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ORIGINAL RESEARCH

Multidetector computed tomography evaluation of buccal carcinoma

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ABSTRACT
Oral cavity cancer is the second leading cancer as compared eleventh globally. India alone accounts for a quarter (77,000 cases) of total number of oral cancer cases across the globe. Carcinoma of the buccal mucosa is the most common oral cavity cancer in India with most common causes including Tobacco, Smoking. MDCT is the first line of investigation and demonstrates the site and extent of carcinoma with evaluation of lymph nodal spread.

INTRODUCTION
Oral cavity cancer is one of the most fatal public health problems in the Indian subcontinent. In India, oral cavity cancer is the second leading cancer as compared eleventh globally. India alone accounts for a quarter of total number of oral cancer cases across the globe. Carcinoma of the buccal mucosa is the most common oral cavity cancer in India. [1]

The buccal space's anatomical boundaries are the buccinator muscle medially, the superficial layer of the deep cervical fascia and the muscles of facial expression laterally and anteriorly, and the masseter muscle, mandible, lateral and medial pterygoid muscles and the parotid gland posteriorly. The buccinator muscle originates from the alveolar processes of the maxilla and the mandible, and it inserts into the pterygomandibular raphe. The buccal space frequently communicates posteriorly with the masticator space because the parotidomasseteric fascia is sometimes incomplete along its medial course where it joins the buccopharyngeal fascia.[2]

Smoking tobacco is the greatest risk factor for developing oral cancer due to carcinogenic chemicals, including nitrosamines, benzopyrenes, and aromatic amines. The risk of developing oral cancer is 3 times higher in smokers compared with non-smokers. [3]

Alcohol consumption, especially when combined with smoking, elevates the risk of oral cancer. HPVs, mainly types 16 and 18, are associated with malignancies, notably cervical cancer and oropharyngeal cancer, especially tonsillar and base of tongue tumors. [4]

Early-stage cancers (stage I or II) usually undergo single modality treatment, which may include surgery (excision of the primary tumour with margins) or radiation therapy. Primary surgery offers improved local control and reduced morbidity in oral cavity cancers compared to non-surgical treatments, which is not often seen in other head and neck cancer sites. Late-stage cancers (stage III or IV), on the other hand, necessitate multimodality therapy. Surgical intervention may be followed by radiation therapy (with or without chemotherapy or immunotherapy) or a combination of chemotherapy and immunotherapy, as well as radiation therapy.[5]

MATERIALS AND METHODS
A retrospective study was conducted in 15 patients who underwent MDCT and were histopathologically proven cases of squamous cell carcinoma of buccal mucosa. Plain and contrast images including arterial, venous phases and puff cheek CT (in few cases) were taken from base of skull till clavicle. Multiplanar reformatted images were obtained using multiplanar imaging. All the CT imaging scans were performed on CT Philips machine (64 slices).

SOURCE OF DATA
The main source of data for the study was the patients referred to the Future Teleradiology Solutions from various scan centres including government and private setup.

INCLUSION CRITERIA
Patients referred to Future Teleradiology Solutions for CT imaging and were histopathological proven cases

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of squamous cell carcinoma of buccal mucosa (before or after imaging).

EXCLUSION CRITERIA
Post op case of buccal mucosa cancer.
Patients who have taken chemotherapy/radiotherapy for buccal mucosa cancer.

EQUIPMENT
The equipment to be used was CT scan 64-slice Philips machine.

SAMPLE SIZE
15 patients with buccal lesions were enrolled in the study.

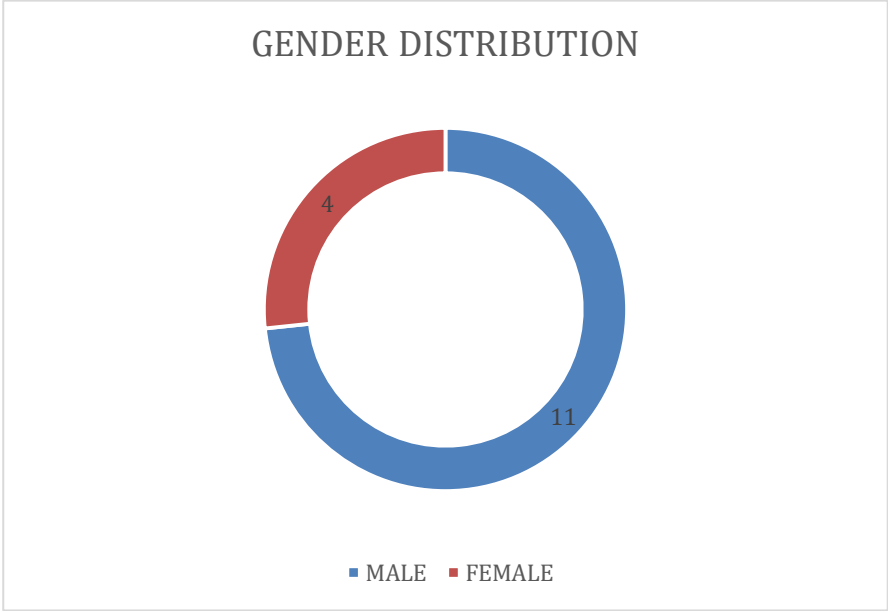
TECHNIQUE
All patients were subjected to multidetector computed tomography (MDCT) imaging. Initially, non-contrast MDCT imaging will be done. Post-contrast MDCT imaging will be performed in hemodynamically stable patients wherever required.

RESULT
The present study included 15 patients having buccal lesions who were referred to Future Teleradiology were evaluated.

Table I: Gender distribution (Total no. Of cases=100)

Gender	No. Of cases	Percentage
Male	11	73.%
Female	4	27%
Total	15	100%

Chart: I



Out of 15, 11 cases (73%) were male patients and 4 cases (27%) were female patients. (TABLE I & CHART I).

Table II: Age distribution (Total no. of cases=15)

Age group (in years)	No. of cases	Percentage
40-45	3	20%
45-50	4	26.6%
50-55	5	33.3%
55-60	3	20%
TOTAL	15	100%

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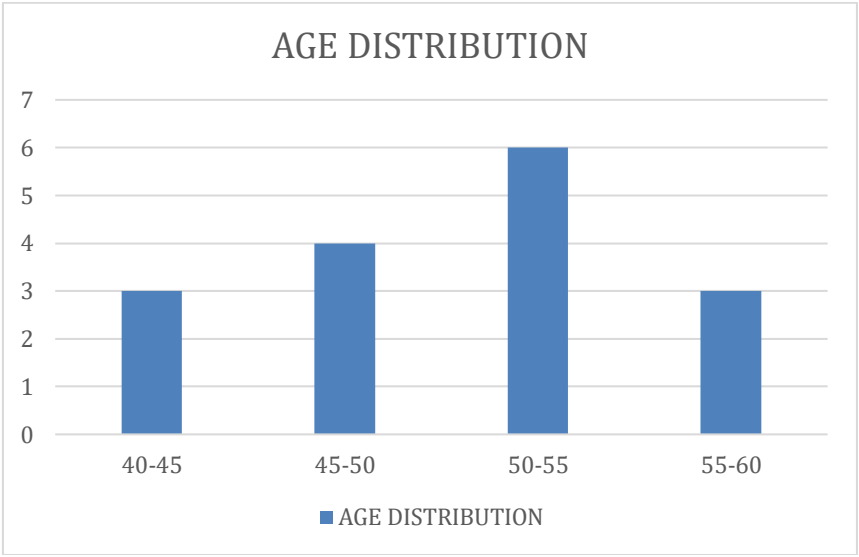
Chart II



The number of patients of age groups 40-45, 45-50, 50-55, 55-60 years were 3,4,5,3 respectively. (TABLE II & CHART II)

Table III: TNM Staging of Buccal carcinoma

TNM	No. of cases	Percentage
STAGE I	2	12
STAGE II	3	18
STAGE III	1	8
STAGE IVa	6	40
STAGE IVb	3	22

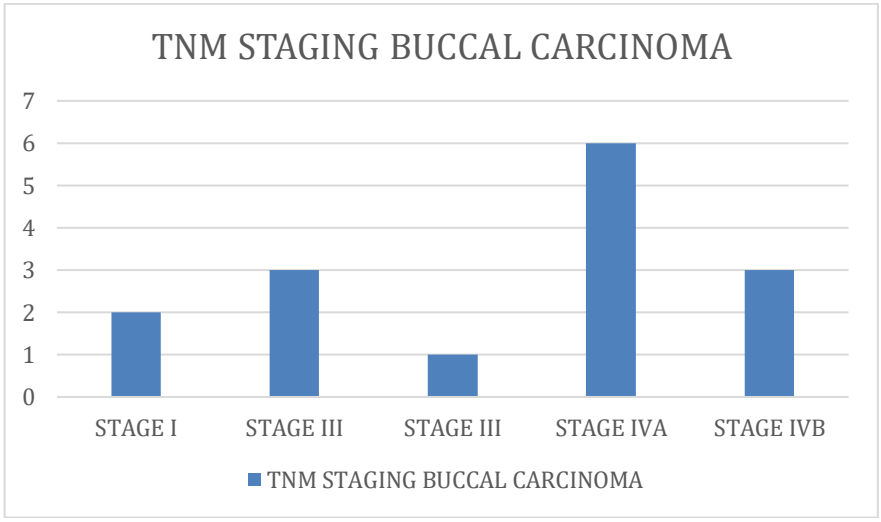


Table IV: Association with Smoking and Tobacco

Risk Factors	No. of patients
Tobacco	12
Smoking	10
Both	8

TNM CLASSIFICATION[6]

Primary tumor (T) definition for oral cavity cancers:

TX	Primary tumor cannot be assessed
Tis	Carcinoma in situ
T1	Tumor ≤ 2 cm and DOI ≤ 5 mm

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T2	Tumor ≤ 2 cm, DOI > 5 mm and ≤ 10 mm or tumor > 2 cm and ≤ 4 cm and DOI ≤ 10 mm
T3	Tumor > 4 cm or any tumor with DOI > 10 mm
T4b	Tumor invades adjacent structures only (e.g., through cortical bone of mandible or maxilla, or involves the maxillary sinus or skin) Tumor invades masticator space, pterygoid plates, or skull base and/or encases the internal carotid artery

*DOI: depth of invasion.

NX	Regional lymph nodes cannot be assessed
N0	No regional lymph node metastasis
N1	Metastasis in a single ipsilateral lymph node, ≤ 3 cm and ENE-
N2a	Metastasis in a single ipsilateral lymph node > 3 cm and ≤ 6 cm and ENE-
N2b	Metastases in multiple ipsilateral lymph nodes, ≤ 6 cm and ENE-
N2c	Metastases in bilateral or contralateral lymph nodes, ≤ 6 cm and ENE-
N3a	Metastasis in a lymph node > 6 cm and ENE-
N3b	Metastasis in any lymph node(s) with ENE+ clinically overt ENE(+) (ENE_c)

Distant metastases (M)

The terms pM0 and MX are not valid TNM categories. The following categories may be used:

- cM0: no evidence of metastases
- cM1: distant metastasis
- pM1: distant metastasis, microscopically confirmed

Stage groups

STAGE 0	Tis, N0, M0
STAGE I	T1, N0, M0
STAGE II	T2, N0, M0
STAGE III	T3, N0, M0[T1, T2, T3], N1, M0
STAGE IVA	T4a, [N0, N1], M0[T1, T2, T3, T4a], N2, M0
STAGE IVB	[Any T], N3, M0T4b, [Any N], M0

In, our study, 11 out of 15 males were affected. Similar findings were found in study conducted by Bobdey S et al.[7]

SPREAD OF BUCCAL CARCINOMA

Buccal cancer can spread laterally into the overlying buccal and subcutaneous fat upto the skin, superiorly into the maxillary sinus, and medially erode the mandible as well as may extend across into the lingual musculature. Anteriorly, it can extend into the lips and occasionally spread perineurally through the mental foramen. Posterosuperiorly spread into the masticator space may occur.[8]

Perineural spread is defined as invasion into mental foramen and mandibular nerve. Bone erosion by SCC is an adverse prognostic criterion and requires some form of mandibular resection, either marginal or segmental mandibulectomy.[9] In our study, most of the cases were of Stage IV. Similar findings were observed in study conducted by Desai NC.[10]

In our study, extension of tumor is mentioned as below:

SITE OF EXTENSION	NO. OF PATIENTS
RETROMOLAR TRIGONE	10
TONGUE	4
BONE	9
MASTICATOR SPACE	9
MAXILLARY SINUS	3
LYMPH NODES	11

In the masticator space, Masseter muscle was the most commonly involved muscle, followed by medial and lateral pterygoid muscle. Similar findings were observed in study conducted by Sankhe A et al.[11]

Mandible is most commonly involved by the buccal masses in our cases, followed by the maxilla.

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IMAGE 1

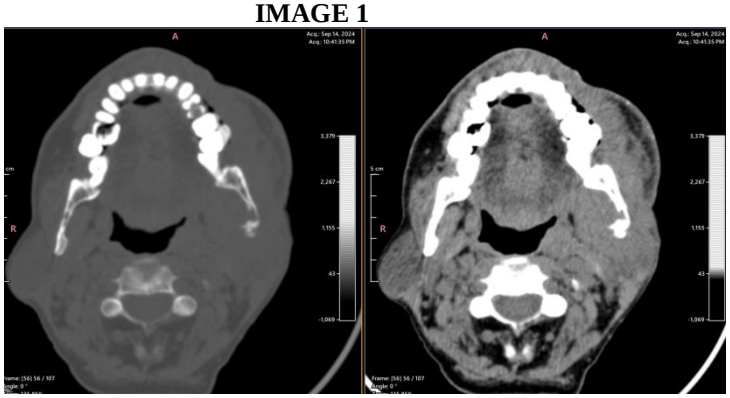

IMAGE 1: Shows buccal carcinoma causing erosion of mandibular ramus with extension into masticator space.

IMAGE: 2

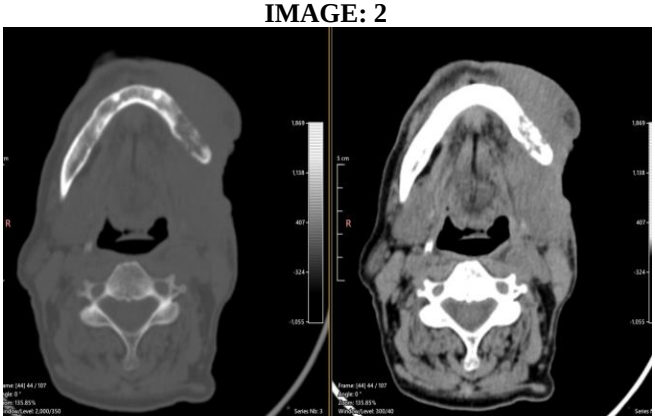

IMAGE 2: Shows ulceration in buccal carcinoma with erosion of body of mandible with extension into tongue .

IMAGE: 3

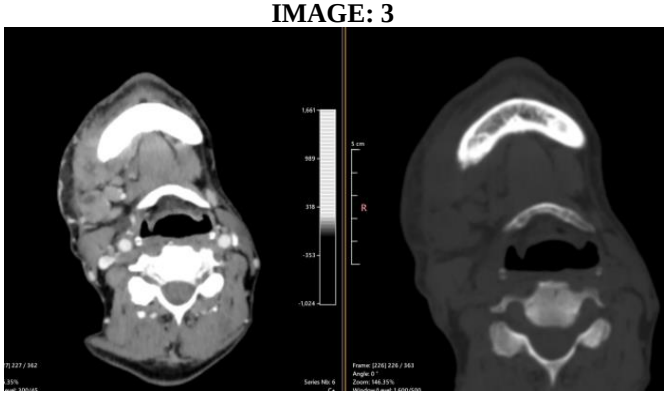

IMAGE 3: Nodal involvement in a case of buccal carcinoma with enlarged ipsilatreal lymph node showing internal necrosis.

IMAGE: 4

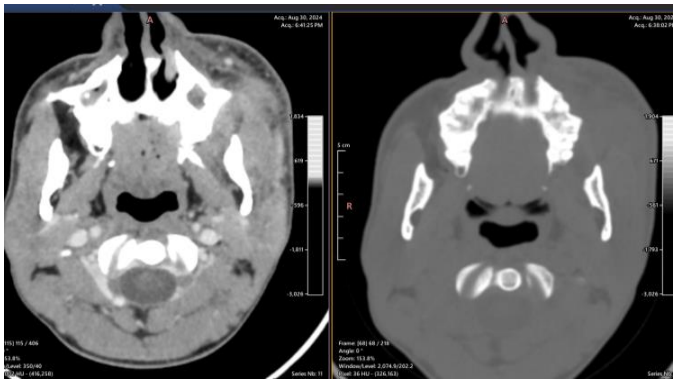

IMAGE 4: Extension into the retromolar trigone and involvement of masticator space.

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IMAGE: 5

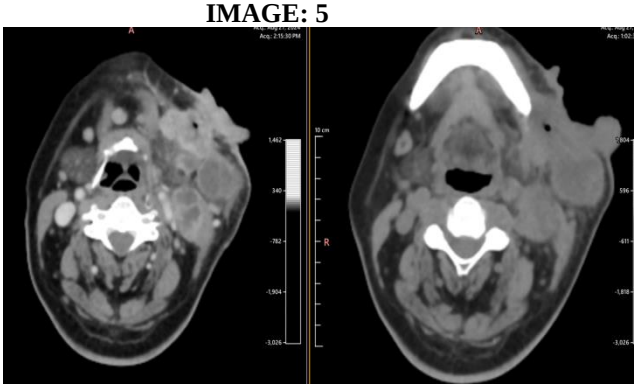

IMAGE 5: Soft tissue density mass involving skin with ulcerative component. Multiple necrotic lymph nodes are seen in the level I,II left side.

DISCUSSION

The buccal mucosa is a subsite within the oral cavity mucosa. Buccal carcinoma is prevalent in India because of tobacco use and the chewing of betel nuts. As buccal carcinoma frequently demonstrated aggressive behaviour, and the buccal mucosa had few anatomical barriers, buccal carcinoma can easily extend to neighbouring intraoral subsites and adjacent structures, which affected its T-staging, surgical resectability and radiation planning.

Although mucosal spread is easily assessed by clinical physical examination, its deep extent of spreading along muscles, invasion of bone and involvement of neurovascular bundles indicate advanced stage of the disease, are not directly visualized. CT is usually the first imaging modality used to assess and stage oral cavity and oropharynx. Contrast-enhanced CT helps detect the abnormalities of deeper extension.[12]

CONCLUSION

Buccal carcinomas are the most common oral cavity tumors and is common in males in India. It can spread easily through the gingiva to masticator space, retromolar trigone and tongue. MDCT is the modality of choice to know the extent of tumor spread as well as involvement of bone. Staging is essential for oral cavity tumors for further management of these tumors.

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