1982; 69: 460 9.
- Schneider D, Wu V, Wax M. Indications for pedicled pectoralis major flap in a free tissue transfer practice. *Head Neck*. 2011; 34 (8):1106–1110.
- Anehosur V, Dikhit PS, Nagraj N, Jayade B, Kumar N. PMMC Flap Revisited and its Clinical Outcome in 150 Patients. *J Maxillofac Oral Surg*. 2020 Mar; 19 (1):26-31.
- Mehrhof AI Jr, Rosenstock A, Neifeld JP et al. The pectoralis major myocutaneous flap in head and neck reconstruction. Analysis of complications. *Am J Surg* 1983; 146: 478 82.
- Zou H, Zhang WF, Han QB et al. Salvage reconstruction of extensive recurrent oral cancer defects with the pectoralis major myocutaneous flap. *J Oral Maxillofac Surg* 2007; 65: 1935 9.flap. *J Oral Maxillofac Surg* 2007; 65:1935 9.
- Başaran B, Ünsaler S, Kesimli MC et al. Free Flap Reconstruction of the Head and Neck Region: A Series of 127 Flaps Performed by Otolaryngologists. *Turk Arch Otorhinolaryngol*. 2021 Jun; 59(2):103-110.
- Chen CM, Lin GT, Fu YC et al. Complications of free radial forearm flap transfers for head and neck reconstruction. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2005; 99:671 6.
- Wu CC, Lin PY, Chew KY, Kuo YR. Free tissue transfers in head and neck reconstruction: complications, outcomes and strategies for management of flap failure: analysis of 2019 flaps in single institute. *Microsurgery*. 2014 Jul; 34(5):339-44.
- Liang J, Yu T, Wang X et al. Free tissue flaps in head and neck reconstruction: clinical application and analysis of 93 patients of a single institution. *Braz J Otorhinolaryngol*. 2018 Jul-Aug; 84(4):416-425.
- Başaran B, Ünsaler S, Kesimli MC et al. Free Flap Reconstruction of the Head and Neck Region: A Series of 127 Flaps Performed by Otolaryngologists. *Turk Arch Otorhinolaryngol*. 2021 Jun; 59(2):103-110.
- McGurk MG, Fan KF, MacBean AD et al. Complications encountered in a prospective series of 182 patients treated surgically for mouth cancer. *Oral Oncol* 2007;43:471-6
- de Melo GM, Ribeiro KC, Kowalski LP et al. Risk factors for postoperative complications in oral cancer and their prognostic implications. *Arch Otolaryngol Head Neck Surg* 2001; 127: 828-33.
- Divya GM, Zinia N, Balagopal PG et al. Risk factors for post-operative complications in primary oral cancer surgery – A prospective study. *Indian J Surg Oncol* 2017; p. 1-7.
- Nair D, Singhvi H, Mair M, et al. Outcomes of surgically treated oral cancer patients at a tertiary cancer center in India. *Indian J Cancer*. 2017 Oct-Dec; 54(4):616-620.