INITIAL EXPERIENCE OF RECONSTRUCTION OF SURGICAL DEFECT IN HEAD AND NECK WITH FREE FLAP AT DEDICATED CANCER CENTER IN NEPAL

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ABSTRACT

Background:

Due to the complexity of surgery, fear of flap failure and lack of resources, free flap reconstruction is rarely performed at most centers in Nepal. Recently free flap reconstruction following ablative surgery for head and neck cancer has been started at Kathmandu cancer center. This study aims to determine the short-term outcomes and success rates of free flap reconstruction following ablative surgery for head and neck cancer at Kathmandu Cancer Center.

Materials and methods:

This is a retrospective chart review of all patients who required free flap reconstruction following head and neck surgery for cancer from July 2021 to December 2022. Various characteristics of patients and details of treatment were extracted from the records.

Results:

During the study period, 38 patients with a median age of 50 underwent surgery for head and neck cancer and required reconstruction with free flap. Primary cancer was the indication for surgery in 32 patients whereas one had undergone surgery for residual tumor and five had undergone surgery for recurrence or second primary. Free radial artery forearm flap (FRAFF) was utilized in 20 patients, free anterolateral thigh flap (FALTF) in 11 patients and free fibula osteocutaneous flap (FFOCF) in 7 patients. Median duration of surgery was 540 minutes. Reexploration within 24 hours was required for two patients, one for hematoma and other for ischemia. One patient experienced free flap failure due to arterial ischemia, resulting in an overall success rate of 97%.

Conclusion:

Dedicated, skilled teams can achieve comparable success and acceptable short-term outcomes in free flap reconstruction.
Keywords: Anastomosis, FALTF, FFOCF, FRAFF, ischemia, oral cavity, neck dissection, Squamous cell cancer.

INTRODUCTION

Among various head and neck cancers, oral cavity is the commonest site involved in people of South Asian countries like Nepal, India, Pakistan, Sri Lanka and Bangladesh.[1] Most of the patients present in locally advanced stage who require multimodality treatment. Surgery is often the mainstay of treatment for many of the sites in head and neck. Resection of primary tumor leads

to defect which is usually not amenable to primary closure and requires reconstruction to rehabilitate the patient. Regional flap like pectoralis major myocutaneous (PMMC) flap has been the workhorse for reconstruction of composite defects once popularized by Arlyan and Cuono.[2] The PMMC flap has its own limitations with reach above zygoma, bulk, in female patients, higher complication rate etc.[3] Due to the increasing familiarity of surgeons with microvascular techniques, free flaps are nowadays favored for reconstruction of defects after radical surgery in head and neck giving superior functional and esthetic outcome.[4,5] Failure of free flap is the major concern and varies widely. Success rate of free flap has been reported up to 91 to 99% in literature.[6] Very few centers in Nepal have the facility for reconstruction with free flaps which requires dedicated skilled manpower. Recently free flap reconstruction of such defects has been started at Kathmandu Cancer Center (KCC) and this study aims to evaluate its short-term outcome and success rate.

MATERIALS AND METHODS

This is a retrospective chart review of all patients who required free flap reconstruction following head and neck surgery from July 2021 to December 2022 at Kathmandu Cancer Center, Tathali, Bhaktapur. Various characteristics of patients were extracted from the records as per the proforma. Details regarding the defect site and free flap utilized were extracted from the operative note. Duration of surgery, estimated blood loss and need for blood transfusion were extracted from anesthesia records. Outcomes including length of stay and medical and surgical complications were extracted from the inpatient medical record.

Following clinico-radiological evaluation of patients, treatment planning was discussed in a multidisciplinary tumor board involving head and neck surgeons, radiologists, radiation oncologists, medical oncologist and plastic surgeons. All patients underwent surgery by two teams. Ablative surgery was commenced by head and neck surgeons. Flap was harvested by plastic surgeons simultaneously. The flaps utilized were free radial artery forearm flap (FRAFF), free anterolateral thigh flap (FALTF) or free fibula osteocutaneous flap (FFOCF). Till the defect size was ascertained after resection of the primary tumor, vessels of the flap were dissected. In order to reduce the ischemia time, vessels in the neck were prepared for anastomosis before dividing the pedicle of the flap. In case of FFOCF, osteotomies for contouring the bone were performed while the vascular pedicle was still attached to the leg. Inset of the flap was performed partially before the vessels were anastomosed. Cut ends of the vessel lumen were irrigated with 10-unit heparin per mL of normal saline. Vessel spasm was managed with 2% lidocaine. One artery and at least two veins were anastomosed in all the cases. After the final inset of flap, patency of the anastomosed vessels was confirmed. Wound was closed under the negative suction drain. Patient was heparinized for 5 days. Flap was monitored every 30 minutes for initial 8 hours then hourly for next 48 hours followed by 3-4 hourly for next 5-7 days. Aspirin was started on day five after discontinuation of heparin and it continued for a month.

RESULTS

During the study period 38 patients underwent surgery for head and neck cancer who required free flap reconstruction. The age of the patients ranged from 21 to 76 years with a median age of 50. Ten (26%) patients were above 60 years of age. Of the patients, 27 were male and 11 were female. All patients had performance status of ECOG 0 (21 patients) or 1 (17 patients). Seven patients had hypertension (HTN), five had diabetes mellitus (DM), two had chronic obstructive pulmonary disease (COPD) and three had psychiatric illness. Two of the patients had both HTN and DM whereas one patient had both HTN and COPD. Most of the patients (32) had a habit of using tobacco related products, Guttkha and/or alcohol whereas six patients did not have a habit of addiction.

The primary site of malignancy was oral cavity in most of the patients (36). Two patients had maxilla as the primary site of involvement. Tongue (10) followed by buccal mucosa (7) and gingivobuccal sulcus (7) were the common subsites of the oral cavity involved by tumor. Squamous cell carcinoma (SCC) was the commonest histological subtype of malignancy which was observed in 35 patients whereas others were adenoid cystic carcinoma (2) and melanoma (1).

Table 1. Subsites of head and neck involved by cancer.

Subsites	No. of cases
Tongue	10
Buccal Mucosa	7
Gingivobuccal Sulcus	7
Alveolus Lower	3
Floor of Mouth	3
Lip	3
Maxilla	2
Alveolus Upper	1
Retromolar Trigone	1
Hard Palate	1
Total	38

Most of the patients (32) had undergone surgery for primary cancer. Whereas one had undergone excision of residual tumor from floor of mouth who was primarily operated at another center. Five patients had undergone surgery for either recurrence or second primary. Out of these 5 patients, one patient had received concurrent chemotherapy and radiotherapy for treatment of previous primary. Whereas four patients following surgery of first primary cancer had received adjuvant radiotherapy. Unilateral neck dissection was performed in 21 patients whereas bilateral neck dissection was performed in 14 patients. Neck dissection was not performed in three patients who were treated for recurrence in whom positron emission tomography (PET) scan did not show uptake in the neck. Infratemporal fossa (ITF) clearance had to be performed in six patients who had low ITF involvement radiologically.

Table 2. Medical and surgical complications in patients undergoing surgery.

Complications	No. of patients	Percent
Seroma	11	28.9
Sialocele	4	10.5
Wound Dehiscence	5	13.1
Partial loss of STSG at donor site	11	28.9
Superficial SSI at the primary site	6	15.8
Superficial SSI at the donor site	2	5.3
Pulmonary infection	4	10.5
Sepsis	1	2.6
Hematoma	2	5.3
Partial flap necrosis	2	5.3
Total flap failure	1	2.6
Orocutaneous fistula	1	2.6

FRAFF was utilized in 20 patients, FALTF in 11 patients and FFOCF in 7 patients. Duration of surgery ranged from 450 to 900 minutes with a median of 540 minutes (9 hours) . Estimated intraoperative blood loss ranged from 500 to 1000 mL. Perioperative blood transfusion was required in two patients. Various surgical and medical complications were encountered. Seroma was observed in 11 patients, out of which 3 required repeated aspiration. Sialocele was observed in four patients which required prolonged treatment with pressure dressing and injection glycopyrrolate. One patient required corrugated drain placement in infraauricular area to divert the saliva in order to avoid getting collected between the flap and cheek. Wound dehiscence was observed at the primary site in five patients out of which three required revision of margins and secondary suturing. There was partial loss of split thickness skin graft (STSG) at donor site of various extent in 11 patients leading to delayed wound healing. Superficial surgical site infection (SSI) at primary site was observed in six patients. Superficial SSI at the donor site was observed in 2 patients. Pulmonary infection was observed in four patients which required upgrade in antibiotics. One patient developed sepsis leading to prolonged hospital stay for 45 days. Median intensive care unit (ICU) stay was 3 days and median hospital stay was 12 days. None of the patients expired during the perioperative period, giving postoperative mortality of zero percent. One patient developed orocutaneous fistula which was managed conservatively. Two patients developed hematoma. One of them required evacuation under general anesthesia as it was compromising the blood circulation of the flap whereas the other patient was managed

conservatively. Two patients developed partial flap necrosis which was debrided and wound healed by secondary intention. Both of them were being treated for second primary cancer and had received radiotherapy to the neck earlier. One patient developed arterial thrombosis after 12 hours. Re-exploration was performed immediately. After declotting, re-anastomosis of vessels was performed establishing the circulation. But the flap could not be salvaged as it, later, developed venous thrombosis. The defect was repaired with a PMMC flap on the third postoperative day. The patient was a 55-year male who had undergone reconstruction with FFOCF following wide local excision (WLE) including lip and outer skin with segmental mandibulectomy from right angle of mandible to left first premolar and bilateral selective neck dissection for primary in the gingivobuccal sulcus extending to lower lip and alveolus. Operative time was 750 minutes. Hence, out of 38 free flap surgeries, there was one unsalvageable failure. Thus, the success rate of free flap turns out to be 97%. Tracheostomy was performed in 32 patients. Decannulation could not be performed because of aspiration in two patients even after completion of adjuvant treatment in 100 days and they were percutaneous endoscopic gastrostomy dependent. One of them had undergone total glossectomy for carcinoma tongue and other had undergone hemiglossectomy for carcinoma floor of mouth. Rest of the patients were able to feed orally.

DISCUSSION

So far, one unsalvageable failure in the current study makes the success rate of free flap 97%. Since the popularization of free flap in the 1970s, it has become the primary modality for reconstruction after ablative surgery in head and neck region. With better understanding and refinement of techniques, the success rate of free flap has been reported in recent publications from 91 to 99%.[6–8] Apart from the patient factors, skill of the ablative and reconstructive surgeons and their collaboration; team work of anesthetists, critical care physicians, nurses and other supporting staff also impart on the outcome of surgery. A 30 year review of use of free flap in 866 cases of head and neck reconstruction by Suh et al had found higher failure rate for FALTF (5.5%) and FFOCF (5.1%) whereas success rate for FRAFF was 98.9%.[9] There was no failure of FRAFF (21 cases) in the current study giving the success rate of 100%. The only failure encountered was in FFOCF. All five patients who underwent free flap reconstruction, despite having received prior radiotherapy or neck dissection, were successful. Due to scarring in previously treated neck, microvascular reconstruction is often difficult but this does not affect the success rate of flap.[10]

Reexploration to ensure the circulation in flap was required in two patients. After evacuation of hematoma in one of the patients, blood circulation was established. In another patient, a failed attempt of reexploration to salvage the flap was performed immediately after suspecting the decreased blood flow on needle prick. Arterial thrombosis was detected. Though reexploration was attempted within 2 hours of suspicion of compromise in circulation, it continued to deteriorate with a brief period of hope. As early identification of compromise in circulation and reexploration gives better chance of salvage of flap, strict monitoring of the flap is crucial.[11] In a retrospective analysis of 2019 flaps in a single institute, reexploration was performed in 201 cases (9.9%).[12] Venous insufficiency was the commonest reason for reexploration with an overall successful salvage rate of 72.6%. Arterial insufficiency had the lowest salvage rate of 50.7% in their study.

Median operative time was 540 minutes in the current study. This is similar to other studies which report mean operative time of 546 to 588 minutes.[11,13] Operative time tends to decrease with experience of the team and then reaches the plateau. The convenience of harvesting flaps (FRAFF, FALTF, FFOCF) in the supine position without need of readjustment of position provides the two teams getting involved in surgery simultaneously. This saves the overall time of anesthesia. In the current study, FRAFF (52.6%) was the most frequently used flap. The ease of harvesting and insetting of FRAFF in comparison to FALTF or FFOCF also contributed to less median operative time. FRAFF was utilized for reconstruction of defects following hemiglossectomy or WLE of buccal mucosa with or without marginal mandibulectomy. FFOCF was utilized to reconstruct defects following middle third

mandibulectomy or segmental mandibulectomy of the body of mandible. Partial skin necrosis was encountered in two patients when a larger skin paddle was required to reconstruct the lip and chin defect following middle third mandibulectomy. FALTF was utilized whenever bulk for filling the defect or larger skin paddle to cover both the mucosal and cutaneous surface was required e.g. ITF clearance, total maxillectomy with orbital exenteration with excision skin of cheek, posterior segmental mandibulectomy with infrastructure maxillectomy with excision of skin of cheek etc.

Median hospital stay was 12 days in current study whereas it was 28 days in a study by Holom et al.[11] In another study, Median hospital stay was 22 days (7–165 days) and was longer for osseous free flaps than for non-osseous flaps.[7] In the current study, patients who were not tracheostomized had a shorter hospital stay. Patients, who were not at risk of aspiration or difficulty breathing, were discharged after decannulation of tracheostomy and commencing oral feeding. Tracheostomy care and nasogastric feeding was taught to the caretaker of patients during hospital stay if it was anticipated that the patient would require them for prolonged duration. Sialocele was encountered in four patients in the current study. Very few studies have quoted about the iatrogenic sialocele following oral cancer surgery.[14] Ligation of the parotid duct and repairing the capsule of parotid gland may minimize this complication.

Limitation of study: While our current experience with a smaller number of patients is encouraging, our ultimate goal is to not only sustain but exceed our current level of success in the future.

CONCLUSION

Acceptable short-term outcome and success rate of free flap for head and neck reconstruction can be achieved with dedicated team effort even in our setup, which is comparable to most of the centers in developed countries. This inspires us to continue to improve and provide the service to patients who were otherwise not offered the curative treatment due to lack of options for reconstruction.

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