ROLE OF IMAGING IN ORAL METASTATIC LESIONS - A SYSTEMATIC REVIEW

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Abstract: Oral metastatic lesions are rare. Different imaging modalities are used to identify the oral metastatic lesions. Knowledge and ease of identifying metastatic lesions in the oral and maxillofacial region is important. This systematic review is undertaken for that purpose.To explore the various imaging modalities and to identify the best imaging modality for diagnosing oral metastatic lesions.
A PUBMED search was done on august 2019 for articles published in the last five years, the search period being 2014 to 2019 using the title "ROLE OF IMAGING IN ORAL METASTATIC LESIONS","ROLE OF IMAGING IN ORAL METASTASIS" and "ROLE OF IMAGING IN ORAL METASTASES" with studies of following designs: clinical trials, clinical studies, case series/reports, prospective and retrospective studies.
We retrieved 36 articles and found 11 articles that fulfilled our inclusion criteria. All included articles were those that were published within the last 5 years. Studies were classified based on the different imaging modalities used for identifying oral metastatic lesion and were tabulated.
This article will be a useful reference for further research for maxillofacial radiologists and orofacial oncologists regarding investigations for patients with metastatic lesions pertaining to the oral and maxillofacial region.

Keywords: Imaging modalities, metastatic lesions, oral metastases

1. Introduction:

Neoplasia is defined as "an abnormal mass of tissue the growth of which exceeds and is uncoordinated with that of the normal tissues and persists in the same excessive manner even after the cessation of the stimuli which evoked the change" according to Willis[1]. In India, about 30 % of all cancers are oral cancer and also it has one-third of the world's oral cancer cases.[2] According to Globocan statistics of India, 2018 cancer of the lip and oral cavity are among the top five frequent cancers for both sexes in India. Cancer of the oral cavity and lip ranks second in India among other cancers with 10.4% of new cases with a mortality rate of 9.3% while cancer of the oropharynx ranks twenty and cancer of the salivary glands twenty-seven with an incidence of 1.5% and 0.66% and a mortality rate of 1.9% and 0.65% respectively.[3] As most of these tumours are detectable, the first step towards the treatment of oral cancer is by traditional clinical examination that is by inspection and palpation. Then the definitive diagnosis is by biopsy of the tissues suspected. Imaging plays a significant role in

the diagnosis of primary and secondary tumours, their location, extensiveness of their local spread, large-vessel invasion, invasion to bone, metastases to lymph nodes and also help in treatment planning of oral cancer and its spread. The diagnostic efficacy of imaging methods for oral metastatic lesions in different anatomical areas of the head and neck region has not been systematically reviewed. Therefore this present review intends to systematically review the available literature on the identification of oral metastatic lesions using different imaging modalities.

1. Aim and Objectives

To explore the various imaging modalities and to identify the best imaging modality for diagnosing oral metastatic lesions.

Materials and methods

Search strategy

PUBMED was systematically searched on august 2019 for published literature between the years 2014 to 2019. The search words used to retrieve studies on imaging in oral metastasis were "ROLE OF IMAGING IN ORAL METASTATIC LESIONS", "ROLE OF IMAGING IN ORAL METASTASIS" and "ROLE OF IMAGING IN ORAL METASTASES".

Selection criteria

Inclusion criteria

1. Studies on the use of various imaging modalities in the diagnosis, staging of oral metastases within last 5 years.
2. Studies of different designs listed in the pubmed search "Case Reports, Classical Article, Clinical Study, Clinical Trial, Clinical Trial, Phase IV, Comparative Study, Controlled Clinical Trial, Journal Article, Observational Study, Randomized Controlled Trial, Twin Study, Validation Studies and published in the last 5 years were included with the filters Humans, English language"

Exclusion criteria

1. Studies on other species (eg. mouse)
2. Studies that are of reviews, systematic review, meta-analysis, books and documents, editorials, letters, published errata and historical articles
3. Studies that are not done within the last 5 years.
4. Studies that describes only about the imaging modalities used and not including their observations were also excluded.

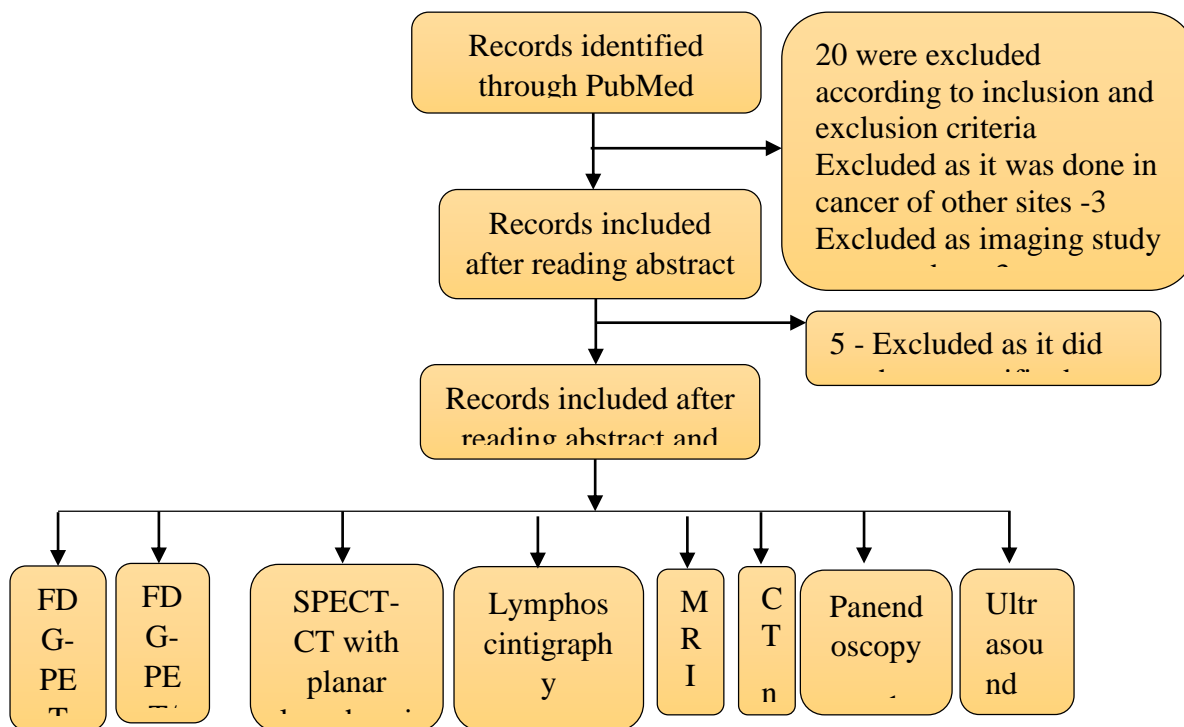## 3. Result

Screening process

Screened the search data thoroughly and the relevant abstracts were identified manually for full-text article evaluation. Around 166 articles were recovered from the pubmed search, of which 123 were located after applying the human filter. After applying the inclusion and exclusion criteria, 87 articles were excluded. Remaining 36 articles were included after reading the abstracts. When the abstract in question is doubtful or is unclear, the full-text article was selected for evaluation. Preliminary selected abstracts, were reviewed. Among them one article were of a study done in mice, 9 were irrelevant, 3 were reviews, 1 was a meta-analysis, 3 were articles which were about cancer of other sites and 3 other articles were not imaging studies. The articles were further sorted and showed in the block diagram

Literature evaluation

All included articles were published within the last 5 years. Articles were classified into different imaging modalities used for identifying oral metastatic lesion were tabulated as shown in the results.

Data extraction

The year of study, number of samples for the evaluation of imaging, sensitivity and specificity, and details related to statistical analysis were extracted.

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┌─────────────────────┐      ┌──────────────────────────┐
│ Records identified  │─────▶│ 20 were excluded          │
│ through PubMed      │      │ according to inclusion and│
└─────────────────────┘      │ exclusion criteria        │
          │                  │ Excluded as it was done in│
          ▼                  │ cancer of other sites -3  │
┌─────────────────────┐      │ Excluded as imaging study │
│ Records included    │      └──────────────────────────┘
│ after reading abstract│
└─────────────────────┘      ┌──────────────────────────┐
          │            ─────▶│ 5 - Excluded as it did    │
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│ Records included after│
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FDG-PET | FDG-PET | SPECT-CT with planar | Lymphoscintigraphy | MRI | CTn | Panendoscopy | Ultrasound

Note: Some articles have identified the oral metastases using one or two imaging modalities

Results:
(SUV-Standardized Uptake Value)
Discussion:
Based on the studies done using various imaging modalities the following recommendations can be made

4. Conclusions

Metastasis of any cancer always signifies an unfavourable prognosis. It must be diagnosed early so that early intervention is done. This review suggests that FDG PET-CT is the modality that can be used to diagnose oral metastases that are on various sites.

Future recommendations

On exploring various modalities in identifying oral metastatic lesions, this review suggests the following: FDG PET- CT is the best modality as it is used in various regions of head and neck cancer and its metastases. In the field of oral metastases, the accuracy of imaging modalities used for identifying the metastasis has to be assessed. Future studies with various imaging modalities of the oral and maxillofacial region for oral metastases can be done.

5. References

1. Cotran Ramzi S, Kumar Vinay, Collins Tucker, Robbins Stanley Leonard. Pathologic Basis of disease. Chapter Neoplasia. 8th edition. Philadelphia: Elseiver Publications; 2010. pp. 259–330

2. Coelho KR. Challenges of the Oral Cancer Burden in India. Brenner H, editor. Journal of Cancer Epidemiology. 2012 Oct 4;2012:701932:1-17

3. Global oral cancer population fact sheets. http://globocan.iarc.fr, http://gco.iarc.fr/

4. Fenesan DI, Lenghel M, Baciut G, Vacaras S, Botar-Jid C, Vasilescu D, et al. Ultrasound and CT imaging features in a patient with salivary duct carcinoma of the parotid gland: a case report with literature review. Medical Ultrasonography. 2015 ;17(1):119.

5. Yokobori Y, Toyoda M, Sakakura K, Kaira K, Tsushima Y, Chikamatsu K. 18 F-FDG uptake on PET correlates with biological potential in early oral squamous cell carcinoma. Acta Oto-Laryngologica. 2015;135(5):494–9.

6. Sürücü E, Polack BD, Demir Y, Durmuşoğlu M, Ekmekçi S, Sarıoğlu S, et al. Dual-phase F-18 FDG PET–CT in staging and lymphoscintigraphy for detection of sentinel lymph nodes in oral cavity cancers. Clinical Imaging. 2015;39(5):781–6.

7. Tartaglione G, Stoeckli SJ, De Bree R, Schilling C, Flach GB, Bakholdt V, et al. Sentinel node in oral cancer: The nuclear medicine aspects. A survey from the sentinel European node trial. Clin Nucl Med. 2016;534–42.

8. Den Toom IJ, van Schie A, van Weert S, Karagozoglu KH, Bloemena E, Hoekstra OS, et al. The added value of SPECT-CT for the identification of sentinel lymph nodes in early stage oral cancer. European Journal of Nuclear Medicine and Molecular Imaging. 2017;44(6):998–1004.

9. Moreno KF, Cornelius RS, Lucas FV, Meinzen-Derr J, Patil YJ. Using 3 Tesla magnetic resonance imaging in the pre-operative evaluation of tongue carcinoma. The Journal of Laryngology & Otology. 2017 ;131(9):793–800.

10. Kimura Y, Tomihara K, Tachinami H, Imaue S, Nakamori K, Fujiwara K, et al. Conventional osteosarcoma of the mandible successfully treated with radical surgery and adjuvant chemotherapy after responding poorly to neoadjuvant chemotherapy: a case report. Journal of Medical Case Reports 2017 Dec :11(210); 1-6

11. Krishnan S, Connell J, Ofo E. Transoral robotic surgery base of tongue mucosectomy for head and neck cancer of unknown primary: Tongue mucosectomy for head and neck cancer. ANZ Journal of Surgery. 2017;87(12):E281–4.

12. Sun Q, Chen M, Sun Y, Chen X, Xu H, Rong L, et al. Cervical metastasis of gingival carcinoma misdiagnosed as branchiogenic carcinoma, a rare entity - report of a case and review of literature. https://bmcoralhealth.biomedcentral.com/articles/10.1186/s12903-017-0435-9

13. Chen C, Lin Z, Xiao Y, Bai P, Yue Q, Chen Y, et al. Role of diffusion-weighted imaging in the discrimination of benign and metastatic parotid area lymph nodes in patients with nasopharyngeal carcinoma. Scientific Reports .http://www.nature.com/articles/s41598-017-18617-y

14. Pehlivan M, Gurbuz MK, Cingi C, Adapinar B, Değirmenci AN, Acikalin FM, et al. Diagnostic role of ultrasound elastography on lymph node metastases in patients with head and neck cancer. Brazilian Journal of Otorhinolaryngology. 2019 85(3):297–302.