Frequency of metastasis to posterior triangle and lower deep jugular lymph nodes in patients with squamous cell carcinoma of oral cavity having clinically N1 neck

Shilpa Varchasvi1*, Azeem Moyihuddin2

ABSTRACT

Background: Oral cancer is the sixth most common cancer in the world and is largely preventable. The objective of the study is to find out the frequency of metastasis to posterior triangle lymph nodes and lower deep jugular (supraclavicular) lymph nodes in patients with squamous cell carcinoma of oral cavity having clinically N1 neck. Methods: A hospital based prospective study. This prospective study was conducted in R. L. Jalappa Hospital and Research Centre and SDU Medical College Kolar, Karnataka. 30 patients having oral squamous cell carcinoma with clinically N1 neck (single ipsilateral lymph node less than 3cms in diameter) undergoing modified radical neck dissection in R. L. Jalappa Hospital and Research Centre. Results: In our study, 4 were male (13%) and 26 were females (87%). The age of the patients ranged from 41-70 years with a mean age of 53 years. Majority of primary tumours were buccal mucosa tumours (24). We had 6 anterior 2/3rd tongue tumours. The primary tumour staging included 17 T2 lesions (57%), 3 T3 lesions (10%), 10 T4 lesions (33%) in patients with buccal mucosa carcinoma, fourteen patients had T2 disease, 9 patients had T4 and one patient had T3 disease. Conclusions: Most common nodal involvement in buccal mucosa carcinoma was level Ib (submandibular lymph node). The incidence of level IV (supraclavicular) and level V (posterior triangle) lymph node metastasis is low in buccal mucosa carcinoma patients with clinically N1 neck. Keywords: Metastasis, Squamous cell carcinoma, Posterior triangle lymph nodes, Lower deep jugular

INTRODUCTION

In India oral cancer is the commonest malignant neoplasm, accounting for 20-30% of all cancers. Southern India presents the highest oral cancer incidence rates among women worldwide and the highest in India overall.1 Besides pan chewing, the effects of tobacco use and alcohol drinking are clear risk factors for oral cancer in India and elsewhere.3-5 Among Indian men, the attributable oral cancer risk due to smoking, alcohol and pan chewing is over 80% and among women in India, pan chewing alone explains almost all (over 90%) the oral cancer risk.6-8 More than 90-95% of oral cancers are SCC or one of its variants.9 Malignancy within oral cavity is potentially devastating due to the associated morbidity. Therefore...
early detection and appropriate treatment of cancers remains the most effective weapon against cancers of the oral cavity. A critical prognostic factor in head and neck cancer is spread of disease to regional lymph node. In the early 1800s, it was believed that once head and neck cancer had spread to the cervical lymph nodes, complete removal of the disease was impossible.

In spite of nerve sparing neck dissections (MRND/SND), some degree of morbidity still persists due to de-vascularization/neuropaxia during surgical manipulation of SAN. These nerve injuries are seen mainly in posterior triangle dissection in neck/supraspinal accessory lymph node clearance. 9-14

Hence this cross-sectional study was undertaken to find out the frequency of metastasis to posterior triangle lymph nodes and lower deep jugular (supraclavicular) lymph nodes in patients with squamous cell carcinoma of oral cavity having clinically N1 neck.

METHODS

This prospective study was conducted in R. L. Jalappa Hospital and Research Centre and SDU Medical College Kolar, Karnataka. Thirty patients having oral squamous cell carcinoma with clinically N1 neck (single ipsilateral lymph node less than 3cms in diameter) undergoing modified radical neck dissection in R.L. Jalappa Hospital and Research Centre between December 2010 and June 2012 were enrolled in the study. Permission for the study was obtained from the college authorities prior to commencement. Written informed consent taken for inclusion in the study, surgical excision of primary tumour, modified radical neck dissection and histopathological examination.

Inclusion criteria

Patients with histologically proven oral squamous cell carcinoma with clinically single ipsilateral lymph node less than 3 cms in greatest diameter (N1).

Exclusion criteria

- Patients with no palpable lymph nodes (N0 neck) with oral squamous cell cancers.
- Oral squamous cell cancer patients treated by other methods such as radiotherapy or chemotherapy.
- Patients with oral cancer with advanced cervical lymph node metastasis (N2, N3).
- Patients with non-squamous malignancies of oral cavity.
- Patients unfit for surgery (neck dissection).
- Patients not willing for surgical treatment.

Following surgical excision of the primary lesion along with simultaneous neck dissection (modified radical), contents of posterior triangle and lower deep jugular lymph nodes along with other dissected lymph nodes was sent for histopathology after marking the various lymph node levels.

Pathological assessment of metastatic nodes: lymph nodes were identified by visual inspection and palpation and were dissected out from the fixed gross specimen in each of the five anatomic levels. All nodes were measured and processed routinely. Histological assessment was made on a single hilar section with examination of step serial sections in selected nodes.

Metastasis to posterior triangle and lower deep jugular lymph nodes and their size were documented. In addition documentation of other criteria in the primary tumor which affect lymph node metastasis like T-stage, histological grade and presence of other positive lymph nodes was done.

Statistical analysis

The data was analyzed using descriptive statistics like proportions and comparison done using Chi-square tests.

RESULTS

Of the 30 patients included in our study, 4 were male (13%) and 26 were females (87%). The age of the study group patients ranged from 41-70 years with a mean age of 53 years. In our study, the majority of primary tumours were buccal mucosa tumours (24). We had 6 anterior 2/3rd tongue tumours. The primary tumour staging included 17 T2 lesions (57%), 3 T3 lesions (10%), 10 T4 lesions (33%). All patients in our study selected were having N1 neck. In our study, in patients with buccal mucosa carcinoma, fourteen patients had T2 disease, nine patients had T4 and one patient had T3 disease. In patients with carcinoma lateral border tongue, three patients had T2 disease, two patients had T3 and one patient had T4 disease.

In our study, in patients with buccal mucosa carcinoma, fourteen patients had T3 disease, nine patients had T4 and one patient had T3 disease.

Table 1: Site of primary tumour and clinical staging.

| Clinical staging | Site of primary tumour |
|------------------|------------------------|
|                  | Buccal mucosa (n=24)   | Tongue (n=6) |
| T2               | 14                     | 3            |
| T3               | 1                      | 2            |
| T4               | 9                      | 1            |

In patients with carcinoma lateral border tongue, three patients had T2 disease, two patients had T3 and one patient had T4 disease (Table 1).

In buccal mucosa carcinoma, out of 24 patients, 16 patients underwent wide excision with hemi-
mandibulectomy. In these 16 cases, 2 patients had reconstruction with double flap (DP+PMMC) while rest 14 cases with island pectoralis major myocutaneous (PMMC) flap. Out of remaining 8 patients, 2 patients underwent marginal mandibulectomy. In all these 8 patients, reconstruction was done using nasolabial flap in 1 patient, buccal pad of fat in 2 patients, masseter flap in 1 patient and forehead flap in 4 patients. In carcinoma anterior 2/3rd tongue, all 6 patients underwent hemiglossectomy with simultaneous modified radical neck dissection (Table 2).

Table 2: Surgery done.

| Treatment of the primary tumour | No. of cases |
|---------------------------------|--------------|
| Buccal mucosa carcinoma         | Wide excision 24 |
| Tongue carcinoma                | Hemi glossectomy 6 |
| Neck dissection                 | MRND (Functional neck dissection) 28 |
|                                 | MRND (Sternomastoid sacrificed) 2 |
| Reconstruction in buccal mucosa carcinoma | Nasolabial flap 1 |
|                                 | PMMC+DP 2 |
|                                 | Buccal pad of fat 2 |
|                                 | Masseter flap 1 |
|                                 | Forehead flap 4 |
|                                 | Island PMMC 14 |
| Hemimandibullectomy             | 16 |
| Marginal mandibulectomy         | 2 |

Histopathologic examination of the tumour specimens in our study revealed squamous cell carcinoma in 26 patients and verrucous variant of squamous cell carcinoma in 4 patients. Majority of our patients belonged to well differentiated squamous cell carcinoma (19 out of 30).

Total number of lymph nodes examined included 327. Out of 30 N1 necks, only 13 necks had lymph node metastasis, rest were found to be false positive (reactive) nodes.

Among 13 pathologically proven metastatic cases, 10 patients with buccal mucosa carcinoma had lymph nodes showing squamous cell deposits at level I and II. None of the patients had metastasis to level IV or level V in buccal mucosa carcinoma.

Out of 3 pathologically proven metastasis, in tongue carcinoma, 1 patient had metastasis to level IV. Metastases to level V did not occur in any patient (Table 3).

Table 3: Pattern of metastasis to neck nodes.

| Neck level | Buccal mucosa (n=10/24) | Tongue (n=3/6) |
|------------|-------------------------|----------------|
| Ia         | 2                       | 1              |
| Ib         | 9                       | 3              |
| IIa        | 2                       | 3              |
| IIb        | 1                       | 2              |
| III        | 1                       | 0              |
| IV         | 0                       | 1              |
| V          | 0                       | 0              |
| Total metastatic nodes | 15                  | 10             |

n=number of patients showing lymph node metastasis out of the total number of patients for each primary site.

In our study, we found high false positive rates (clinically positive nodes, pathologically negative for tumour). The probable cause may be inflammatory lymphadenopathy owing to poor orodental hygiene. False negative were nil in this study as N0 cases were excluded from the study.

In buccal mucosa carcinoma, level I was positive in 2 T2 lesions, 1 T3 and 5 T4 lesions while level II was positive in 2 T2, 1 T3, 3 T4 cases and level III in 1 T4 case. This shows level I being commonly involved in the study. None of the patients had metastasis to nodal levels IV and V in any “T” stage in our study.

In tongue carcinoma, level II and level IV was involved in 1 T3 stage. Level I and II was involved in 2 T2 stage patients. No metastasis at level V was seen in any patient (Table 4).

Table 4: Pathological stage and nodal metastasis.

| Pathological staging | Site of primary tumour |
|----------------------|------------------------|
|                      | Buccal mucosa (n=10/24) | Tongue (n=3/6) |
|                      | I  II  III  IV  V  I  II  III  IV  V |
| T2                   | 2  2  -  -  -  2  5  -  -  - |
| T3                   | 1  1  -  -  -  2  -  1  -  - |
| T4                   | 5  3  1  -  -  0  -  -  -  - |

*n=number of patients showing lymph node metastasis out of the total number of patients for each primary site.
DISCUSSION

Our study involved 30 patients in the age group ranging from 41-70 years with mean age 53 years. Out of 30 patients, four were males (13%) and the majority (i.e., twenty six) were females (87%). This shows that oral cancers are more common among females in this region. This can be attributed to the habit of chewing tobacco, beetle nuts and keeping a cud in the mouth.

In literature, southern India presents the highest oral cancer incidence rates among women worldwide and the highest in India overall. These very high incidence rates in Indian population reflect the continued prevalence of pan chewing in India, a habit which is equally common in both genders.

Majority of the patients in our study had malignancy involving buccal mucosa and tongue (80% and 20% respectively). Owing to their addiction to chewing beetle nuts and tobacco and keeping a cud, buccal mucosa cancer is by far the most common malignancy in this region.

In our study, seventeen patients (57%) had early malignancy (T2) and 43% had advanced malignancy T3 (10%) and T4 (33%). Out of 30 patients, thirteen patients had metastases on histopathological examination and the rest seventeen cases had reactive lymph nodes on histopathology. This high incidence of false positive cases of lymphadenopathy on clinical examination could be attributed to reactive lymphadenopathy due to poor oral hygiene. There were no false negatives as patients with N0 neck were excluded from the study (Table 5).

In other studies, the incidence of false-negative neck nodes was lower in well differentiated primary lesions when compared to false positive nodes. Micro metastases or metastasis to nodes measuring less than 1.7 cm accounted for misdiagnosed cases.

In buccal mucosa carcinoma, out of 24 patients, 16 patients underwent wide excision with hemimandibulectomy. In these 16 patients, 2 patients had reconstruction with double flap (DP+PMMC) while rest 14 cases with island pectoralis major myocutaneous (PMMC) flap. Out of remaining 8 patients, 2 patients underwent marginal mandibulectomy. In all these 8 patients, reconstruction was done using nasolabial flap in 1 patient, buccal pad of fat in 2 patients, masseter flap in 1 patient and forehead flap in 4 patients.

In carcinoma anterior 2/3rd tongue, all 6 patients underwent hemiglossectomy with simultaneous modified radical neck dissection.

Hemimandibulectomy was done whenever tumour was involving posterior most region of buccal mucosa or involving the bone. Marginal mandibulectomy was done when tumour was reaching lower alveolus without infiltrating bone. Hemiglossectomy was done in 6 patients of tongue cancer as they were well lateralised not extending to midline or base tongue.

In our study, among buccal mucosa tumours with N1 neck, 10 out of 24 (41.6%) patients had metastasis. Among those with pathologically involved nodes (p N1), level I cervical node was most commonly involved site followed by level II and III. Level IV or V was not involved in any patient. This is in accord with other studies in literature.

In literature, metastasis to level V is not expected if the other nodal levels are not involved. Even if the other levels are involved, risk of occult metastasis to level V is not above 20%. According to a large study by Davidson, the metastasis at level V is least expected and metastasis to level V occurs only when other levels are involved. Shah in his study found level IV metastasis in 3-6% of oral cancers. Similar observations were found in few other studies.

In our study, among tongue tumours with N1 neck, 3 out of six (50%) patients had metastases. Among these 3 patients, there was metastasis at level II (2 patients) and level IV (one patient). There was no case with isolated involvement of level IV in the absence of nodal disease at level I or II. Metastases to level V did not occur in any patient. In literature, metastasis to level IV in oral tongue cancers is reported to be higher (15-17%).

CONCLUSION

There is high prevalence of buccal mucosa cancers in Kolar district. There is female preponderance in oral malignancy in our study. In oral malignancy there is a high incidence of false positive lymph nodes. Most common nodal involvement in buccal mucosa carcinoma was level Ib (submandibular lymph node). The incidence of level IV (supraclavicular) and level V (posterior triangle) lymph node metastasis is low in buccal mucosa carcinoma patients with clinically N1 neck.

ACKNOWLEDGEMENTS

I would like to express my profound gratitude to all the participants.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee
REFERENCES

1. Franceschi S, Bidoli E, Herrero R, Múoz N. Comparison of cancers of the oral cavity and pharynx worldwide: etiological clues. Oral Oncol. 2000;36:106-15.

2. IARC. Monographs on the evaluation of carcinogenic risk of chemicals to humans, Vol 37: Tobacco Habits other than Smoking; Betel-quid and Areca-nut Chewing, and Some Related Nitrosamines. Lyon: International Agency for Research on Cancer; 1985.

3. Znaor A, Brennan P, Gajalakshmi V, Mathew A, Shanta V, Varghese C, et al. Independent and combined effects of tobacco smoking, chewing and alcohol drinking on the risk of oral, pharyngeal and esophageal cancers in Indian men. Int J Cancer. 2003;105(5):681-6.

4. WCRF/AICR (World Cancer Research Fund and American Institute of Cancer Research). Food, nutrition and the Prevention of Cancer A Global Perspective. Washington, DC: American Institute of Cancer Research; 1997: 96-106.

5. Balaram P, Sridhar H, Rajkumar T, Vaccarella S, Herrero R, Nandakumar A, et al. Oral cancer in southern India: the influence of smoking, drinking, Paanchewing and oral hygiene. Int J Cancer. 2002;98(3):440-5.

6. Lizzy S, Yeole BB, Hakama M, Shiri R, Sastry PS, Mathews S, et al. Oral Cancers in Mumbai, India: a fifteen years perspective with respect to incidence trend and cumulative Risk. Asian Pacific J Cancer. 2004;5(3):294-300.

7. Thorat RV, Panse NS, Budukh AM, Dinshaw KA, Nene BM, Jayant K. Prevalence of Tobacco Use and Tobacco–dependent Cancers in Males in the Rural Cancer Registry Population at Barshi, India. Asian Pacific J Cancer Prev. 2009;10(6):1167-70.

8. Kalyani R, Das S, Bindra S, Kumar HML. Cancer profile in Kolar: a ten years study. Indian J Cancer. 2010;47:160-5.

9. Jin Y, Jin C. Oral squamous cell carcinoma. Atlas Genet Cytogenet Oncol Haematol. 2006;5368.

10. Leipzig B, Suen JY, English JL, Barnes J, Hooper M. Functional evaluation of the spinal accessory nerve after neck dissection. Am J Surg. 1983;146:526-31.

11. Sobol S, Jensen C, Sawyer W, Costiloe P, Thong N. Objective comparison of physical dysfunction after neck dissection. Am J Surg. 1985;150:503-9.

12. Gordon SL, Graham WP, Black JT, Miller SH. Accessory nerve function after surgical procedures in the posterior triangle. Arch Surg. 1997;112:264-8.

13. Patten C, Hillel AD. The 11th Nerve Syndrome Accessory Nerve or Adhesive Capsulitis. Arch Otolaryngol Head Neck Surg. 1993;119:215-20.

14. Dijkstra PU, van Wilgen PC, Buijs RP, Brendeke W, de Goede CJ, Kerst A, et al. Incidence of shoulder pain after neck dissection: a clinical explorative study for risk factors. Head Neck. 2001;23(11):947-53.

15. Ali S, Tiwari RM, Snow GB. False positive and false negative neck nodes. Head Neck Surg. 2006;8:78-82.

16. Woolgar JA, Vaughan ED, Scott J, Brown JS. Pathological findings in clinically false-negative and false-positive neck dissections for oral carcinoma. Ann R Coll Surg Engl. 1994;76(4):237-44.

17. Woolgar JA. Histological distribution of cervical lymph node metastases from intraoral/oropharyngeal squamous cell carcinomas. Br J Oral Maxillofac Surg. 1999;37:175-80.

18. Skolnik EM, Yee KF, Freidman M, Golden TA. The Posterior Triangle in Radical Neck Surgery. Arch Otolaryngol. 1976;102:1-4.

19. Davison BJ, Kulkarny V, Delacure MD, Shah JP. Posterior triangle metastasis of squamous cell carcinoma of the upper aerodigestive tract. Am J Surg. 1993;166(4):395-8.

20. Shah JP. Patterns of cervical lymph node metastasis from squamous cell carcinomas of the upper aerodigestive tract. Am J Surg. 1999;160:405-9.

21. Nitya CS, Pandey M, Naik BR, Ahamed M. Patterns of cervical metastases from carcinoma of the oral tongue. World J Surg Oncol. 2003;1:1-6.