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Original Research Article

Functional and aesthetic outcome of different technique for lip reconstruction after ablative surgery of lip carcinoma at a comprehensive cancer care center in Nepal

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ABSTRACT

Introduction: When treating carcinoma of the lip, surgical excision often becomes necessary to remove cancerous tissue, which subsequently requires reconstructive surgery to restore both functional integrities, like speech and swallowing, and aesthetic desirability as the lip is a prominent facial feature. Different flap techniques are employed depending on the size, location, and extent of the resection.
Objective: To evaluate the functional & aesthetic outcome of different techniques used in lip reconstruction after lip cancer ablative surgery.
Materials and Methods: A retrospective review of all patients undergoing lip reconstruction using various techniques after lip cancer ablative surgery between 2021 and 2023 were conducted at a tertiary cancer hospital. Descriptive analysis was done.
Results: Out of 17 patients, 12 were men and five were women. The mean age was 52.23 years. Out of 17 patients, primary closure using W-plasty and V-plasty technique was used in four patients, lip & commissure by Zisser Flap in one patient, lip advancement and Karapandzic flap in three patients, Bilateral Webster Bernard Flap in one patient, nasolabial flap in two patients, Bilobed Pectoralis Major Myocutaneous Flap in one patient, free radial artery forearm flap with palmaris tendon in two patients, Free Anterolateral thigh Flap in two patients and lip & mandibular reconstruction with Free Fibula Osteocutaneous flap in one patient. Oral competence was present in 15 cases and only two patients having minimal incompetence those reconstructed with anterolateral and Radial artery forearm free Flap. Aesthetic outcome was excellent in seven cases, good in six cases and satisfactory in four cases. In one case, minor wound dehiscence was present that healed spontaneously and one had seroma that resolved with serial needle aspiration. Minor grade microstoma was observed in four cases and speech problem in three cases which was minimal in severity.
Conclusion: Successful reconstruction of all type of lip defects can be attained, if as many reconstructive procedures as possible have been mastered, and an appropriate technique is used according to the lip defect.

1. Introduction

Lip cancer accounts for 23.6 to 30% of malignant tumors of the oral cavity.[1] Squamous cell carcinoma (SCC) is the

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most common malignancy related to the lips (95%) and the lower lip is more commonly involved in comparison to upper lip (90%).[2] SCC of the lip is thought to be related to sun exposure.[1] However, the etiology of lip cancer is multifactorial, including exposure to sunlight, tobacco, genetic predisposition, immunosuppression and immunodeficiency.[3] The accepted method of lip cancer treatment is full-thickness surgical resection of the skin, muscle and underlying mucosa to allow a safe surgical margin. In presence of poor prognostic indicators like multiple levels of positive lymph nodes, extra capsular extension of the cancer in lymph nodes, deep invasion of the primary tumor, neural and vascular invasion and tumor margins less than 5mm, tumors of the lips should be treated with surgery and postoperative radiation.[4]Defect in the lip is treated with a variety of reconstructive techniques, depending on site, size and type of the defect. The subsequent reconstruction should satisfy two fundamental requirements: 1) to conserve labial function & maintain continence & 2) to achieve acceptable aesthetic appearance.[5] Therefore, reconstruction of lip is a challenge to restoration of both function & aesthesis after tumor resection. This study was aimed to evaluate the functional and aesthetic outcome of different techniques used in the lip reconstruction after Lip cancer ablative surgery.

2. Material and Methods

This retrospective study was conducted in Department of Head and Neck Oncology & Reconstructive Surgery of Purbanchal Cancer Hospital a sister wing of B & C medical college from January 2021 to December 2023 after getting clearance from the institutional ethical committee. The patients with lip carcinoma treated with surgical resection leaving the defect and reconstructed with different techniques (primary, local, distant and microvascular free flap) were enrolled. Anatomic location of the lip defects (skin, vermillion, or both), thickness of the lip defect (partial thickness or full thickness), and width of the lip defect relative to the overall width of the lip were used to classify the lip defect into three categories: 1) defects less than one-third of the total lip length, 2) defects between one-third and two-thirds of total lip length, and 3) total lip defects.[6–8] The different technique of lip reconstruction was done according to the standard operative techniques.

All patients were evaluated preoperatively by clinical examination and radiological imaging for cancer staging for treatment (tumor resection and appropriate neck dissection followed by radiotherapy and/or chemotherapy those patients having oncological indication after histopathological report). Preoperative and postoperative and subsequent follow up photographic documentation were done. The functional and aesthetic results were evaluated at the end of 12 weeks. Oral competence, lip mobility, and sensations were used for functional assessment. The patients were asked to evaluate the subjective overall function of the reconstructed oral commissure in terms of speech integrity and oral competence) with four grades (4 -excellent; 3- good; 2- satisfactory; 1- poor).

For aesthetic assessment, followings methods were used: i) lip appearance at rest (symmetrical or asymmetrical), ii) size of the lip in a horizontal and vertical direction, iii) status of oral stoma (severe microstomia, moderate microstomia, or normal stoma), iv) commissure (acute or obtuse), v) scar aesthetics in nasolabial and mentolabial crease and vi) size of new vermilion to available old residual vermilion. Two surgeon's assessment and comments as well as patients' comments were also taken into consideration for aesthetics outcomes with four grades (4-excellent; 3- good; 2- satisfactory; 1- poor). Descriptive analysis of the data was performed using the statistical package software SPSS 16.0 (SPSS Inc., Chicago, IL, USA).

3. Results

There were 17 patients i.e. 12 male and 5 females. The patient age range between 34 and 91 years (mean age was 52.23 year). Lower lip had tissue defects in 16 cases and involved commissure in eight cases. Out of the 17 patients, five patients had a defect size up to 1/3, six patients had a defect size of 1/3 to 2/3 and six patients had a defect size >2/3.

Out of 17 patients four patients had primary closure by W plasty and V platy technique (Figure 1), one patient lip & commissure by Zisser Flap (Figure 2), three patients lip advancement and Karapandzic flap (Figures 3, 4 and 5), one patient Bilateral Webster Bernard Flap (Figure 6), two patients nasolabial flap (Figure 7), one patient bilobed pectoralis major myocutaneous flap (Figure 8), two patients free radial artery fore- arm flap with palmaris tendon (Figures 9 and 10), two patients with free anterolateral thigh flap in which facia lata was used to make a sling in one case (Figure 11) and one patient lip & mandibular reconstruction with free fibula osteocutaneous flap (Figure 12). The patients' characteristics, reconstructive techniques, tissue defect location and size, functional and aesthetic outcome, and complications are shown in Table 1.

Out of 17 patients the functional outcomes were: 14 patients had good Oral competence and three patients had slight incompetence during taking foods, six patients had developed microstomia those were reconstructed with local flap and five patients experienced disturbance in some degree of speech integrity. Aesthetic outcome was excellent in seven cases, good in six cases and satisfactory in four cases. In one case, we had minor wound dehiscence that healed spontaneously, one had seroma and resolved with serial needle aspiration and two patients had developed hypertrophic scar.

Table 1: The patients' characteristics, reconstructive techniques, tissue defect location and size, functional and aesthetic outcome, and complications (n=17)

SN	Age/Sex	Defect size	location	Relation to commissure	Reconstructive techniques	Complication	Functional Outcome			Aesthetic outcome
							Microstoma	Oral competence	Speech problem	
1.	91/M	$1/3^{rd}$	Central, lower lip	Not involved	W- Plasty	Nil	NO	competence	No	Excellent
2.	34/F	< $1/3^{rd}$	Right. Lower lip	Involved	Right Zisser Flap	Nil	NO	competence	No	Excellent
3	42/M	$1/3^{rd}$ – $2/3^{rd}$	Right central lower lip	Not involved	Bilateral Karapandzic Flap	Hypertrophic scar	Moderate	competence	No	Good
4	40/F	$1/3^{rd}$ – $2/3^{rd}$	Central upper lip	Not involved	Bilateral reverse Karapandzic Flap	Hypertrophic scar	Moderate	competence	No	Good
5	43/M	$1/3^{rd}$ – $2/3^{rd}$	Left lower lip	Involved	Right Karapandzic flap + and Left Estlander flap	Nil	Moderate	competence	Minimal	Satisfactory
6	60/M	>$2/3^{rd}$	Left central lower lip	Involved	Bilateral Webster Bernard Flap	Minor wound dehiscence healed spontaneously	NO	competence	No	Excellent
7	57/M	$1/3^{rd}$ >$1/3^{rd}$	Left Upper lip Lower lip	Involved	Left Bilobed Pectoralis Major Myocutaneous Flap	Nil	Moderate	Slight incompetence	Minimal	Satisfactory
8	45/M	>$2/3^{rd}$	Right lower lip	Involved	Left Radial forearm free Flap	Nil	NO	Slight incompetence	Minimal	Good
9.	51/M	>$2/3^{rd}$ (100%)	Lower li[p	Involved	Free Fibula Osteocutaneous Flap	Nil	No	competence	Minimal	Satisfactory
10	62/M	>$2/3^{rd}$	Lower lip	Involved	Left Radial forearm free Flap with Palmaris tendon sling	Nil	No	competence	No	Good
11.	47/M	>$2/3^{rd}$	Lower lip	Involved	Anterolateral Thigh (ALT) Flap	Seroma	Moderate	Slight incompetence	Minimal	Satisfactory
12.	53/F	$1/3^{rd}$	Lower lip	Not involved	W plasty	Nil	No	competence	No	Excellent
13.	56/F	$1/3^{rd}$ – $2/3^{rd}$	Lower lip	involved	Nasolabial Flap	Nil	No	competence	No	Excellent
14.	61/M	$1/3^{rd}$ – $2/3^{rd}$	Lower lip	involved	Nasolabial Flap	Nil	No	competence	No	Good
15.	46/M	$1/3^{rd}$ – $2/3^{rd}$	Lower lip	Not involved	Bilateral Karapandzic Flap	Nil	Minor	competence	No	Good
16.	51/F	< $1/3^{rd}$	Lower Lip	Not involved	V plasty	Nil	No	competence	No	Excellent
17	49/M	< $1/3^{rd}$	Lower Lip	Not involved	V plasty	Nil	No	competence	No	Excellent

Figure 1: Lip reconstruction with W-plasty

Figure 2: Lip reconstruction with Zisser Flap

Figure 3: Lip reconstruction with Karapandzic Flap

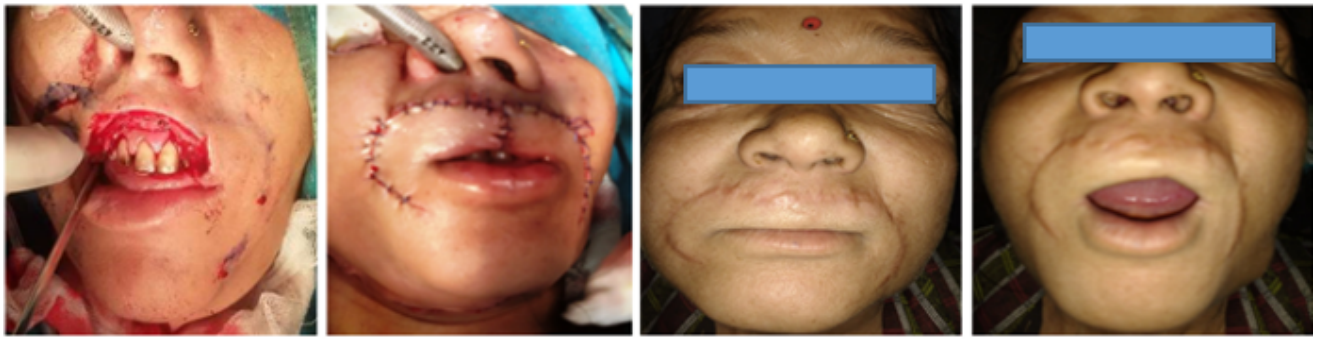

Figure 4: Lip reconstruction with karapandzic flap

Figure 5: Lip reconstruction with Rt. Karapandzic flap + Lt. Estlander flap

Figure 6: Lip reconstruction with webster bernard flap

Figure 7: Lip Reconstruction with nasolabial flap

Figure 8: Lip with commissural reconstruction with Bipedal Left PMMC Flap

Figure 9: Near total lip reconstruction with left radial forearm free flap

Figure 10: Total lip reconstruction with radial forearm free flap with palmaris tendon sling

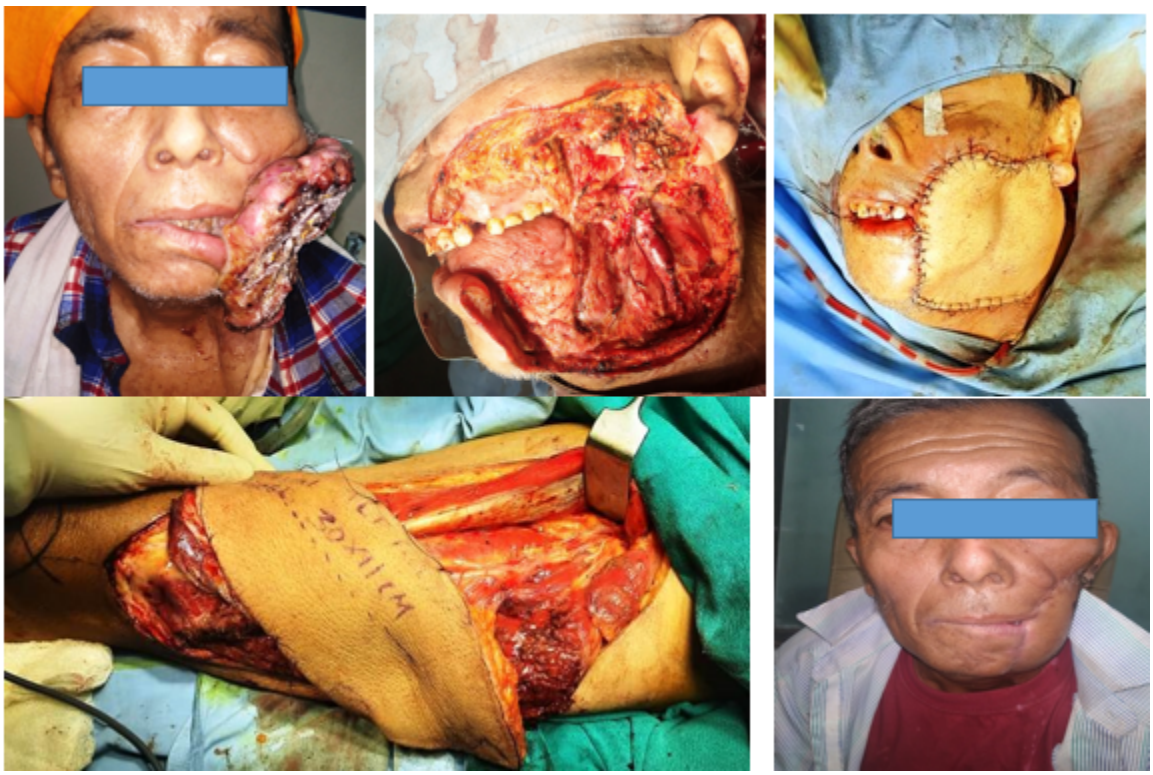

Figure 11: Lip with commissural reconstruction with anterolateral thigh alap

Figure 12: Lip with commissural reconstruction with fibula osteocutaneous free flap

4. Discussion

Lips play an important role in speech, swallowing and facial expression and facial cosmetics[9]. The reconstruction of lip secondary to ablative surgery requires careful planning so as to restore the normal function by reestablishing oral competence, maintaining adequate mouth opening, maintain the mobility of lips, preserve sensation and aesthetics.[9,10]

Following lip resection, reconstruction by applying the principle of like for like should be followed whenever possible. However, this may not be easily achievable with large defects and when there is scarcity of tissues of similar qualities. Nevertheless, the method of lip reconstruction should aim at maintaining sphincter function which prevents sialorrhea, acquiring an adequate mouth opening, achieving an aesthetically pleasing outcome and skin coverage.[11]

Full-thickness defects repair consists of reconstitution of skin, muscle, and mucosa. In case of defects involving less than one-third of the lip, primary closure is usually possible without following "tight lip" or significant microstomia.[8] The V excision, followed by primary synthesis, should be the first option to repair defects affecting up to 30% of the lower lip,[5,9,12–18] In this study 4 patients of defects affecting up to 1/3 of the lip, reconstructed with primary sutures, V excisions were performed in 2 and 2 patients, in which a W excision was performed (Figure 1).

When more than 1/3 of the lip is lost, the local flaps are the best options for reconstruction.[5,9,12-91][5,9,12–38] The most commonly used techniques, which offer good results, are the use of rotation and advancement flaps in the oral commissure, such as the Karapandzic flaps,[20], as well as lip transfer flaps such as the Abbé[21] and Estlander[22] flaps. In present study, 3 patients lip reconstructed with Karapandzic flaps in which Estlander flap used in one (Figures 3, 4 and 5). In those patients with good skin laxity Karapandzic flap is a viable option for medium to large sized full thickness defects as it provides single stage reconstruction with good oral competence and normal sensation; however, lip asymmetry and microstomia are notable. It is a single stage flap that can be used for the lower and upper lip and has good sensation and oral competence; however, it is associated with microstomia.[10,23,24] In this study also microstomia seen in all three cases of Karapandzic flap reconstruction patients. Undoubtedly, the oral commissure is the most difficult region to reconstruct from a functional and aesthetic point of view.[25] Reconstruction of a vertically oriented commissural defect by means of combined cheek-skin advancement and an intraoral mucosal flap was first described in 1975 by Zisser.[26] The Bernard–von Burow–Webster procedure is a headway fold with the extraction of cutaneous triangles. Webster strategy is generally utilized for lower lip absconds more than 80%.[27,28] We were able to get quite acceptable functional and aesthetic results in patient of our study (Figure 6).

Nasolabial flap can be used for large full thickness lip defects in case of intolerable microstomia; it is also useful in commissural defects with buccal mucosal lesion that needs cover after excision. Vermilion mismatch is obvious

and the flap is generally made thin to match the remaining lip tissue bulk. Central defect and single lip lateral defect usually don't have problem of incompetence.[29] We got good functional and aesthetic results in patient of our study (Figure 7). It has been reported that free flap successfully was used in total lip reconstruction with excellent results.[30–32] As donor site tissue is different from oral tissue, the free flap is largely limited about oral function and aesthetic outcomes. A single-stage reconstruction of total lip defects including affected areas of cheek and/ or chin is achieved with micro-vascular reconstruction. For reconstruction of the entire lower lip, fasciocutaneous flaps (e.g., radial forearm and anterolateral thigh flaps) have proven to be reliable.[33–36] In case if intolerable microstomia, free radial artery forearm flap with or without palmaris longus sling are used for total lip defect, lip defect along with buccal mucosal defect and less local tissue for reconstruction. Lip defect along with involvement of commissure leads to oral incompetence. However, incorporation of palmaris longus sling in central and whole lip defect had good oral competence in our study. Similar findings were also reported by Özdemir et al. in which all patients had good oral competence, sensation and acceptable aesthetic results.[37]

The use of free revascularized osteo-cutaneous flaps (e.g., fibula or iliac crest flaps) permits reconstruction of large composite defects of the lip and mandible.[38] In present study, five patients lip reconstruction done with free flap i.e. two patients free radial artery fore- arm flap with palmaris tendon (Figures 9 and 10), two patients with Free Anterolateral thigh Flap in which facia Lata was used to make a sling in one case (Figure 11) and one patient lip & mandibular reconstruction with Free Fibula Osteocutaneous flap (Figure 12) with good functional and aesthetic results.

5. Conclusion

The selection of flap technique for lip reconstruction after carcinoma resection depends on multiple factors, including defect size, patient-specific considerations, and long-term goals. Local flaps often provide good aesthetic outcomes and adequate function for smaller defects, while regional and free flaps are preferable for extensive reconstructions to ensure functional integrity. Achieving a balance between functional efficacy and aesthetic acceptability is paramount, with individualized treatment planning being essential for optimal patient satisfaction.

6. Source of Funding

None.

7. Conflict of Interest

None.

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