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ORIGINAL ARTICLE

Comparison of Visor Access Approach with Lower LIP Split Approach in Resection of Oral Cancers

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Abstract

Purpose There is high prevalance of oral cancers particularly buccal mucosa and lower gingivobuccal sulcus in our region. These can be approached by both Lower lip split and by Visor approach. Anteriorly placed oral cancers can be resected by visor approach, retaining oral competence and lower lip vascularity. Visor approach is challenging in locally advanced oral cancers requiring reconstruction. We compared outcome of resection of lateralized oral cancers by lower lip split approach and visor approach with regard to duration of surgery, adequacy of exposure of tumour, access for reconstruction, resection margins and complications.

Methodology 66 Patients with T2 & T3 staged oral squamous cancers were randomized into two groups. Following neck dissection, Group A underwent composite resection by lower lip split, and Group B by visor approach. Variables mentioned above were compared between two groups.

Results This study included patients with T2(58%)and T3 (42%) oral cancers. Except 3 patients in Group B, adequacy of exposure was similar in both groups. Operating time was longer in Group B. Close margins anteriorly were more frequent in Group A. Axial flaps(98.5%) and radial forearm free flaps(1.5%) were used for reconstruction. Suturing bulky flaps was difficult in Group B(9.1%).Most common complication in both groups was orocutaneous fistula.

Conclusion Adequacy of exposure, resected margins, surgical outcome with regards to healing and complications were similar between lower lip split and visor approach in oral cancers. Visor approach for resection of oral cancers is preferred option in tumours close to oral commissure.

Summary

Oral cancers particularly buccal mucosa and lower gingivobuccal sulcus in our region and these can be approached by both Lower lip split and by Visor approach.

Adequacy of exposure, resected margins, surgical outcome with regards to healing were similar in lower lip split and visor approach.

Complications were also similar between lower lip split and visor approach in oral cancers.

Visor approach for resection of oral cancers is preferred option in tumors close to oral commissure.

Most common complication in both groups was orocutaneous fistula.

Keywords Lip split approach · Visor access approach · Oral squamous cell carcinoma · resection margins · surgical complications

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Introduction

Head and neck cancers are the most common malignancies among males and 2nd most common among females in this region. They account for 30–35% of all malignancies, and about 50% of these are oral cancers. 60–80% of these patients present with advanced disease as compared to 40% in developed countries. 1.

Our institution is a tertiary care rural hospital treating locally advanced Head and Neck cancers particularly involving buccal mucosa or lower gingivobuccal sulcus. Surgery is the first line of treatment. The type of surgical access used depends on the extent and location of the tumour. Lower Lip split approach remains the time tested Gold standard approach for resection of oral cancers. It provides adequate access and three dimentional assessment of soft tissue involvement of the primary tumour and is an extension of incision for neck dissection.

Early cancers of the oral cavity can be resected by both Lip split and without splitting the lower lip by raising the soft tissues of the face from the mandible like a visor thereby accessing the oral cavity -Visor approach. Anteriorly placed oral cancers can also be addressed by Visor approach, thereby avoiding the lower lip split in tumours close to the angle of mouth, where midline lip split may result in avascular necrosis of lower lip. It also provides a better cosmetic result.

In larger volume T2 & T3, transoral approach alone may not give access to the tumour and in rural areas, access to LASER is not available in developing countries.

Visor flap can also be used when a microvascular free tissue transfer is done for the reconstruction of the surgical defect. This approach also preserves orofacial functions like speech and swallowing immediately after surgery and reduces the duration between surgery and post-operative radiotherapy. 2.

Visor approach has not been adapted by many surgeons. In this study we compared resection of lateralized tumours (buccal mucosa and lower gingivobuccal sulcus) of oral cavity staged T2 and T3 by lower lip split approach and visor approach with regard to the following variables like adequacy of exposure of primary tumour and resection margins, adequacy of access for reconstruction, average time taken for resection of primary tumour & reconstruction of the defect and surgical complications.

OBJECTIVES OF THE STUDY

To compare the outcome of resection of lateralized oral cancers staged T2 and T3 by lower lip split approach and visor approach with regard to adequacy of exposure of primary tumour and resection margins, adequacy of access for reconstruction, average time taken for resection of primary tumour & reconstruction of the defect and surgical complications .

Materials and Methods

This comparative observational study was approved by the Institution ethics committee of our medical college hospital with IEC number DMC/KLR/IEC/769/2020-21.

Following an informed written consent, 66 patients aged 35 to 65 years presenting to Department of Otorhinolaryngology and Head & Neck Surgery, with biopsy proven lateralized oral squamous cell carcinoma (buccal mucosa and lower gingivobuccal sulcus) staged T2 & T3 and planned for composite resection and reconstruction were included in this study from December 2018 till May 2020. However all the T2 were more than 3 cm and less than 4 cm in diameter and were reaching close to oral commissure. Patients with recurrent tumours, history of head and neck surgery in the past, history of Radiotherapy to oral cavity or neck in the past, patients who had received neoadjuvant chemotherapy and patients with large scars/ deformity of the face or neck were excluded from the study.

The sample size was calculated based on a study by Benjamin et al. in 2007.

Formula

$$H_0 : P_1 = P_2; \qquad H_a : P_1 \neq P_2$$

$$n = \frac{\left\{ Z_{1-\frac{\alpha}{2}} \sqrt{2\bar{P}(1-\bar{P})} + Z_{1-\beta} \sqrt{P_1(1-P_1) + P_2(1-P_2)} \right\}^2}{(P_1 - P_2)^2}$$

Where,

$$\bar{P} = \frac{P_1 + P_2}{2}$$

P_1 : Proportion in the first group

P_2 : Proportion in the second group

α : Significance level

$1-\beta$: Power

The patients were randomized into two groups by four block randomization. The extent of the tumor was documented in all cases by Contrast enhanced CT scan and the findings were documented in the SPSS excel sheet. All patients underwent neck dissection- Modified radical neck dissection (MRND)-69.7%, Supraomohyoid (SOHND) neck dissection-30.3%. This was because most of the patients who underwent MRND were found to have lymph nodes in level 2 and 3, however in all cases level 3 lymph nodes were reported as reactive on histopathology. 33 patients in Group A underwent composite resection of oral cancer by lower lip split approach and 33 patients in Group B underwent composite resection of oral cancer by visor approach without lower lip split. Many of the visor flaps were modified such that the neck incision did not extend from one angle of mandible to another and ended below the contralateral

Fig. 1 PMMC flap sutured intraorally in lip split approach

mental foramen. This was similar to the approach adapted by Cohen et al. 3.

Most of the tumours staged T2 in our series were more than 3 cm but less than 4 cm in diameter and less than 5 mm in depth of invasion. Composite resection included marginal mandibulectomy (33.3%) and hemimandibulectomy (66.7%) in group A and marginal mandibulectomy (51.5%) and hemimandibulectomy (48.5%) in group B depending on the proximity of the primary tumour with the mandible. Reconstruction was performed with Pectoralis major myocutaneous flap(74.2%), supraclavicular flap (19.7%), submental flap(4.5%), radial forearm free flap(1.5%) .

Following surgery, primary tumour with neck dissection specimen were sent for histopathological examination. Documentation of adequacy of exposure of oral tumour, accessibility for reconstruction, closest margin of resection, average time taken for resection of primary tumour & reconstruction of the defect and surgical complications were noted. A margin of 0.5 cm after formalin fixation of the specimen was considered adequate. An adequacy of access for resection was determined by the adequacy of resection margins and any inadvertent burns on margins and time taken for resection.

A comparison was made between visor access approach and lower lip split approach for resection of primary tumour of oral cavity in the above patients. Patients were subjected to adjuvant Radiotherapy(90.9%) and Chemotherapy with

Fig. 2 Intraoperative image showing access to oral cavity for flap in visor approach

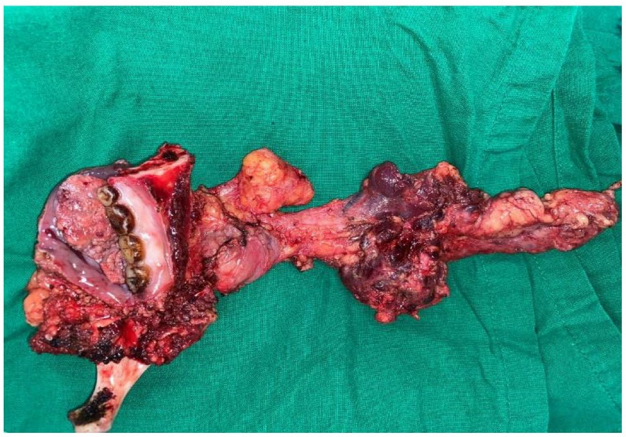

Fig. 3 Composite Resection specimen with neck dissection

Radiotherapy (3%). The patients were followed up for minimum of 6 months after completion of treatment. Surgical complications and local/regional recurrence if any were documented.

To reduce the bias, the same surgeon performed resection of tumour as well as reconstruction in all the patients.

Student t test (two tailed, independent) was used for Inter group analysis .Chi-square/ Fisher Exact test was used to find the significance of study parameters on categorical scale between the two groups. p value of < 0.05 was considered statistically significant after assuming all the rules of statistical tests.

Fig. 4 Intraoperative image showing supraclavicular flap being advanced into the oral cavity via visor approach

Table 1 Distribution of subjects according to type of mandibulectomy

Surgery	Group A	Group B	Total
HEMI MANDIBULECTOMY	22(66.7%)	16(48.5%)	38(57.6%)
MARGINAL MANDIBULECTOMY	11(33.3%)	17(51.5%)	28(42.4%)
Total	33(100%)	33(100%)	66(100%)

Results

In our study, Group A patients were between 40 and 50 years of age, whereas in Group B patients were between 51 and 60 years. In both groups, majority(90%) of patients were females. Most of the tumours were ulceroexophytic (75%) in nature. 28 patients in each group presented with primary lesion at buccal mucosa and 5 patients in each group presented with primary at lower gingivobuccal sulcus (T2-57.5% and T3-42.4%).

Among the patients staged T2 in Group A, majority were found to have no lymph nodes on imaging (61.1% and 80% in Group A & Group B respectively). Among the patients staged T3, majority were found to have neck nodes (50% & 38.4% in Group A & Group B respectively) on imaging. 75.8% patients in Group A and 87.9% in group B patients had well differentiated squamous cell carcinoma. One patient in each group had verrucous carcinoma and moderately differentiated carcinoma was the second most common finding.

On analysis of depth of invasion, < 5 mm invasion – 39.4%, 5-10 mm invasion– 54.5% was seen in Group A patients, where as 100% of Group B patients had < 5 mm depth of invasion. Unintentionally there was a bias that a larger number of deep tumours underwent lower lip split because the third dimension(depth) appeared close to the plane of resection peroperatively. No patient in this study had perineural invasion or lymphovascular invasion. 60.6% of patients underwent hemimandibulectomy with Modified radical neck dissection and 39.4% patients underwent marginal mandibulectomy with Supraomohyoid neck dissection (Table 1).

The larger number of patients underwent MRND because they were found to have level 2 lymph nodes and level 3 lymph nodes intraoperatively and we did not want to risk an inadequate lymph node clearance. However all reactive lymph nodes were reported reactive in level 3 on histopathology. This could be due to poor oral hygiene or recurrent throat infections.

In Group A patients the average time taken for resection of primary tumour and reconstruction using axial or microvascular free flaps was less than 160 min(84.4%) where as in Group B it was 160–190 min(72.7%) and this was statistically significant. $P < 0.001$. Visor approach required 20% more time compared to lower lip split approach for surgery (Table 2).

In Group A patients, exposure of tumour and access to it was adequate in all patients, where as in Group B exposure of tumour and adequate access to it was in 90.9%. On analyzing resection margins, there was one case with positive superior margin among group A patients, whereas in group B all patients had adequate margin of resection. In both the groups, >5 mm anterior margin after formalin fixation was present in more than 80% of study population. On analyzing the posterior margins in both the groups, >5 mm margin was present in more than 85% of study population. Close margins were seen in almost similar percentage in both the groups.

There was a difficult access for reconstruction in Group B in 9% of study subjects compared to Group A (3%). This could be attributed to bulky PMMC flaps and reduced space for suturing intraoral flap used in Visor approach(Table 3). Supraclavicular flap was the second most commonly used

Table 2 Distribution of subjects according to Time taken for resection of primary tumour and reconstruction

Average time taken(minutes) for resection of primary tumour and reconstruction of defect	Group A	Group B	Total
< 160	28(84.8%)	7(21.2%)	35(53%)
160–190	5(15.2%)	24(72.7%)	29(43.9%)
> 190	0(0%)	2(6.1%)	2(3%)
Total	33(100%)	33(100%)	66(100%)

Table 3 Distribution of subjects according to Adequacy of access for reconstruction

Adequacy of access for reconstruction	Group A	Group B	Total
Adequate	32(97%)	30(90.9%)	62(93.9%)
Inadequate	1(3%)	3(9.1%)	4(6.1%)
Total	33(100%)	33(100%)	66(100%)

Table 4 Distribution of subjects according to Flap used for reconstruction

Flap used for reconstruction	Group A	Group B	Total
PMMC	28(84.8%)	21(63.6%)	49(74.2%)
Radial forearm free	0(0%)	1(3%)	1(1.5%)
Submental flap	0(0%)	3(9.1%)	3(4.5%)
Supraclavicular flap	5(15.2%)	8(24.2%)	13(19.7%)
Total	33(100%)	33(100%)	66(100%)

Table 5 Distribution of subjects according to Surgical Complications

Surgical Complications	Group A (n = 33)	Group B (n = 33)	Total (n = 66)
Nil	25(75.8%)	26(78.8%)	51(77.3%)
Yes	8(24.2%)	7(21.2%)	15(22.7%)
• Orocutaneous fistula	4(12.1%)	6(15.2%)	9(13.6%)
• Flap necrosis	1(3%)	1(3%)	2(3%)
• Lower Lip necrosis	2(6.1%)	0(0%)	2(3%)
• Marginal mandibular nerve palsy	1(3%)	0(0%)	1(1.5%)
• Necrosis of skin over neck	0(0%)	1(3%)	1(1.5%)

flap for reconstruction. Fasciocutaneous flaps like supraclavicular flap, Submental flaps were more used in Group B than Group A. This was to ensure better access and provide adequate space for suturing in Group B(Table 4). One patient in both the groups developed recurrence.

A patient in Group A died due to carotid blow out. However one patient in Group B died due to locoregional recurrence. Orocutaneous fistula was the most common post operative complication. Salivary leak was seen in 4 patients in group A and 6 patients in Group B respectively. Two patients in Group A developed partial lower lip necrosis. One patient in each group developed intra-oral flap necrosis for which flap debridement and secondary reconstruction was done at a later stage (Table 5).

2 patients in Group A and 4 patients in Group B did not receive any Radiotherapy as they were staged T2 and had adequate margins. 60 Gy Radiotherapy was provided to 6 patients in Group A and 2 patients in Group B. One patient in each group developed recurrence within 6 months of completion of treatment. The patient who recurred in Group A died due to carotid blow out. The patient who recurred in Group B died due to locoregional recurrence.

Discussion

In the last decade, many institutions attempted to avoid lower lip split while accessing tumors in oral cavity for composite resection. The main advantage of this approach was to avoid the scar on the lower lip and the mental region. This attempt was made in USA, Europe and Korea 3,4,5. Over the last five years interest in non lip split approach for oral cavity cancers was reignited in USA and Europe(Italy).

In our study, majority of the patients were elderly women in the age group of 46–60 years. This can be explained by the fact that the women in this rural area are addicted to chewable carcinogens like tobacco quid(sometimes kept overnight in the cheek), areca nut, betel leaves etc. while the men are more addicted to smoking tobacco.

The site of the primary tumor was buccal mucosa, lower gingivobuccal sulcus and lower alveolus (72.7%, 13.6%, 13.6%). This is in contrast to few western studies particularly the one done by Benjamin W Cilento(Pennsylvania and Seattle & US Navy), where T4 tumors were included and majority of patients had oral cancer involving the lower alveolus(close to the midline, floor of mouth and tongue) 6. 56% of our patients had no palpable lymph nodes and 44% of patients presented with palpable neck nodes. The nodal status did not affect the approach or resection of the primary tumor in both groups.

All patients in both the groups in our study underwent neck dissection (MRND- 78.8% in Group A, 60.6% in Group B And SOHND-0% in Group A % and 18.2% in Group B) SOHND was done only in clinically N0 necks. Literature also shows that the nodal status has no implication on the approach to oral cavity cancers as long as extra nodal spread is not there. Our study had equal number of patients in both the Group A and Group B. However the studies in USA and Italy did not have equal number of patients in the two different approaches 6.

In our study, many of the visor access approach were modified such that the neck incision did not extend from one angle of mandible to another and ended below the contralateral mental foramen. This was similar to the approach adapted by Cohen et al. 3. The reason for this modification is that all the patients included in our study had lateralized tumors involving buccal mucosa, lower gingivobuccal sulcus or lower alveolus unlike the patients in studies done in other institutions in USA and Korea. An extension of the incision from one angle of mandible till the contralateral angle of mandible would have been unnecessary when adequate exposure was available through our modification.

A classical visor approach in our study was used whenever the tumor was close to midline (around lower alveolus) or when it involves the lower lip. All cases in both groups in our study were operated by the same senior surgeon to

avoid surgeon bias. In our study, the mean time taken for neck dissection and resection of the primary tumor was 173 min when Visor access approach was used and 135 min when lower lip split approach was used. This shows that the visor access approach required a longer operating time when compared to lower lip split approach. This was in contrast to an Italian study and Pennsylvanian study where the resection time was less in visor access approach compared to lower lip split approach 7.

In our study, only one patient had a positive margin (superior aspect) in Group A while none of the patients in Group B had positive margins. This can be explained by the fact that few of the larger tumors staged T3 were taken up in Lower lip split approach. In rest of the patients there was no statistically significant difference in resection margins in the lip split approach and Visor access approach. However the close margins were marginally more frequent in Group A -particularly anterior margin. Similar observations were made by the US Navy study, Korean study as well as Italian study 7. The reason for this may be the apprehension on part of the surgeon regarding the lower lip vascularity while resecting the oral cavity tumors coming close to oral commissure by lower lip split approach.

In our study, 19.7% of patients had reconstruction of the defect by supraclavicular flap-an axial fasciocutaneous flap based on supraclavicular branch of transverse cervical artery and 74.2% had reconstruction by Pectoralis major myocutaneous flap – a bulky axial flap based on pectoral branch of acromiothoracic artery 8. Only one patient had reconstruction by radial forearm free flap. 4.5% patients had reconstruction by submental flap.

The larger defects in our study were reconstructed by Pectoralis major myocutaneous flap and the relatively smaller defects were reconstructed by supraclavicular, submental and microvascular free flap. We experienced inadequacy of exposure, difficult access for suturing and longer operating time while using the bulky Pectoralis major myocutaneous flap for reconstruction in patients with visor access approach. However, the reconstruction had relatively good access and surgical time for suturing the flap was similar in both groups when fasciocutaneous flaps were used.

Since this was performed in a rural area in a developing country having resource constraints like unavailability of microvascular surgeon, patients being undernourished and majority having peripheral vascular disease, Pectoralis major myocutaneous flap has been the work horse for reconstruction.

All the American studies and Italian studies have documented no difference in access as well as time taken for reconstruction in both the groups 7. Studies done in USA, Korea and Italy have reported orocutaneous fistulae to be more commonly associated with lower lip split approach compared to visor access approach. This has been implicated to the trifurcate suture near the cut edge of mandible. They also report a higher frequency of lower lip necrosis in midline lower lip split approach. However in our study the complications were more frequent in the visor access approach when Pectoralis major myocutaneous flap was used for reconstruction. This included orocutaneous fistula(15.2%) when compared to 12.1% by lower lip split approach. However all the orocutaneous fistulae healed spontaneously. In our study 2 patients in the lower split group had necrosis of lower lip requiring secondary reconstruction of lip. This could have been due to devascularization the lower lip close to the oral commissure. Similar observations were made by studies in other countries.

A few studies including one from Turkey have advocated visor flap approach for bilateral temporoparietal flap or microvascular free tissue transfer for reconstruction of oral cavity defects 9. There was no statistically significant difference in the time taken for healing as well as duration of hospital stay between both the groups. Similar observations were made by all the other studies comparing lower lip split and visor flap approach for resection of oral cavity cancers and their reconstruction.

Conclusion

The midline lower lip split to access the oral cavity malignancies for surgical resection remains the gold standard but also has limitations with regard to aesthetic appearance and vascularity of lip, particulary in lesions situated close to oral commissure. Visor access approach (non lip-split) for resection of oral cancers and few of its modifications provide a better aesthetic appearance, better vascularity of lower lip and competence of oral commissure. The frequency of surgical complications encountered both by lip split approach and visor access approach is almost similar. However the operating time may be longer and access for suturing a bulky flap for reconstruction may be limited in Visor approach. However this is a subjective perception and can be minimized as more experience is gained in this approach. The adequacy of resected margins and outcome of surgery with regards to healing remains similar between the two approaches. Visor access approach for resection of oral malignancies is a reliable and effective option especially if the tumour is situated to close to oral commissure

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Declarations

Disclosure of Potential Conflicts of Interest All authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript.

Informed Consent Consent to participate Informed consent was obtained from all individual participants included in the study. **Consent for publication** Patients signed informed consent regarding publishing their data and photographs.

Ethics Approval Institutional ethical clearance was obtained before starting the study.(DMC/KLR/IEC/769/2020-21).

Research involving human participants and/or animals No.

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