

Surgical outcomes in oral cancer involving the central arch of the mandible in elderly patients: An institutional experience

ABSTRACT

Backgrounds: Oral squamous cell cancer (SCC) is one of the most common cancers. The most common age of presentation is fifth to sixth decade. Management of this disease is dictated by stage, age, and related comorbidities. Elderly patients have their own set of limitations as far as their management is concerned. Carcinoma involving central mandibular arch is a challenging disease for surgeons, especially in the elderly. This article describes our experience with the surgical treatment of oral cancer involving the central arch of the mandible in elderly patients.

Methods: Forty elderly (≥ 60 years) patients with histologically proven SCC of the oral cavity in which disease was involving the central arch of the mandible, were included in our study. Demographic, clinical, and treatment-related factors were recorded. The outcome was assessed in terms of postoperative complications, recurrence, and patient survival.

Results: The median age of the patients was 63 years. The male:female ratio was 7:3. A history of oral tobacco use was present in 95% of patients. The most common site of disease was lower alveolus (80%) followed by carcinoma of the lower lip (20%). Majority of our patients (77.3% [30]) were having Stage IV disease. Mandibulectomy was either segmental (62.5%) or marginal (37.5%). Bilateral neck dissection (37/40, 92.5%) was done in most patients. Among all patients, 62.5% (25) received adjuvant radiotherapy. The local recurrence rate after a median follow-up of 30 months was 15% (6). Two-year disease-free survival and overall survival were 89% and 90%, respectively.

Conclusion: Central arch of the mandible is a difficult disease to treat. It needs a complex and lengthy reconstructive procedure. Comorbidities such as extreme age, diabetes, and pulmonary and cardiac illnesses make it more challenging to manage. With the proper evaluation of comorbidities and avoiding long, cumbersome procedures, we can provide patients a fairly good chance of survival.

Keywords: Anterior arch, mandibulectomy, oral cancer, outcome, reconstruction

INTRODUCTION

Oral squamous cell cancer (SCC) ranks in the top three most common cancers in India.^[1] Surgical resection is an essential component of curative treatment for most patients.^[2] However, the majority of patients in India present an advanced age and require multimodality treatment.^[3]

Management of this disease is dictated not only by the stage of the disease but also by age and related comorbidities. Elderly patients (60 years and above) have limitations in their management. It is not possible to do very complex, cumbersome, and prolonged procedures in these patients.

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Carcinoma involving or abutting the central lower alveolus (mandibular arch) is especially challenging in the elderly. It requires extensive resection and primary reconstruction along with bilateral nodal clearance. The reconstruction of the anterior mandibular arch is essential for a satisfactory cosmetic outcome, but is a complex and cumbersome procedure.

There are only a few studies addressing the outcome and reconstruction of tumors which are involving or close to the anterior arch of the mandible. We were not able to find any study addressing the outcome of tumors requiring resection of the anterior arch in elderly patients.^[4,5] We describe our experience with the treatment of oral cancer involving or abutting the central arch of the mandible in elderly patients.

METHODS

We reviewed the records of patients treated in our institution, a tertiary care teaching hospital in North India, from January 2015 to January 2020. Forty elderly (≥ 60 years) patients who were operated for histologically proven SCC of oral cavity, in which disease was either involving or was close to the central arch of the mandible, were included in our study. We excluded patients with recurrence, those with second primary, or having inoperable disease. These patients were operated after a rigorous evaluation of their disease and their fitness to undergo major surgical resection. This involved preoperative computed tomography of the face and neck, pulmonary evaluation, and cardiac evaluation. The clinical and investigative records were abstracted to a standard format as part of the study. Details of surgery, including reconstruction and postoperative outcomes, especially for complications, recurrence, and survival, were included. Disease-free survival (DFS) was calculated from the date of surgery to the date of development of recurrence, and overall survival (OS) was calculated from the date of surgery to the date of death due to any cause. Perioperative mortality was defined as death due to any cause in the first 30 days post surgery. Descriptive statistics were used to analyze results. Survival was assessed using the Kaplan–Meier method.

RESULTS

A total of 2327 patients underwent surgery for oral SCC from January 2015 to January 2020 at our institute. Out of these, forty patients were found eligible for our study. The median age of the patients was 63 years, with a male:female ratio of 7:3. Oral tobacco use was present in 95% (38/40) of the patients. Majority of the patients ($n = 32$) in our study were nonalcoholic. The demographic details of the patients are shown in Table 1.

Table 1: Details of demographic, clinical, surgical, and histological characteristics

Parameters	No. (Percentage)
Median age (years) (range)	63 (80–60)
Sex (male:female)	7:3
Addiction (%)	
Oral tobacco	38/40 (95)
Smoking	21/40 (52.5)
Alcohol	8/40 (20)
Comorbidity (%)	
Pulmonary	3/40 (7.5)
Cardiac	6/40 (15)
Diabetes	5/40 (12.5)
ECOG performance (%)	
0	24/40 (60)
1	14/40 (35)
2	2/40 (5)
Site (%)	
Central alveolus	32/40 (80)
Lip	8/40 (20)
Stage (%)	
I	1/40 (2.5)
II	3/40 (7.5)
III	6/40 (15)
IV	30/40 (75)
Mandibulectomy (%)	$n=40$
Segmental	25/40 (62.5)
Marginal	15/40 (37.5)
Neck dissections (%)	$n=77$
SOND	17/77 (22)
MND	57/77 (74)
RND	3/77 (4)
Mandibulectomy (%)	$n=40$
Segmental	25/40 (62.5)
Marginal	15/40 (37.5)
Tracheostomy (%)	20/40 (50)
Defect size (mm)	41.6 \pm 9.36 (58–27)
Margin (clear) (%)	40 (100)
ENI (%)	3 (7.5)
LVI (%)	4 (10)
PNI (%)	7 (17.5)
Adjuvant RT (%)	25 (62.5)

MND: Modified neck dissection, SOND: Supra-omohyoid neck dissection, RND: Radical neck dissection, ENI: Elective neck irradiation, LVI: Lymphovascular invasion, PNI: Perineural invasion, RT: Radiotherapy, ECOG: Eastern Cooperative Oncology Group

Majority of the patients (95%) who underwent surgery had a good performance status (Eastern Cooperative Oncology Group 0 and 1). Bronchial asthma and chronic obstructive pulmonary disease were the pulmonary comorbidities in 7.5% (3/40) of the patients; cardiac comorbidities (myocardial infarction, hypertension, and arterioventricular block) were present in 15% (6/40) of the patients and diabetes in 12.5% (5/40) of the patients. Majority (77.3% 30 of 40) of the patients had Stage IV disease [Table 1].

In our study, SCC of the central lower alveolus ($n = 32$, 80%) was the most common indication for resection of the anterior arch followed by SCC of the lip ($n = 8$, 20%) [Figure 1]. All the patients underwent *en bloc* resection of the central arch of the mandible along with neck dissection [Figures 2 and 3]. Segmental mandibulectomy was performed in 62.5% (25/40) of the patients. Marginal mandibulectomy was done in 37.5% (15/40) of the patients as they had no obvious bony erosion on contrast-enhanced computed tomography of the face and neck. Most patients (37/40, 92.5%) had bilateral neck dissection. Out of these, 74% (57/74) had modified neck dissections, 22% (17/74) had supra-omohyoid neck dissections, and 4% (3) had radical neck dissections [Table 1].

Reconstruction of the central arch requires replacement of mandible for contour and rigidity along with a soft-tissue cover. Although osteocutaneous free fibular flap is the ideal choice, we used alternative simpler methods in 25 of the 40 patients where segmental mandibulectomy had been done. Contour was provided by bone cement (antibody impregnated) in eight, titanium plate in six, prolene mesh

in five, ethylene terephthalate suture in three, and free rib in three patients [Figures 4-6]. Soft-tissue cover was provided by pectoralis major myocutaneous flap (PMMC) ($n = 23$), nasolabial flap ($n = 11$), deltopectoral flap ($n = 1$), forehead flap ($n = 1$), and mucosal advancement ($n = 4$) [Figures 7 and 8]. All patients had clear resection margins (>5 mm). Extracapsular extension was present in three patients, lymph vascular invasion in four patients, and perineural invasion in seven patients [Table 1]. The postoperative complications are described in Table 2. Adjuvant radiotherapy was given to 62.5% (25) of the patients [Table 1].

Perioperative mortality occurred in 5% (2/40) of the patients. Both these patients had a myocardial infarction, although preoperative history and cardiac evaluation were normal.

After a median follow-up of 30 months, local recurrence occurred in six (15%) patients. None of these recurrences was surgically salvageable, and patients received palliative

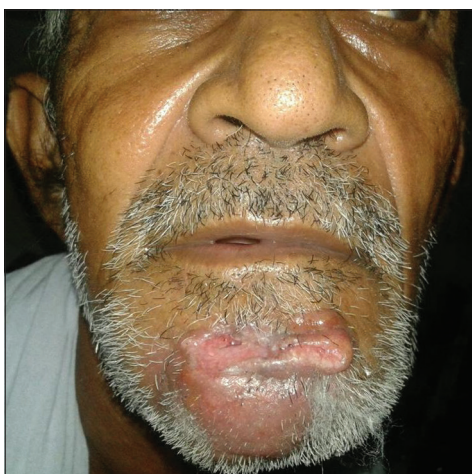


Figure 1: Carcinoma oral cavity involving the anterior arch



Figure 2: Resection of carcinoma involving the anterior arch



Figure 3: Defect after resection of carcinoma involving the anterior arch



Figure 4: Reconstruction using pectoralis major flap and ethylene terephthalate suture

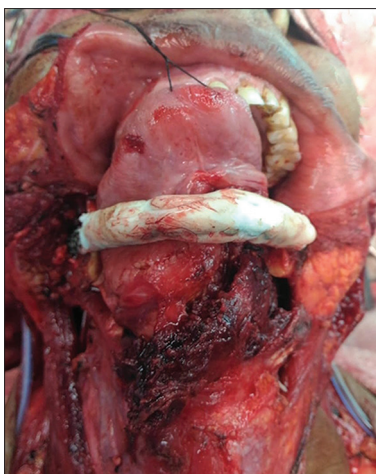


Figure 5: Reconstruction using bone cement

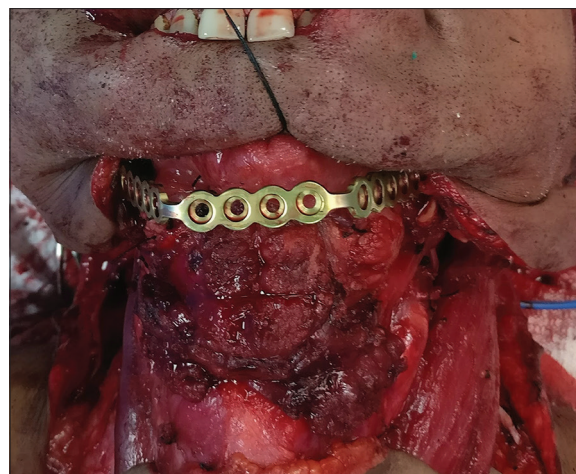


Figure 6: Reconstruction using metallic plate

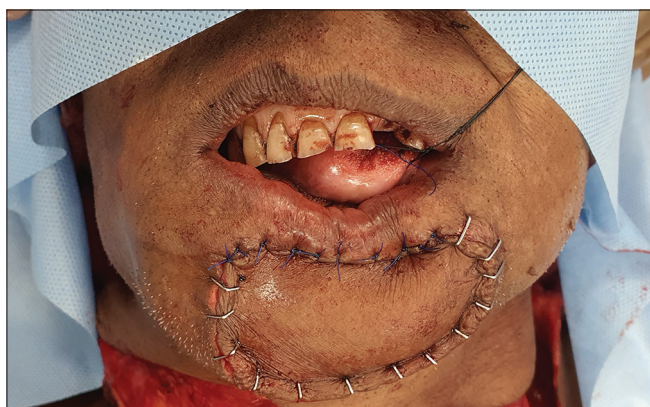


Figure 7: Final outcome after reconstruction using pectoralis major myocutaneous flap and ethylene terephthalate suture

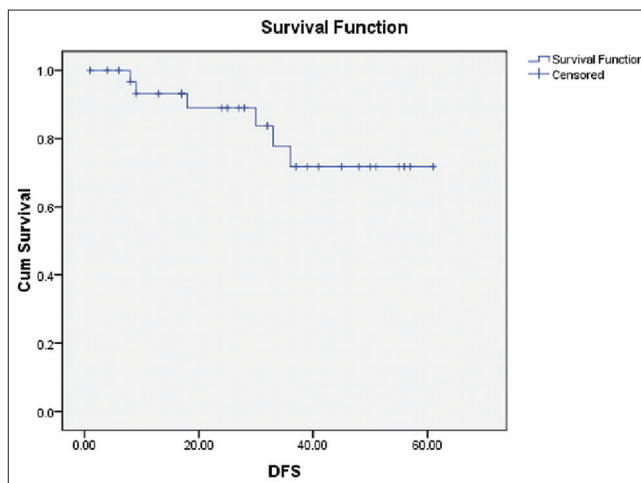


Figure 8: Disease-free survival of patients. The median disease-free survival was not reached in our study, suggesting that >50% of the patients were disease free after the median follow-up of 30 months

Table 2: Postoperative complications and outcome

Parameters	No. (Percentage)
Postoperative complications (%)	
Major flap loss	1/40 (2.5)
Minor flap loss	3/40 (7.5)
Bleeding	2/40 (5)
Surgical-site infection	4/40 (10)
Orocutaneous fistula	3/40 (7.5)
Extrusion of material	5/40 (12.5)
Delayed "Andy Gump deformity"	3/40 (7.5)
Median follow-up (months)	30
Recurrence (%)	6 (15)
One year (%)	
DFS	96
OS	97
Two years (%)	
DFS	89
OS	90
Three years (%)	
DFS	74
OS	70

DFS: Disease-free survival, OS: Overall survival

chemotherapy. One, 2- and 3-year DFS and OS are shown in Table 2 and Figures 9 and 10. Two-year DFS and OS were 89% and 90%, respectively [Table 2]. Stage-wise survival at a median follow-up of 30 months is shown in Table 3.

The median DFS and OS were not reached in our study, suggesting that >50% of the patients were disease free and surviving after the median follow-up of 30 months [Figures 5 and 6]. Out of the 40 patients, 25 were alive. Ten patients were dead, out of which six patients had disease recurrence. Five patients were lost to follow-up.

DISCUSSION

Oral squamous cell carcinoma of the central arch of mandible easily invades the mandible, thus requiring central segmental mandibulectomy.^[6,7] Even when the bone is not

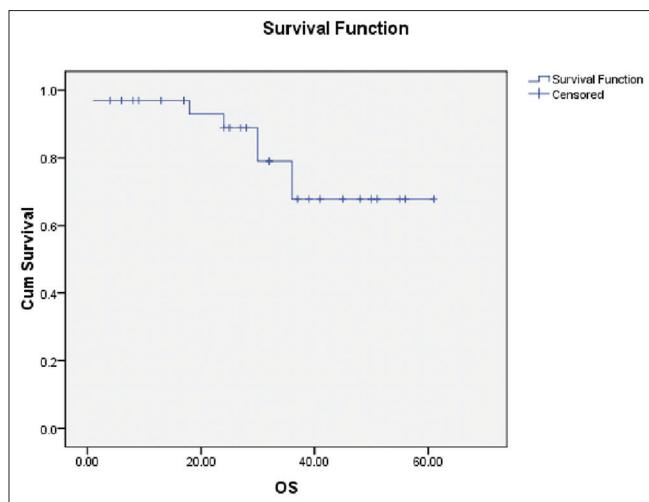


Figure 9: Overall survival of patients. The median overall survival was not reached in our study, suggesting that >50 % of the patients were alive after the median follow-up of 30 months

Table 3: Stage-wise survival of patients

Stage	Survival (at a median follow-up 30 months) (%)
I	1/1 (100)
II	3/3 (100)
III	4/6 (66.6)
IV	17/30 (56.6)

involved, removal of bony margin in the form of marginal mandibulectomy is required.^[6,7] However, removing the arch of the mandible poses unique challenges to the surgeon in terms of reconstruction.^[7] Radical surgery, followed by radiotherapy, remains the mainstay in the management of advanced SCC of the oral cavity (T3/T4 disease or node involvement). Deo *et al.*, in their series of SCC of the central arch, reported that 88% of the patients presented with Stage IVA disease.^[5] In our study also, majority of the patients (75%) presented with Stage IVA disease. Late presentation has been related to poor awareness, lack of dedicated oncology centers, and poor socioeconomic status.

In our study, there was one major and three minor flap losses. Postoperative bleeding occurred in two patients and surgical-site infection in three patients. Deo *et al.* in their study of 54 patients similarly encountered only one complete flap loss, partial flap loss in two patients, and minor complications in seven patients.^[5]

Despite the late presentation of the disease in Stage IVA in our patients, survival was 77% at a mean follow-up of 30 months, which is higher than the survival reported in the previous series by Deo *et al.* (52%) at 32 months.^[5] Two-year DFS and OS were 89% and 90%, respectively. At a median follow-up of 30 months, six (15%) patients developed recurrence. The

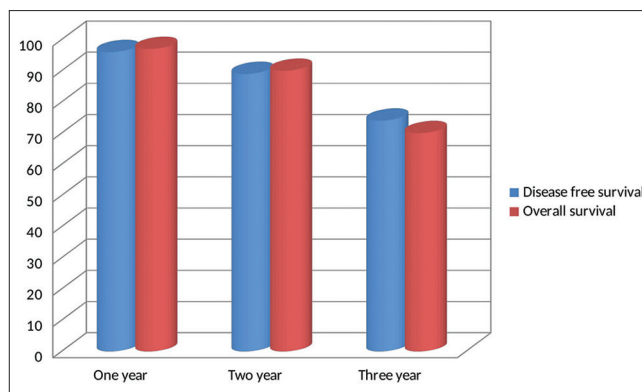


Figure 10: Year-wise disease-free and overall survival

less difference between the DFS and OS suggests that after developing recurrences, the survival of these patients was extremely poor.

Tumors requiring resection of the anterior arch result in very poor functional outcomes and require special reconstruction.^[8] The ideal reconstruction for such diseases is free fibula osteomyocutaneous flap, which replaces all the three resected tissues with similar structures. However, in a resource-limited country like ours, and in patients who are elderly in whom major reconstruction is a matter of concern for the surgeons, various other reconstructive methods have been tried, but the best method remains yet to be discovered. In a study from AIIMS, New Delhi, Deo *et al.* have shown that bi-paddle pectoralis major flap for soft-tissue reconstruction and titanium plate for the reconstruction of the mandibular arch are valid options.^[5] Similarly, we reconstructed the anterior arch with PMMC, nasolabial flap, forehead flap, or deltopectoral flap to provide soft-tissue cover, along with bone cement/titanium plate/rib/prolene mesh and ethylene terephylate suture to provide shape and rigidity.^[4]

CONCLUSION

Central arch of the mandible is a complicated disease to resect and reconstruct. Comorbidities such as extreme age, diabetes, and pulmonary and cardiac illnesses make it more difficult to manage. Nevertheless, with proper evaluation of comorbidities and performance status of the patient, avoiding long, cumbersome procedures can give patients a fairly good chance of DFS and OS.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients

understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Sharma S, Satyanarayana L, Asthana S, Shivalingesh KK, Goutham BS, Ramachandra S. Oral cancer statistics in India on the basis of first report of 29 population-based cancer registries. *J Oral Maxillofac Pathol*. 2018;22:18–26.
2. Montero PH, Patel SG. Cancer of the Oral Cavity. *Surg Oncol Clin N Am* [Internet]. 2015;24:491-508. Available from: <https://linkinghub.elsevier.com/retrieve/pii/S1055320715000319>. [Last accessed on 2020 Jun 14].
3. D'Cruz A, Arya S, Desai C, Chaturvedi P, Sharma S, Teli A, *et al.* Indian Council of Medical Research consensus document for the management of tongue cancer. *Indian J Med Paediatr Oncol* [Internet]. 2015;36:140. Available from: <http://www.ijmpo.org/text.asp?2015/36/3/140/166712>. [Last accessed on 2020 Jun 14].
4. Rajan S, Akhtar N, Kumar V, Gupta S, Misra S, Chaturvedi A, *et al.* A Novel and Simple Technique of Reconstructing the Central Arch Mandibular Defects—a Solution During the Resource-Constrained Setting of COVID Crisis. *Indian J Surg Oncol* [Internet]. 2020 Sep 25; Available from: <http://link.springer.com/10.1007/s13193-020-01233-0>. [Last accessed on 2020 Jun 14].
5. Suryanarayana Deo SV, Shukla N-K, Pandit A, Jha D, Bhatnagar S. Management of central arch mandibular squamous cell carcinoma in a resource constrained population – Challenges and solutions. *Oral Oncol* [Internet]. 2011 Jul;47:S149-50. Available from: <https://linkinghub.elsevier.com/retrieve/pii/S1368837511006853>. [Last accessed on 2020 Jun 14].
6. Gou L, Yang W, Qiao X, Ye L, Yan K, Li L, *et al.* Marginal or segmental mandibulectomy: Treatment modality selection for oral cancer: a systematic review and meta-analysis. *Int J Oral Maxillofac Surg* [Internet]. 2018;47:1-10. Available from: <https://linkinghub.elsevier.com/retrieve/pii/S0901502717315758>. [Last accessed on 2020 Jun 14].
7. Du W, Fang Q, Wu Y, Wu J, Zhang X. Oncologic outcome of marginal mandibulectomy in squamous cell carcinoma of the lower gingiva. *BMC Cancer* [Internet]. 2019;19:775. Available from: <https://bmccancer.biomedcentral.com/articles/10.1186/s12885-019-5999-0>. [Last accessed on 2020 Jun 14].
8. Misra S, Chaturvedi A, Misra N. Management of Gingivobuccal Complex Cancer. *Ann R Coll Surg Engl* [Internet]. 2008;90:546-53. Available from: <https://publishing.rcseng.ac.uk/doi/10.1308/003588408X301136>. [Last accessed on 2020 Jun 14].