



RADIOLOGIC- PATHOLOGIC CORRELATION OF DEPTH OF INVASION IN TONGUE CARCINOMA

Oncology

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ABSTRACT

Introduction: In tongue carcinoma according to AJCC 8th guidelines depth of invasion is included in staging, therefore there is need of imaging which can accurately assess the pretreatment stage of tumor. The objective of this study was to correlate the depth of invasion reporting by MRI and postoperative HPR. **Methods:** In MRI DOI was measured by drawing perpendicular lines from the reference line to the point of maximal tumor projection in the tongue medially, histologically DOI was measured from the level of the basement membrane of the closest adjacent normal mucosa. **Results:** Paired t test was done on the DOI of MRI and HPR. The two tailed P value is less than 0.0001. This difference is considered to be extremely statistically significant. The mean of group one (DOI-MRI) minus Group 2 (DOI-HPR) equals 6.860. 95% confidence interval of this difference is from 5.200 to 8.520. **Conclusion:** In our study we find there is statistically significant difference between DOI reports in MRI and postoperative HPR.

KEYWORDS

Tongue carcinoma, MRI, Histopathological Report, Depth of Invasion

INTRODUCTION

Oral tongue is one of the most common subsite for squamous cell carcinoma^(1,2). Possibility of nodal metastases is related to the depth of invasion of 4-5 mm^(3,4). Depth of invasion assessment can be done clinically by tumor palpation and radiological with use of Magnetic Resonance Imaging (MRI)⁽⁵⁾. According to AJCC 8th guidelines depth of invasion is included in staging, therefore there is need of imaging which can accurately assess the pretreatment stage of tumor⁽⁶⁾. Clinical examination is limited due to subjective variation and one's capability to determine an exact measurement of depth of invasion by induration and also presence of edema. Trismus or patient intolerance to palpation is some of the factors which can cause hindrance in clinical evaluation. MRI in evaluation of depth of invasion is sometimes limited by motion artifact due to long image acquisition times and the relative inability to visualize superficial tumors. While in practice we have seen many times there is difference of depth of invasion in reporting between MRI and postoperative Histopathological report (HPR). The objective of this study was to correlate the depth of invasion reporting by MRI and postoperative HPR.

METHODS

Patient with biopsy proven oral tongue cancer who came to OPD department in SRJ CBCC hospital, Indore were included in this study between time periods of December 2020 to April 2021. Patients were then sent for MRI with contrast of head and neck. Then patients underwent surgical resection with neck dissection. Depth of invasion was assessed on gross pathologic examination and histopathologic examination on formalin fixed specimen.

Evaluation of depth of tumor

Axial gadolinium enhanced MRI was used to determine DOI in the tongue where tumor lies vertically. A horizontal line joining the tumor mucosa junctions was drawn as reference line. DOI was measured by drawing perpendicular lines from the reference line to the point of maximal tumor projection in the tongue medially, and tumor thickness is measured from the tumor highest tumor projection laterally to medially (Figure 1).

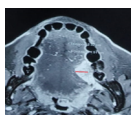


Figure 1: Line 1 is a horizontal line joining the tumor mucosa junctions was drawn as reference line. Red line denotes the DOI which is 14 mm and tumor thickness is Line 2 which is about 15.1 mm

All patients were then underwent wide excision of the primary tumor with 1-1.5 cm resection margins and neck dissection. DOI were noted in final histopathology. Pathologically, DOI was measured from the level of the basement membrane of the closest adjacent normal mucosa. A line is dropped from this plane to the deepest point of tumor invasion which corresponds to the DOI. MRI findings were then correlated with final histopathology using correlation and paired t test. P<0.05 was considered as statistically significant.

RESULTS:

Table 1: DOI in MRI and postoperative HPR

S.No.	MRI (DOI)	HPE (DOI)
1.	14mm	8mm
2.	18mm	6mm
3.	26mm	18mm
4.	26mm	25mm
5.	8mm	3mm
6.	18mm	13mm
7.	11mm	7mm
8.	13mm	7mm
9.	23mm	9mm
10.	19.5mm	7mm
11.	24mm	11mm
12.	10mm	2mm
13.	18mm	11mm
14.	10mm	4mm
15.	11mm	7mm
16.	13mm	8mm
17.	20mm	18mm
18.	21.3mm	11mm
19.	16.5mm	11mm
20.	13mm	7mm
21.	7mm	5mm

22.	11mm	8mm
23.	24mm	10mm
24.	19mm	13mm
25.	38mm	40mm
26.	24mm	8mm
27.	3.5mm	2mm
28.	17mm	10mm
29.	23mm	10mm
30.	15mm	10mm

Paired t test was done on the DOI of MRI and HPR. The two tailed P value is less than 0.0001. This difference is considered to be extremely statistically significant. The mean of group one (DOI-MRI) minus Group 2 (DOI-HPR) equals 6.860. 95% confidence interval of this difference is from 5.200 to 8.520. Standard error of difference is 0.812.

Table 2: Data after evaluation

Group	DOI (MRI)	DOI (HPR)
Mean	17.160	10.300
SD	7.174	7.401
SEM	1.310	1.351

DISCUSSION:

Preoperatively determination of DOI in oral tongue cancer is of utmost importance to clinicians to be able to decide on elective neck dissection, the extent of surgery, reconstruction, and provide patients with an idea as to whether they may require post-operative radiation⁽⁷⁾. In up to 40% of cases, occult metastasis to the cervical lymphnodes may occur in T1 and T2 tongue cancers⁽⁸⁾. DOI is one of the primary predictors of nodal metastases and bases of prognosis in these patients⁽⁹⁾. MRI provides excellent soft tissue discrimination.

Preda et al found MRI thickness strongly correlated with histopathological thickness (correlation coefficient= 0.68, P<0.0001)⁽¹⁰⁾. Park et al evaluated 114 patients with oral cavity and oropharyngeal squamous cell carcinoma, of which 49 patients had oral tongue squamous cell carcinoma. Relationship between MRI and histological DOI in OT was high with a correlation coefficient of 0.949⁽¹¹⁾. In 2019 Verma et al⁽¹²⁾ conducted a prospective study at a tertiary care hospital and research centre. Correlation and linear regression analysis were used to study the relationship between tumor dimensions in MRI and correlated with the results on final histopathology. In this prospective study, they studied fifty cases of carcinoma tongue of which 38 were males and 12 were females. Mean age was 49 years. The tumor thickness on MRI correlated well with final histopathology and most values fell below the 1:1 (x=y) line of agreement. Also, depth of invasion on histopathology was correlated with MRI which also related well to the histopathology taking into account the shrinkage. They concluded there was a significant correlation between the MRI T staging and final histopathology and it is found that MRI findings and depth correlated well with final histopathology taking into account the shrinkage factor. In 2019 Mao et al⁽¹³⁾ compared the consistency of depth of invasion (DOI) measurements by magnetic resonance imaging (MRI) and intraoperative and postoperative pathological sections. This study included 150 patients, the overall difference between MRI and postoperative pathological sections (DMP) and the overall difference between intraoperative and postoperative pathological sections (DIP) based on pathological specimens were 2.32 ± 1.68 mm and 0.68 ± 0.99 mm. The overall difference between MRI and intraoperative pathological sections (DMI) based on intraoperative specimens was 1.64 ± 1.32 mm. The tumour growth pattern and T stage were significantly correlated with measurement differences. The cut-off value of MRI depth that could identify nodal metastasis was 8 mm, and were both 11 mm for OS and DSS. They concluded Clinicians performing T staging on patients with tongue cancer based on MRI measurements must consider the false-positive mean depth of 2.3 mm as well as the growth pattern and specific infiltration depth. The prognostic MRI depths that enabled the identification of nodal metastasis, OS and DSS were 8 mm, 11 mm and 11 mm, respectively. In our study we compare the DOI in MRI and HPR. We found the difference in mean of 2 groups to be 6.860. 95% confidence interval of this difference is from 5.200 to 8.520. Standard error of difference is 0.812. On paired t test P value is less than 0.0001. This difference is considered to be extremely statistically significant. Factors like inflammation, changes due to biopsy as well as tumor mass can be enhanced by contrast agent and tumor size may be overestimated on

contrast-enhanced T1WI. Tumor shrinkage after resection can be factor in reducing the size of DOI. As pointed by Lwin *et al.*, there is tumor shrinkage after resection in all oral cavity subsites, including oral tongue⁽¹⁴⁾.

CONCLUSION:

In our study we find there is statistically significant difference between DOI reports in MRI and postoperative HPR. We cautioned clinician not be overly aggressive in resecting tumor on the basis of MRI report. Also if possible MRI should be done before performing biopsy in order to avoid increase contrast uptake, inflammation and oedema. An MRI report gives us an idea of resection and plan for reconstruction but other factor should also be included in deciding treatment plan for patients. Also MRI should be analysed in three planes and it is correlated with final histopathology to assess the reliability of MRI in preoperative assessment.

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