Review Article

Metastasis to the Jawbones: A review of 453 cases

Soussan Irani

Department of Oral Pathology, Dental Research Centre, Dental Faculty, Hamadan University of Medical Sciences, Hamadan, Iran

The purpose of the present article was to review the characteristics of the jawbone metastases to analyze all variables. A relevant English Literature search in PubMed, Scopus, and Google Scholar was performed. All variables such as age, gender, primary and secondary tumor sites were analyzed. There were 453 metastatic cases. The male-to-female ratio was 1.2:1, and the mean age of the patients was 53.4 years. The lung was the most common primary site in men, and breast in women. The most common metastatic site was the mandible, and adenocarcinoma was the most frequent histological diagnosis. Metastases to the jaw bones occur in the advanced stages of a malignancy hence; a careful examination of patients with jaw bone lesions is strongly suggested. Dentists, as well as general physicians, should take into consideration the possible presence of jaw metastases in cases which present atypical symptoms, especially in patients with known malignant disease.

Keywords: Jawbones, metastasis, mouth

INTRODUCTION

Metastasis to the oral cavity rarely occurs and constitutes 1% of all oral cavity malignancies and has mostly been found in the jaws compared to the soft tissues. Metastasis to the jaw bones mainly occurs in the posterior region of the mandible, ramus, and the condyle, which are rich in red bone marrow. Metastasis to the maxilla is rare and comprises one-fifth of all metastatic tumors to the jawbones. The male-to-female ratio is almost equal with a ratio of 1:1.1. The mean age of patients is 45 years. The primary focus in women is usually located in the breasts, reproductive organs, thyroid gland, and kidneys, whereas in men it is in the lungs, prostate, kidneys, bones, large intestine, and suprarenal glands. Metastases to the jaw bones almost originate from infraclavicular regions. The diffusion through Batson’s venous system is the principal process of the oral cavity metastasis. Histologically, the primary foci are usually carcinomas, and among them adenocarcinomas are more common. Adenocarcinoma is usually a metastasis from the breasts in women or from the lungs, alimentary canal, or prostate in men. There are also descriptions of metastases from embryonal tumors, sarcomas, or even disseminated foci of myeloma or lymphogranulomatosis. Metastasis to the oral cavity is a complication of malignancy and usually develops at the end stage of cancer. Distant metastasis has a pivotal role in the management of patients. Oral cavity metastasis increases in the world and is one of the main causes of morbidity and mortality in cancer patients. Oral cavity metastasis is also a therapeutic challenge for clinicians. Early detection and treatment of oral cavity metastasis may improve patient’s life and prolong survival. The dentists have an important role in the diagnosis and management of cancer patients, especially in those with undiscovered malignancy.

The purpose of the present article was to review the characteristics of the jawbone metastases to analyze all available information. A relevant English Literature search in PubMed, Scopus, and Google Scholar was performed. The keywords “oral cavity,” “jawbone,” and “metastasis” were searched the in title/abstract of publications limited to 1930–2015. Only the related publications were included. All variables such as age,

Access this article online

Quick Response Code:
Website: www.jispcd.org
DOI: 10.4103/jispcd.JISPCD_512_16

How to cite this article: Irani S. Metastasis to the Jawbones: A review of 453 cases. J Int Soc Prevent Communit Dent 2017;7:71-81.
gender, and primary and secondary tumor sites were analyzed. In some reports, especially in case series, most of the variable assessments were incomplete.

**RESULTS**

In general, there were 453 available cases of jaw bone involvement in the English language literature. A significant predominance of men was detected (245 men; 54.1%, 208 women; 45.9%). The male-to-female ratio was 1.2:1. The mean age of the patients at diagnosis was 53.4 years (range: 4 months to 94 years), with a mean age of 54.81 years for men and 51.81 years for women. The youngest patient was a 4-month-old girl (metastasis from adrenal glands), and the eldest was a 94-year-old woman (metastasis from breast).

Significant details from the literature concerning the cases of jaw bone metastases are summarized in Tables 1 and 2. In addition, Table 3 demonstrates the comparison of the results of this review with those of the previous reviews.

Overall, the breast with 86 cases (19%) was the most common primary site, followed by the lung (66 cases; 14.6%) and thyroid gland (39 cases; 8.6%). The primary site differed between genders. The most common primary sites for men were the lungs \((n=49; 20\%)\), followed by liver \((n=40; 16.3\%)\) and prostate \((n=27; 11\%)\), and

**Table 1: A summary of oral metastasis in men**

| Primary site (No. of patients) | Age range (years) | The time intervals from primary tumor detection to diagnosis of an oral metastasis | Range of time duration of development of a metastatic lesion | The time intervals from diagnosis to death | References |
|--------------------------------|-------------------|---------------------------------------------------------------------------------|-------------------------------------------------------------|------------------------------------------|------------|
| Lung (49)                      | 45-78             | 1 month-5 years                                                                | 1 week-3 years                                              | 2 weeks-26 months                       | [5-7,17-41] |
| Liver (40)                     | 6-78              | 2 months-7 years                                                               | 1 week-10 months                                            | 1 month-2 years                         | [7,26,39,42-70] |
| Prostate (27)                  | 32-90             | 3 weeks-7 years                                                                | 2 weeks-17 months                                           | 1-17 months                             | [3,5,9,22,28,36,39,40,62,66,71-77] |
| Kidney (24)                    | 48-78             | 1 month-13 years                                                              | 1 week-1 year                                               | 2 months-2 years                        | [5,22,26,28,40,73,78,89] |
| Unknown (14)                   | 35-77             | 11 months                                                                      | 1-2 months                                                  | 5 months-1 year                         | [28,37,39,70,91-98] |
| Esophagus (12)                 | 30-69             | 1 month-7 years                                                               | 1-4 months                                                  | 1 month-2 years                         | [5,38,99-101] |
| Rectum (7)                     | 56-76             | 2 years-4 years                                                               | 3 weeks-2 years                                             | 1 month-2 years                         | [102-107] |
| Adrenal Gland (6)              | 1-59              | 4 months                                                                      | 1 week-5 months                                             | 1 month-1 year                          | [108-112] |
| Skin (6)                       | 23-68             | 2-4 years                                                                     | 2 months-2 years                                            | 3 weeks-19 months                       | [27,113-116] |
| Eye (5)                        | 4-8               | 10 month-7 years                                                              | 1 week-2 months                                             | 3 weeks-19 months                       | [26,34,38,117,118] |
| Thyroid (5)                    | 58-65             | 6-28 months                                                                    | 1 month-2 months                                            | 2-6 months                              | [126-129] |
| Testis (5)                     | 43-81             | 1-2 years                                                                     | 1 week-4 months                                             | 13-17 months                            | [36,73,119-121] |
| Breast (5)                     | 43-73             | 4-9 years                                                                     | 2 months-6 years                                            | 4 months-3 years                        | [62,122-125] |
| Urinary bladder (4)            | 48-69             | 20 months-7 years                                                             | 2-5 months                                                  | 1-18 months                             | [5,28,130,131] |
| Colon (4)                      | 59-75             | 5-24 months                                                                   | 2-5 months                                                  | 1-6 months                              | [26,132,133] |
| Brain (3)                      | 7-16              | 2-18 months                                                                   | 2 months                                                    | 6 months                                | [3,134,135] |
| Thigh (3)                      | 19-33             | 6 months-1 year                                                               | 2 months                                                    | 7 months-2 years                        | [73,136,137] |
| Bronchus (3)                   | 34-51             | 3 months-1 year                                                               | 9 months                                                    | alive                                   | [27,138] |
| Nasopharynx (2)                | 69-70             | 1 year                                                                        | 1-6 months                                                  | alive                                   | [39,140] |
| Femur (2)                      | 11-21             | 6-18 months                                                                   | 1 month                                                    | 2 months                                | [27,62] |
| Leg (2)                        | 7-69              | 1-5 years                                                                     | No data                                                     | 2 months                                | [141] |
| Stomach (1)                    | 67                | 9-10 months                                                                   | 9 months                                                    | 1 month                                 | [142] |
| Foot (1)                       | 61                | 1 week                                                                        | 1 week                                                      | 6 months                                | [143] |
| Forearm (1)                    | 14                | 1 year                                                                        | 2 months                                                    | 6 months                                | [144] |
| Maxilla (1)                    | 56                | 1 year                                                                        | No data                                                     | alive                                   | [145] |
| Tibia (1)                      | 17                | 1 year                                                                        | 2 month                                                     | 1 week                                  | [146] |
| Hemitorax (1)                  | 12                | 1 year                                                                        | 1 week                                                      | 6 months                                | [147] |
| Thoracic wall (1)              | 28                | 10 years                                                                     | 2 months                                                    | 2 years                                 | [148] |
| Mediastine (1)                 | 23                | 3 years                                                                       | 3 months                                                    | 6 months                                | [36] |
| Pancreas (1)                   | 54                | No data                                                                       | No data                                                     | alive                                   | [149] |
| Secum (1)                      | 65                | 5 months                                                                      | 1 month                                                     | 2 months                                | [27] |
| Sacroilae (1)                  | 21                | 5 months                                                                      | 1 month                                                     | No data                                 | [150] |
| Ileum (1)                      | 68                | No data                                                                       | 3 weeks                                                     | 11 months                               | [151] |
| Intestine (1)                  | 75                | No data                                                                       | No data                                                     | alive                                   | [152] |
| Gallbladder (1)                | 78                | 4 months                                                                      | 2 months                                                    | alive                                   | [153] |
| Shoulder (1)                   | 68                | 8 months                                                                      | 2 weeks                                                     | alive                                   | [154] |
for women was the breast ($n = 81; 39.1\%$), followed by thyroid gland ($n = 39; 18.8\%$), and lungs ($n = 17; 8.2\%$). All cancer types mostly metastasized to the mandible with 334 cases (73.7\%), temporomandibular joint (TMJ), and condyle in 37 cases (8.1\%). The posterior mandible was involved more commonly than the anterior parts ($n = 130$ vs $n = 20$). Maxilla and palate were involved in 71 cases (15.7\%), among which anterior region was involved in 7 cases, and in 11 cases, the metastatic lesion developed bilaterally. In 11 cases (2.4\%), both the mandible and maxilla were involved. The presence of teeth was the most frequent finding. Metastasis to edentulous cases was found in only 7 cases. In 16 cases (3.5\%), the oral metastasis developed in a tooth extraction site. The metastatic tumors were distributed equally on the right and left sides. In 61 cases (13.4\%), the metastatic lesion was on the contralateral side of the primary tumor. In 68 cases (16.6\%), overlying soft tissue was also involved. Swelling, pain, and numbness were the most common clinical features.

### Table 2: A summary of oral metastasis in women

| Primary site (No. of patients) | Age range | The time intervals from primary tumor detection to diagnosis of an oral metastasis | Range of time duration of development of a metastatic lesion | The time intervals from diagnosis to death | References |
|-------------------------------|-----------|---------------------------------------------------------------------------------|-----------------------------------------------------------|------------------------------------------|------------|
| Breast (81)                   | 24-94     | 2 months-25 years                                                                | 1 week-3 years                                           | 1 week-3 years                          | [3,5,22,26-28,36,38,40,62,66,67,73,79,89,152-174] |
| Thyroid (34)                  | 9-83      | 6 months-15 years                                                                | 1 week-5 years                                           | 1-19 months                              | [3,5,26,28,36,70,175-189] |
| Lung (17)                     | 49-75     | 11 months-5 years                                                               | 3 weeks-3 years                                          | 2 weeks-1 year                           | [5,28,34,36,62,190-196] |
| Kidney (12)                   | 2-84      | 6 months-316 months                                                             | 3 weeks-4 months                                         | 2 weeks-22 months                        | [5,28,40,89,197-201] |
| Unknown (11)                  | 44-83     | 1-5 months                                                                        | 1-3 months                                              | 2 months-2 years                         | [28,36,40,66,202-204] |
| Liver (8)                     | 15-76     | 1-6 years                                                                         | 2 weeks-3 months                                         | 10 months-2 years                        | [39,205-209] |
| Uterus (7)                    | 19-75     | 9-28.5 months                                                                    | 1-2 months                                              | 3 months-3 years                         | [37-39,210-213] |
| Colon (5)                     | 29-70     | 1-49 months                                                                      | No data                                                 | 6-17 months                             | [28,37,73,214] |
| Adrenal Gland (5)             | 4 months-12 years                                                                 | No data                                                 | Alive                                    | [26,39,215,216] |
| Ovary (4)                     | 29-61     | 2 years                                                                          | 2-5 months                                              | 6 months                                | [37,217-219] |
| Endometrium (3)               | 45-71     | 1 month                                                                          | 1-2 months                                              | 6 months                                | [26,220,221] |
| Eye (2)                       | 3-61      | 1-7 years                                                                         | 1 month                                                 | 3-5 months                              | [79,114] |
| Bronchus (2)                  | 45-60     | 1-2 years                                                                         | No data                                                 | 17 months                               | [73] |
| Rectum (2)                    | 79        | 49 months                                                                         | 2 weeks                                                 | 1 month                                 | [222,223] |
| Stomach (2)                   | 51-58     | 10-12 months                                                                      | 2-3 months                                              | 1 year                                  | [224,225] |
| Cerebellum (2)                | 8         | 12-13 months                                                                      | No data                                                 | 1-6 months                              | [28,40] |
| Shoulder (1)                  | 31        | 3 years                                                                           | No data                                                 | 3 months                                | [226] |
| Skin (1)                      | 30        | 3 years                                                                           | 4 months                                                | 6 months                                | [227] |
| Rib (1)                       | 12        | 10 months                                                                         | No data                                                 | 2 months                                | [228] |
| Follopian tube (1)            | 44        | No data                                                                           | 2 months                                                | Alive                                   | [229] |
| Esophagus (1)                 | 67        | 5 years                                                                           | No data                                                 | No data                                 | [62] |
| Bone (1)                      | 27        | No data                                                                           | No data                                                 | 6 months                                | [26] |
| Brain (1)                     | 60        | 7 years                                                                           | 5 years                                                 | Alive                                   | [230] |
| Cervix (1)                    | 63        | 1 year                                                                            | No data                                                 | Alive                                   | [231] |
| Thigh (1)                     | 16        | No data                                                                           | No data                                                 | No data                                 | [3] |
| Urinary bladder (1)           | 29        | No data                                                                           | No data                                                 | No data                                 | [37] |
| Limb (1)                      | 36        | No data                                                                           | No data                                                 | No data                                 | [36] |

### Table 3: Comparison of the results with those of previous reviews

| Reference No. | Age (years) | Male/female ratio | Most common primary sites | Most common metastatic site (s) | Most common histologic tumor type | Oral metastasis as the first sign |
|---------------|-------------|-------------------|---------------------------|--------------------------------|----------------------------------|----------------------------------|
| Current Review| 53.4        | 1.2:1             | Breast                    | Mandible                       | Adenocarcinoma                   | 27.6%                            |
| 3             | 43          | 1:1.5             | Thyroid and prostate      | Equal involving of mandible and maxilla | Adenocarcinoma                   | 0                               |
| 26            | 60.5        | 4:11              | Breast                    | Mandible                       | Adenocarcinoma                   | 26.3%                            |
| 38            | 64.5        | 0.6:1             | Breast and lung           | Mandible                       | Adenocarcinoma                   | 0                               |
| 233           | 52          | Equal distribution| Breast and lung           | Mandible                       | Not mentioned                    | Not mentioned                    |
Discussion

Metastasis to the oral cavity is a rare event. Three main criteria have been suggested to diagnose a lesion as metastatic.\(^1\) The histopathological verification of the primary tumor,\(^2\) the unification of histological type of the metastatic tumor and primary tumor,\(^3\) the exclusion of the possibility of direct local spread from the primary tumor.\(^{232}\) A previous review showed that the number of the jaw bone metastasis was equal for men and women,\(^{233}\) however, the current review found a higher prevalence of metastases for males. In this review, the mean age of patients for both males and females were different from previous studies which was 45 years.\(^{4}\) In the present series, the most common primary sites for men were the lungs, liver, and prostate, and for women were the breasts, thyroid gland, and lungs. These findings are in disagreement with a previous review which indicated the lungs, prostate, kidneys, and liver as the most common primary sites in men, and the breasts, adrenal glands, genital organs (uterus, cervix, ovaries), and colorectal in women.\(^{234}\) In the present review, only 16 cases were from the female genital tract, which is in agreement with a previous report indicating the low incidence of bone metastasis from the female genital tract.\(^{235}\) Regarding the involved bone, the mandible was the most commonly affected bone, and condyle and TMJ were the least. Hematopoietically, active bone marrow is an attractive site of metastasis. Moreover, the vascular spaces are sinusoidal in nature, therefore, it is easy for cancer cells to penetrate.\(^{236}\) In addition, the bone marrow contains growth factors, which promote tumor cells proliferation and survival.\(^{237}\) Metastasis to TMJ is rare and mostly occurs in the final stage of a malignancy, which is associated with generalized skeletal metastases.\(^{238}\) Metastases to the condyle mostly originate from the breasts, uterus, rectum, and melanoma.\(^{239}\) The exact mechanism of the low incidence of metastatic lesions in the condyle is not well understood, however, might be due to the deficit of bone marrow and isolated blood supply which is derived from the maxillary artery and temporal artery.\(^{240}\) Maxillary involvement comprises nearly one-seventh of all metastatic tumors to the jawbones. This finding is in disagreement of the previous studies indicating involvement of the maxilla in one-fifth of all metastatic lesions to the jawbones.\(^3\) The early diagnosis of jawbone metastasis is more difficult than those of the soft tissues.\(^{241}\) The most common symptoms of jaw metastasis are anaesthesia and paraesthesia over the chin, lower lip, and submental area due to mental nerve involvement, which is called numb chin syndrome or mental nerve neuropathy.\(^{96,242}\) Numb chin or mental nerve neuropathy should always raise the possibility of a metastatic disease in the mandible, invasion of the tumor into the bone, and involvement of the inferior dental or mental nerves.\(^{10}\) The other common symptoms are pain, swelling, and loosening of teeth.\(^{243}\) Current review revealed anesthesia and paraesthesia in 90% of cases.

On the radiographic examination, metastatic lesions mostly appear as a radiolucent area with ill-defined borders. However, metastases from sites such as prostate present as a radiopaque or mixed radiopaque-radiolucent lesion.\(^{244}\) Bone metastases from thyroid carcinoma are mostly osteolytic, therefore, osteoblastic metastasis rarely occurs.\(^{245}\) In this review, majority of metastasis to the jaws appeared as an ill-defined and radiolucent area on the radiograph examination. In 7 cases, it looked like a mixed radiopaque-radiolucent lesion, in 9 cases it appeared as a radiopaque lesion, and in 1 case it had a ground glass appearance. In addition, there were 4 cases of thyroid cancer, and 5 cases of breast cancer metastasis that presented as a lytic lesion on the radiographic examination. According to a previous study, time interval between diagnosis of the primary tumor and the metastasis is 40 months.\(^{233}\) The prognosis of oral metastatic tumor is poor, and the mean survival rate after diagnosis is 6–7 months.\(^{245}\) The present review found that time interval between the diagnosis of the primary and metastasis can range from 1 week to 10 years, and the mean survival rate after diagnosis range from one week to 5 years, even though some patients were alive at the time of report. Metastasis to the oral cavity is usually found at the advanced stage of the disease, showing widespread nature of the disease. The site of primary tumor and degree of metastatic spread are the most important factors to predict prognosis and treatment planning.\(^{246}\) The metastatic lesion should be treated by radiation, chemotherapy, surgical resection, or a combination of these techniques. Palliative treatment helps in reducing the patient’s pain, size of tumor, and also preserves oral function.\(^{16}\)
CONCLUSION

In conclusion, the diagnosis of oral metastasis is a challenge to the clinicians. In addition, metastases to the jaw bones are rare and occur in the advanced stages of a malignancy. Although some of the previous reports were not available, this review collected and summarized all available data regarding oral jawbone metastasis. Understanding the characteristics of oral metastasis can help the clinician in early diagnosis. In addition, 27.6% of the cases of a metastatic lesion in the jawbones were the first indication of an undiscovered malignancy; hence, a careful examination of patients with jaw bone lesions is strongly suggested. Histopathological diagnosis of the origin of primary tumor has a crucial role in patient treatment, especially in cases of undiscovered primary malignancy. Dentists, as well as general physicians, should take into consideration the possible presence of jaw metastases in cases that present atypical symptoms, especially in patients with known malignant disease.

FINANCIAL SUPPORT AND SPONSORSHIP

Nil.

CONFLICTS OF INTEREST

There are no conflicts of interest.

REFERENCES

1. Zachariades N. Neoplasms metastatic to the mouth, jaws and surrounding tissues. J Craniomaxillofac Surg 1989;17:283-90.
2. Irani S. Metastasis to the oral soft tissues: A review of 412 cases. J Int Soc Prev Community Dent 2016;6:393-401.
3. Antunes AA, Antunes AP. Gnathic bone metastasis: A retrospective study of 10 cases. Braz J Otorhinolaryngol 2008;74:561-5.
4. Singh H, Kumar P, Narwan A, Kaur R. Possible pathogenetic mechanisms and overview of metastatic tumours to the oral cavity. Internet J Oncol 8.
5. Friedrich RE, Abadi M. Distant metastases and malignant cellular neoplasms encountered in the oral and maxillofacial region: Analysis of 92 patients treated at a single institution. Anticancer Res 2010;30:1843-8.
6. Kaugars GE, Svirsky JA. Lung malignancies metastatic to the oral cavity. Oral Surg Oral Med Oral Pathol 1981;51:179-86.
7. Shin SJ, Roh JL, Choi SH, Nam SY, Kim SY, Kim SB, et al. Metastatic carcinomas to the oral cavity and oropharynx. Korean J Pathol 2012;46:266-71.
8. Batson OV. The function of the vertebral veins and their role in the spread of metastases. 1940. Clin Orthop Relat Res 1995;4-9.
9. Menezes JD, Cappellari PF, Capelari MM, Goncalves PZ, Toledo GL, Toledo Filho JL, et al. Mandibular metastasis of adenocarcinoma from prostate cancer: Case report according to epidemiology and current therapeutic trends of the advanced prostate cancer. J Appl Oral Sci 2013;21:490-5.
10. Kumar GS, Manjunatha, BS. Metastatic tumors to the jaws and oral cavity. J Oral Maxillofac Pathol 2013;17:71-5.
11. Irani S. Distant metastasis from oral cancer: A review and molecular biologic aspects. J Int Soc Prev Community Dent 2016;6:265-71.
12. Noguti J, De Moura CF, De Jesus GP, Da Silva VH, Hossaka TA, Oshima CT, et al. Metastasis from oral cancer: An overview. Cancer Genomics Proteomics 2012;9:329-35.
13. Hirshberg A, Berger R, Allon I, Kaplan I. Metastatic tumors to the jaws and mouth. Head Neck Pathol 2014;8:463-74.
14. Irani S, Bidari-Zerehtpoush F, Sabeti S. Prevalence of Pathological Entities in Neck Masses: A Study of 1208 Consecutive Cases. Avicenna J Dent Res 2016;8:1-5.
15. Irani S. Pre-Cancerous Lesions in the Oral and Maxillofacial Region: A Literature Review with Special Focus on Etiopathogenesis. Iran J Pathol 2016;11:303-22.
16. Alok A, Singh ID, Singh S, Kishore M, Jha PC. Curcumin - Pharmacological Actions And its Role in Oral Submucous Fibrosis: A Review. J Clin Diagn Res 2015;9:Ze01-3.
17. Sari M, Serin GM, Inanli S, Kaya H. Condylar metastasis involving TMJ and TMJ dislocation presenting as the initial manifestation of squamous lung cancer. Oral Oncol Extra 2006;42:224-6.
18. Owen DG, Stelling CB. Condylar metastasis with initial presentation as TMJ syndrome. J Oral Med 1985;40:198-201.
19. You TK, Kim SR, Park HS, Jang KY, Moon WS, Chung MJ, et al. Fine needle aspiration cytology of metastatic adenocarcinoma of the gingiva from the lung: A case report. Korean J Pathol 2012;46:101-4.
20. Lopez-Jornet P, Garcia G, Camacho-Alonso F. Isolated gingival metastasis from lung carcinoma. N York State Dent J 2011;77:27-8.
21. Terakado N, Shintani S, Nakashiro K, Hamakawa H. Malignant pleural mesothelioma metastasis to the mandible. Int J Oral Maxillofac Surg 2004;33:798-800.
22. Pruckmayer M, Glaser C, Marosi C, Leitha T. Mandibular pain as the leading clinical symptom for metastatic disease: Nine cases and review of the literature. Ann Oncol 1998;9:559-64.
23. Selden HS, Manhoff DT, Hatges NA, Michel RC. Metastatic carcinoma to the mandible that mimicked pulpal/periodontal disease. J Endod 1998;24:267-70.
24. Marinella MA. Metastatic large cell lung cancer presenting with numb chin syndrome. Resp Med 1997;91:235-6.
25. Kerbel SM, Freedman PD. Metastatic mesothelioma of the oral cavity. Report of two cases. Oral Surg Oral Med Oral Pathol 1993;76:746-51.
26. Muttagi SS, Chaturvedi P, D’Cruz A, Kane S, Chaukar D, Pai F, et al. Metastatic tumors to the jaw bones: Retrospective analysis from an Indian tertiary referral center. Indian J Cancer 2011;48:234-9.
27. Zachariades N, Kounmourea F, Vairaktaris E, Mezitis M. Metastatic tumors to the jaws: A report of seven cases. J Oral Maxillofac Surg 1989;47:991-6.
28. Seoane J, Van der Waal I, Van der Waal RI, Cameselle-Teijeiro J, Anton I, Tardio A, et al. Non small-cell lung cancer with metastasis to the oral cavity. J Oral Med 2012;46:266-71.
29. Giugliano FM, Alberti D, Guida G, Palma GD, Iadanza L, Mornire M, et al. Non small-cell lung cancer with metastasis to thigh muscle and mandible: Two case reports. J Med Case Rep 2013;7:98.
30. Ciola B, Yesner R. Radiographic manifestations of a lung carcinoma with metastases to the anterior maxilla. Oral Surg Oral Med Oral Pathol 1977;44:811-6.
32. Katsnelson A, Tartakovskiy JV, Miloro M. Review of the literature for mandibular metastasis illustrated by a case of lung metastasis to the temporomandibular joint in an HIV-positive patient. J Oral Maxillofac Surg 2010;68:1960-4.

33. Bircan A BT, Kapucuolu N, Öztürk Ö. Small Cell Carcinoma of the Lung with Mandible Metastasis. Tur Toraks Der 2008;9:185-7.

34. Kruse AL, Luebbers HT, Obwegeser JA, Edelmann L, Graetz KW. Temporomandibular disorders associated with metastases to the temporomandibular joint: A review of the literature and 3 additional cases. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2010;110:e21-8.

35. Morini A, Manera V, Boninsegna C, Viola L, Orrico D. Mandibular drop resulting from bilateral metastatic trigeminal neuropathy as the presenting symptom of lung cancer. J Neurol 2000;247:647-9.

36. Abdul Jalil A, Lau SH. Metastatic Tumours of the Oral Cavity in Malaysians: A Retrospective Study (1967-2007) 2009;21:101-5.

37. Lim SY, Kim SA, Ahn SG, Kim HK, Kim SG, Hwang HK, et al. Metastatic tumours to the jaws and oral soft tissues: A retrospective analysis of 41 Korean patients. Int J Oral Maxillofac Surg 2006;35:412-5.

38. Bodner L, Sion-Vardy N, Geffen DB, Nash M. Metastatic tumors to the jaws: A report of eight new cases. Med Oral Patol Oral Cir Bucal 2006;11:E132-5.

39. Shen ML, Kang J, Wen YL, Ying WM, Yi J, Hua CG, et al. Metastatic tumors to the oral and maxillofacial region: A retrospective study of 19 cases in West China and review of the Chinese and English literature. J Oral Maxillofac Surg 2009;67:718-37.

40. van der Waal RI, Buter J, van der Waal I. Oral metastases: Report of 24 cases. Br J Oral Maxillofac Surg 2003;41:3-6.

41. Boniello R, Gasparini G, D’Amato G, Di Petritto A, Pelo S. TMJ metastasis: A unusual case report. Head Face Med 2008;4:8.

42. Muldoon CJ. A hepatocarcinoma with osseous metastases. J Laryngol Otol 1974;88:891-2.

43. Yu S, Estess A, Harris W, Dillon J. A rare occurrence of hepatocellular carcinoma metastasis to the mandible: Report of a case and review of the literature. J Oral Maxillofac Surg 2012;70:1219-23.

44. Wang AR, Paletta F, Banki M. A unique presentation of oral metastases from hepatocellular carcinoma. J Oral Maxillofac Surg 2013;71:1298-302.

45. Bair MJ, Lei WY, Chen CL. Electronic images of the month. An unusual presentation of hematemesis: A presentation of maxillary metastasis from hepatocellular carcinoma. Clin Gastroenterol Hepatol 2010;8:e61-2.

46. Miller ME, McCall AA, Juillard GF, Nadelman CM, Wang MB, Nabil V. Hepatocellular carcinoma metastatic to the mandible. Ear Nose Throat J 2013;92:E17-9.

47. Ocampo-Acosta F, Robledo J, Aldape-Barrios B, Garcia-Vazquez FJ. Clinico-pathologic conference: Case 4. Head Neck Pathol 2009;3:290-4.

48. Junquera L, Rodriguez-Recio C, Torre A, Sanchez-Mayoral J, Fresno MF. Hepatocellular carcinoma metastatic to the mandible: A case involving severe hemorrhage. Med Oral 2004;9:345-9.

49. Takinami S, Yahata H, Kanoshima A, Yamasaki M, Funaoaka K, Nakamura E, et al. Hepatocellular carcinoma metastatic to the mandible. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 1995;79:649-54.

50. Yoshimura Y, Matsuda S, Naitoh S. Hepatocellular carcinoma metastatic to the mandibular ramus and condyle: Report of a case and review of the literature. J Oral Maxillofac Surg 1997;55:297-306.

51. Mucitelli DR, Zuna RE, Archard HO. Hepatocellular carcinoma presenting as an oral cavity lesion. Oral Surg Oral Med Oral Pathol 1988;66:701-5.

52. Chin A, Liang TS, Borislow AJ. Initial presentation of hepatocellular carcinoma as a mandibular mass: Case report and review of the literature. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 1998;86:457-60.

53. Kamatani T, Tateto M, Tateishi Y, Yamamoto T. Isolated metastasis from hepatocellular carcinoma to the mandibular condyle with no evidence of any other metastases: A case report. Br J Oral Maxillofac Surg 2008;46:499-501.

54. Niedzielksa I, Langowska-Adamczyk H, Pajak J, Kajor M, Niedzielski Z, Golka D. Mandible metastasis of hepatocellular carcinoma. Wiadomosci lekarskie 2004;57:392-4.

55. Barrera-Franco JL, Flores-Flores G, Mosqueda-Taylor A. Mandibular metastasis as the first manifestation of hepatocellular carcinoma: Report of a case and review of the literature. J Oral Maxillofac Surg 1993;51:318-21.

56. Doyal DC KV, Kumaraswamy SV, Reddy BKM, Bapsy PP, Rama Rao C. Mandibular metastasis in hepatocellular carcinoma. Int J Oral Maxillofac Surg 1992;21:97-8.

57. Marker P, Clausen PP. Metastases to the mouth and jaws from hepatocellular carcinomas. A case report. Int J Oral Maxillofac Surg 1991;20:371-4.

58. Fujihara H, Chikazu D, Saijo H, Suenaga H, Mori Y, Iino M, et al. Metastasis of hepatocellular carcinoma into the mandible with radiographic findings mimicking a radicular cyst: A case report. J Endod 2010;36:1593-6.

59. Okada H, Kamino Y, Shimo M, Kitamura E, Katoh T, Nishimura H, et al. Metastatic hepatocellular carcinoma of the maxillary sinus: A rare autopsy case without lung metastasis and a review. Int J Oral Maxillofac Surg 2003;32:97-100.

60. Han L, Bhan R, Zak I, Husain M, Fung J, Vella S, et al. Metastatic hepatocellular carcinoma to the mandible masquerading as a parotid gland mass: A potential pitfall in the diagnosis by fine needle aspiration biopsy. Diagn Cytopathol 2007;35:674-6.

61. Newland JR, McClendon JL, Lynch DP. Metastatic neuroblastoma of the jaws. J Oral Maxillofac Surg 1985;43:549-53.

62. Jham BC, Salama AR, McClure SA, Ord RA. Metastatic tumors to the oral cavity: A clinical study of 18 cases. Head Neck Pathol 2011;5:355-8.

63. Pires FR, Sagarra R, Correa ME, Pereira CM, Vargas PA, Lopes MA. Oral metastasis of a hepatocellular carcinoma. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2004;97:359-68.

64. Daley TD, Minett CP, Driman DK, Darling MR. Oral metastatic hepatocellular carcinoma: A changing demographic in Europe and North America. Immunohistochemical advances in the microscopic diagnosis. Oral Oncol 2011;47:62-7.

65. Teshigawara K, Kakizaki S, Sohara N, Hashida T, Tomizawa Y, Sato K, et al. Immunohistochemical advances in the microscopic diagnosis of hepatocellular carcinoma: A changing demographic in Europe and North America. Immunohistochemical advances in the microscopic diagnosis. Oral Oncol 2011;47:62-7.

66. Teshigawara K, Kakizaki S, Sohara N, Hashida T, Tomizawa Y, Sato K, et al. Solitary mandibular metastasis as an initial manifestation of hepatocellular carcinoma. Acta Med Okayama 2006;60:243-7.

67. Murillo J, Bagan JV, Hens E, Diaz JM, Leopoldo M. Tumors metastasizing to the oral cavity: A study of 16 cases. J Oral Maxillofac Surg 2013;71:1545-51.

68. Li R, Wolvek RR, Nalesnik MA, Gamblin TC. Unresectable hepatocellular carcinoma with a solitary metastasis to the mandible. Am Surg 2008;74:346-9.

69. Afrozoe N, Soomro IN, Pervz S, Kayani N, Hashan SH. Well differentiated hepatocellular carcinoma metastasizing to jaw and oral cavity within six months of primary diagnosis. J Pak Med
Irani: Metastasis to the oral tissues

69. Greemstein A, Witherspoon R, Iqbal F, Coleman H. Metastatic Cellular carcinoma metastasis to the maxilla: A rare case. Aust Dent J 2013;58:373-5.

70. Tamiloakis D, Tsamis I, Thomaidis V, Lambropoulou M, Alexiadi G, Venizelos I, et al. Jaw bone metastases: Four cases. Acta Dermato-Venereol Alp Pannonica Adriat 2007;16:21-5.

71. Freudlsperger C, Kurth R, Werner MK, Hoffmann J, Reinitz S. Condylar metastasis from prostatic carcinoma mimicking temporomandibular disorder: A case report. Oral Maxillofac Surg 2012;16:79-82.

72. Takahashi G, Yonemura S, Matsuyama H, Nakahashia K. Mandibular metastasis as the first manifestation of prostate adenocarcinoma. J Oral Maxillofac Surg Med Pathol 2014;26:145-9.

73. Schwartz ML, Baredes S, Mignogna FV. Metastatic disease to the mandible. Laryngoscope 1988;98:270-3.

74. Soares EC, Costa FW, Rocha-Filho FD, Ferreira FV, Alves AP. Metastatic prostate adenocarcinoma associated with nuch synov syndrome. J Craniofac Surg 2011;22:2366-8.

75. Reyes Court D, Encina S, Levy I. Prostatic adenocarcinoma with mandibular metastatic lesion: Case report. Med Oral Patol Oral Cir Bucal 2007;12:E424-7.

76. Takahashia YS, Matsuyamaa H, Nakahashia K. Mandibular metastasis as the first manifestation of prostate adenocarcinoma. Case Report. J Oral Maxillofac Surg Med Pathol 2014;26:145-9.

77. Pontes HA, Pontes FS, Fonseca FP, Sena-Filho M, dos Santos Pinto D, Soares PT, et al. Prostate adenocarcinoma metastasis to the oral cavity. J Craniofac Surg 2014;25:723-5.

78. Eivazi Ziaei JFA, Estakhri R. Gingival Metastasis of Renal Cell Carcinoma. Iran J Cancer Prev 2011;4:144-7.

79. Bucin E, Andreasson L, Bjorlin G. Metastases to the mandible. J Oral Maxillofac Surg Med Pathol 2014;26:145-9.

80. Lewis DM. Metastasis to the oral cavity. J Okla Dent Assoc 2008;99:28-9.

81. Shinozaki Y, Ito H, Nakayama R, Noguchi T, Jinbu Y, Kusama M, et al. Metastatic Clear Cell Carcinoma of the Mandible in a Patient with Renal Cancer undergoing Haemodialysis. Asian J Oral Maxillofac Surg 2009;21:43-7.

82. Peacock ZS, Lam DK, Cox DP, Schmidt BL. Metastatic epithelioid hemangioendothelioma mimicking osteogenic sarcoma radiologically. Case report. J Oral Maxillofac Surg Med Pathol 2014;26:145-9.

83. Shinozaki Y, Ito H, Nakayama R, Noguchi T, Jinbu Y, Kusama M, et al. Metastatic Clear Cell Carcinoma of the Mandible in a Patient with Renal Cancer undergoing Haemodialysis. Asian J Oral Maxillofac Surg 2009;21:43-7.

84. Maschino F, Guillette J, Curien R, Dolivet G, Bravetti P. Oral metastasis: A report of 23 cases. Int J Oral Maxillofac Surg 2013;42:164-8.
Irani: Metastasis to the oral tissues

111. Kammerer PW, Shabazfar N, Palarie V, Kleis W, Al-Nawas B. Therapy and diagnosis of extrarectal malignant melanoma metastasizing to the jaw: Case report and literature review. J Oral Maxillofac Surg 2011;69:1229-34.

112. Rivera RD, Diamante M, Kasten SJ, Ward BB. Metastatic melanoma to the mandible: Case report and review of the literature. J Oral Maxillofac Surg 2010;68:2903-6.

113. Fenton CC, Nish IA, Carmichael RP, Sandor GK. Metastatic mandibular retinoblastoma in a child reconstructed with soft tissue matrix expansion grafting: A preliminary report. J Oral Maxillofac Surg 2007;65:229-33.

114. Perriman AO, Figures KH. Metastatic retinoblastoma of the mandible. Oral Surg Oral Med Oral Pathol 1978;45:741-8.

115. King DL, Shapiro SD, Beall JC. Metastatic retinoblastoma of the maxilla and mandible: Report of case. ASDC J Dent Child 1976;43:347-9.

116. Taguchi A, Suci Y, Ogawa I, Naito K, Nagasaki T, Lee K, et al. Metastatic retinoblastoma of the maxilla and mandible. Dentomaxillofac Radiol 2005:34:126-1.

117. Hefer T, Manor R, Zvi Joachims H, Groisman GM, Peled M, Gov-Ari E, et al. Metastatic follicular thyroid carcinoma to the maxilla. J Laryngol Otol 1998;112:69-72.

118. Nikitakis NG, Polymeri A, Polymeris A, Sklavounou A. Metastatic papillary thyroid carcinoma to the maxilla: Case report and literature review. Head Neck Pathol 2012;6:216-23.

119. Shah D, Shetty S, MacBean AD, Olsey SF. Numb chin syndrome: A metastatic deposit in the mandible. Dent Update 2010;37:244-6.

120. Bastian HL, Jensen EK, Jylling AM. Urachal carcinoma with metastasis to the maxilla: The first reported case. J Oral Pathol Med 2001;30:378-80.

121. Porter SR, Chaudhry Z, Griffiths MJ, Scully C, Kabala J, Whipp et al. E. Bilateral metastatic spread of testicular teratoma to mandibular condyles. Eur J Cancer B Oral Oncol 1992;38:27-9.

122. Franklin CD, Kunkler IH. Carcinoma of the male breast metastatic to the mandible. Clin Oncol 1992;4:62-3.

123. Gonzalez-Perez LM, Infante-Cossio P, Crespo-Torres S, Franklin CD, Kunkler IH. Carcinoma of the male breast metastatic to the mandible. Clin Oncol 1992;4:62-3.

124. Sahoo S, Alatassi H, Bernstein M, Slone SP, Chagpar AB. Breast carcinoma metastatic to ameloblastoma: A unique tumour-to-tumour metastasis. Histopathology 2007;50:815-7.

125. Choukas C, Toto PD, Choukas NC. Metastatic breast carcinoma mandible in gynecostasia gynecomastic. Case report. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2010;109:587-93.

126. Hoshino K, Mogi K, Negishi A, Nakasone Y, Takano A, Imai M. Mandibular Metastasis of a Bronchial Tumour. Asian J Oral Maxillofac Surg 2004;16:200-3.

127. Adler CI, Sotereanos GC, Valdivejos JG. Metastatic bronchogenic carcinoma to the maxilla: Report of case. J Oral Surg 1973;31:543-6.

128. Huang PH, Shyen YC, Sloan P, Ou KL, Hsia YJ, Devlin H. Nasopharyngeal carcinoma metastatic to the mandible. Open Dent J 2010;4:195-7.

129. Dayal PK, Patil S, Suvarna P, Srinivasan SV. Maxillary metastasis of osteosarcoma. Indian J Dent Res 1997;8:86-9.

130. Singh HB, Singh H, Chakraborty M. Metastatic osteosarcoma of the mandible. J Laryngol Otol 1978;92:619-22.

131. Smolka W, Brekenfeld C, Buchel P, Izzuza T. Metastatic adenocarcinoma of the temporomandibular joint from the cardia of the stomach: A case report. Int J Oral Maxillofac Surg 2004;33:713-5.

132. Nardi P, Ficarra G. Mandibular metastasis of angiosarcoma. A case report. Int J Oral Maxillofac Surg 1988;17:386-7.

133. Carl W. Tumor metastases to the oral cavity. Quintessence Int 1980;11:11-6.

134. Lee L, Maxymiw WG, Wood RE. Ameloblastic carcinoma of the maxilla metastatic to the mandible. Case report. J Cranio-maxillofac Surg 1990;18:247-50.

135. Samit AM, Falk HJ, Ohanian M, Leban SG, Mashberg A. Malignant melanoma metastatic to the mandible. J Oral Surg 1978;36:816-21.

136. Bayar GR, Gulses A, Sencimen M, Aydintug YS, Arpaci F, Gunhan O. Metastatic metastasis of the mediastinal germ cell tumor (yolk sac). J Craniofac Surg 2010;21:1828-30.

137. Vormittag L, Evrov B, Schopper C, Zielinski CC, Kornek G, Thurnher D. Unilateral face swelling as first manifestation of metastatic pancreatic cancer: Case report and review of the literature. Wien Klin Wochenschr 2008;120:693-6.

138. Delfino J, Wilson TK, Rainero DM. Metastatic adenocarcinoma from the colon to the mandible. J Oral Maxillofac Surg 1982;40:188-90.

139. Lutz JC, El-Bouiihi M, Vital N, Fricain JC, Robert M, Deminiere C, et al. Mandibular metastases from an ileum stromal tumor. Rev Stomatol Chir Maxillofac 2008;109:399-402.

140. Tanaka A, Sato S, Saito Y, Takano M, Tanaka T. Metastasis to the maxilla with metastasis to the mandible. Int J Oral Maxillofac Surg 2001;30:378-80.

141. Porter SR, Chaudhry Z, Griffiths MJ, Scully C, Kabala J, Whipp E. Bilateral metastatic spread of testicular teratoma to mandibular condyles. Eur J Cancer B Oral Oncol 1996;32b:359-61.

142. Fenton CC, Nish IA, Carmichael RP, Sandor GK. Metastatic mandibular retinoblastoma in a child reconstructed with soft tissue matrix expansion grafting: A preliminary report. J Oral Maxillofac Surg 2007;65:229-33.

143. Choukas C, Toto PD, Choukas NC. Metastatic breast carcinoma mandible in gynecostasia gynecomastic. Case report. Oral Surg Oral Med Oral Pathol 1993;76:757-9.

144. Cohen DM, Green JG, Diekmann SL, Howell RM, Harn SD. Maxillary metastasis of transitional cell carcinoma: Report of a case. Oral Surg Oral Med Oral Pathol 1989;67:185-9.

145. Hoshino K, Mogi K, Negishi A, Nakasone Y, Takano A, Imai M. Mandibular Metastasis of a Bronchial Tumour. Asian J Oral Maxillofac Surg 2004;16:200-3.

146. Delfino J, Wilson TK, Rainero DM. Metastatic adenocarcinoma from the colon to the mandible. J Oral Maxillofac Surg 1982;40:188-90.

147. Lutz JC, El-Bouiihi M, Vital N, Fricain JC, Robert M, Deminiere C, et al. Mandibular metastases from an ileum stromal tumor. Rev Stomatol Chir Maxillofac 2008;109:399-402.

148. Delfino J, Wilson TK, Rainero DM. Metastatic adenocarcinoma from the colon to the mandible. J Oral Maxillofac Surg 1982;40:188-90.

149. Ahmad S, Roberts GJ, Lucas VS, Barrett AW, Harkness W. Metastatic infiltration of the dental pulp by meluloblastoma. J Oral Pathol Med 2007;36:270-4.

150. McElderry J, McKenney JK, Stack BC. High-grade liposarcoma of the maxilla and mandible: Report of case. Oral Surg Oral Med Oral Pathol 1995;80:802-4.

151. Croxton RW, Christensen RE, Jr., Fish LR. Glomangiosarcoma with metastasis to the maxilla. Int J Oral Maxillofac Surg 1987;16:116-8.

152. Webster K. Adenocarcinoma metastatic to the mandibular condyle. J Cranio-maxillofac Surg 1988;16:230-2.
153. Garas G, Stacey-Clear A, Whitaker S, Collyer J. An atypical presentation of breast cancer metastasis. BMJ Case Rep 2009;2009.

154. Miles BA, Schwartz-Dabney C, Sinn DP, Kessler HP. Bilateral metastatic breast adenocarcinoma within the temporomandibular joint: A case report. J Oral Maxillofac Surg 2006;64:712-8.

155. Menezes AV, Lima MP, Mendonca JE, Hattier-Neto F, Kurita LM. Breast adenocarcinoma mimicking temporomandibular disorders: A case report. J Contemp Dent Pract 2008;9:100-6.

156. Zachariades N, Papanicolaou S. Breast cancer metastatic to the mandible. J Oral Maxillofac Surg 1982;40:813-8.

157. Bigelow NH, Walsh TS. Metastatic Carcinoma of the Mandible. Oral Surg Oral Med Oral Pathol 1956;9:1318-23.

158. Dib LL, Soares AL, Sandoval RL, Nammark U. Breast metastasis around dental implants: A case report. Clin Implant Dent Relat Res 2007;9:112-5.

159. Staton JB, Costello TH, Donovan FD, Laster RE. Cystosarcoma phyllodes metastatic to the mandible: Report of a rare case and literature review. Ear Nose Throat J 2003;82:380-1.

160. Qureshi SS, Navadgi S, Shet T, Mistry RC. Lobular adenocarcinoma of the breast metastatic to the mandible. J Postgrad Med 2006;52:236-7.

161. Tenzer JA, Rypins RD, Jakowitz JG. Malignant cystosarcoma phyllodes metastatic to the maxilla. J Oral Maxillofac Surg 1988;46:80-2.

162. Santaolalla F, Ereno C, Martinez A, Del Rey AS, Zabala A. Mandibular Metastasis of a Signet Ring Cell Carcinoma of the Breast in a Patient who Underwent Bilateral Mastectomy more than 25 Years Earlier. Breast Cancer 2009;4:192-4.

163. Eichhorn W, Wehrmann M, Blessmann M, Pohlenz P, Blake F, Schmelze R, et al. Metastases in odontogenic cysts: Literature review and case presentation. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2010;109:582-6.

164. Kechagias N, Nomouchtsis A, Patrikiodou A, Christoforidou B, Andreadis C, Vahtsevanos K. Metastasis of a ductal breast carcinoma to the buccal mucosa of the mandible with tooth involvement. Oral Maxillofac Surg 2012;16:377-81.

165. Mizukawa JH, Dolwick MF, Johnson RP, Miller RJ. Metastatic breast adenocarcinoma of the mandibular condyle: Report of case. J Oral Surg 1980;38:448-51.

166. Spott RJ. Metastatic breast carcinoma disguised as periapical disease in the maxilla. Oral Surg Oral Med Oral Pathol 1985;60:327-8.

167. Pouillas E, Melakopoulos I, Tosios K. Metastatic breast carcinoma in the mandible presenting as a periodontal abscess: A case report. J Med Case Rep 2011;5:265.

168. Khalili M, Mahboobi N, Shams J. Metastatic breast carcinoma initially diagnosed as pulpal/periapical disease: A case report. J Endod 2010;36:922-5.

169. Ogunten-Toller M, Metin M, Yildiz L. Metastatic breast carcinoma mimicking periodontal disease on radiographs. J Clin Periodontol 2002;29:269-71.

170. Bigelow NH, Walsh TS. Metastatic Carcinoma of the Mandible. Ann Surg 1953;137:138-40.

171. Blackwood HJ. Metastatic carcinoma of the mandibular condyle. Oral Surg Oral Med Oral Pathol 1956;9:1318-23.

172. Yoshimura Y, Inoue Y, Mihara Y, Miura H. Metastatic malignant cystosarcoma phyllodes. Report of a case presenting with an oral tumour and review of the literature. J Craniomaxillofac Surg 1991;19:227-31.

173. Orhan K, Bayndr H, Aksoy S, Seker BK, Berberoglu A, Ozan O. Numb chin syndrome as a manifestation of possible breast cancer metastasis around dental implants. J Craniofac Surg 2011;22:942-5.

174. Patricia A, Kaba SP, Trierveiler MM, Shinhoara EH. Osteoblastic metastasis from breast affecting the condyle misinterpreted as temporomandibular joint disorder. Indian J Cancer 2011;48:252-3.

175. Baker A, Hammersley N, Hislop S. Periapical metastasis. Br Dent J 1993;175:399-400.

176. Kim DW, Hah JH, An SY, Chang H, Kim KH. Follicular thyroid carcinoma presenting as bilateral cheek masses. Clin Exp Otorhinolaryngol 2013;6:55-2.

177. Araki M NS, Iwanari S, Sawada A, Matsumoto N, Honda K, Ohtki H, et al. Mandibular metastases from follicular carcinoma of the thyroid gland: A case report. Oral Radiol 2008;24:85-9.

178. Razieh Mostaan L, Irani S, Rajati M, Memar B. Mandibular metastasis from follicular thyroid carcinoma: A rare case after twelve years. Arch Iran Med 2013;16:557-9.

179. Yokoe H, Kasamatsu A, Ogoshi K, Ogawara K, Endo-Sakamoto Y, Ono K, et al. Mandibular metastasis from thyroid follicular carcinoma: A case report. Asian J Oral Maxillofac Surg 2010;22:208-11.

180. Bhadage CJ, Vaishampayan S, Umarji H. Mandibular metastasis in a patient with follicular carcinoma of thyroid. Contemp Clin Dent 2012;3:212-4.

181. Nishikawa H, Nakashiro K, Sumida T, Sugita A, Hamakawa H. Mandibular osteoblastic metastasis of poorly differentiated carcinoma of the thyroid gland. Int J Oral Maxillofac Surg 2010;39:301-4.

182. Anil S, Lal PM, Gill DS, Beena VT. Metastasis of thyroid carcinoma to the mandible. Case report. Aust Dent J 1999;44:56-7.

183. Narain BH. Metastatic carcinoma of maxilla secondary to primary follicular carcinoma of thyroid gland—a case report. Indian J Dent Res 2011;22:30-2.

184. Vishveshwariah PM, Mukunda A, Laxminarayana KK, Kasim K. Metastatic follicular thyroid carcinoma to the body of the mandible mimicking an odontogenic tumor. J Cancer Res Ther 2013;9:320-3.

185. Ismail SB, Abraham MT, Zaini ZB, Yaacob HB, Zain RB. Metastatic follicular thyroid carcinoma to the mandible: A case report. Cases J 2009;2:6533.

186. Passupula AP, Dorankula SP, Thokala MR, Kumar MP. Metastatic follicular thyroid carcinoma to the mandible. Indian J Dent Res 2012;23:843.

187. Vural E, Hanna E. Metastatic follicular thyroid carcinoma mimicking temporomandibular joint. J Oral Maxillofac Surg Med Pathol 2013;25:74-8.

188. Araki M NS, Iwanari S, Sawada A, Matsumoto N, Honda K, Ohtki H, et al. Mandibular metastases from follicular carcinoma of the thyroid gland: A case report. Oral Radiol 2008;24:85-9.

189. Razieh Mostaan L, Irani S, Rajati M, Memar B. Mandibular metastasis from follicular thyroid carcinoma: A rare case after twelve years. Arch Iran Med 2013;16:557-9.

190. Yokoe H, Kasamatsu A, Ogoshi K, Ogawara K, Endo-Sakamoto Y, Ono K, et al. Mandibular metastasis from thyroid follicular carcinoma: A case report. Asian J Oral Maxillofac Surg 2010;22:208-11.

191. Bhadage CJ, Vaishampayan S, Umarji H. Mandibular metastasis in a patient with follicular carcinoma of thyroid. Contemp Clin Dent 2012;3:212-4.

192. Nishikawa H, Nakashiro K, Sumida T, Sugita A, Hamakawa H. Mandibular osteoblastic metastasis of poorly differentiated carcinoma of the thyroid gland. Int J Oral Maxillofac Surg 2010;39:301-4.

193. Anil S, Lal PM, Gill DS, Beena VT. Metastasis of thyroid carcinoma to the mandible. Case report. Aust Dent J 1999;44:56-7.

194. Narain BH. Metastatic carcinoma of maxilla secondary to primary follicular carcinoma of thyroid gland—a case report. Indian J Dent Res 2011;22:30-2.

195. Vishveshwariah PM, Mukunda A, Laxminarayana KK, Kasim K. Metastatic follicular thyroid carcinoma to the body of the mandible mimicking an odontogenic tumor. J Cancer Res Ther 2013;9:320-3.

196. Ismail SB, Abraham MT, Zaini ZB, Yaacob HB, Zain RB. Metastatic follicular thyroid carcinoma to the mandible: A case report. Cases J 2009;2:6533.

197. Passupula AP, Dorankula SP, Thokala MR, Kumar MP. Metastatic follicular thyroid carcinoma to the mandible. Indian J Dent Res 2012;23:843.

198. Vural E, Hanna E. Metastatic follicular thyroid carcinoma to the mandible: A case report and review of the literature. Am J Otolaryngol 1998;19:198-202.

199. Ripp GA, Wendth AJ, Jr., Vitale P. Metastatic thyroid carcinoma of the mandible mimicking an arteriovenous malformation. J Oral Surg 1977;35:743-5.

200. Nishimura Y, Nakajima T, Yakata H, Kawasaki T, Fukushima M. Metastatic thyroid adenocarcinoma to the mandible: A case report with twelve years. Arch Oral Biol 2009;54:53-9.
Irani: Metastasis to the oral tissues

193. Pfammatter C, Lindenmuller IH, Lugli A, Filippi A, Kuhl S. Metastases and primary tumors around dental implants: A literature review and case report of peri-implant pulmonary metastasis. Quintessence Int 2012;43:563-70.

194. Salam NH, Jham BC, Papadimitriou JC, Scheper MA. Metastatic neuroendocrine carcinomas to the head and neck: Report of 4 cases and review of the literature. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2009;108:242-7.

195. Schulze D. Metastasis of a bronchial carcinoma in the left condylar process. Quintessence Int 2008;39:616.

196. Tatlidil R, Gouzubuyuk MM. Mucinous adenocarcinoma of lung presenting as oral metastases: A case report and literature review. J Endod 2011;37:110-3.

197. Jia J, Chen XM, Sun ZJ, Zhang WF. Mandibular metastasis of nephroblastoma: A rare case. Int J Oral Maxillofac Surg 2006;35:1160-1.

198. Huang SF, Wu RC, Chang JT, Chan SC, Liao CT, Chen IH, et al. Metastatic renal cell carcinoma presenting as oral metastases: A case report and literature review. J Oral Maxillofac Surg 1992;50:754-9.

199. KelleS M, Akarcay M, Kizilay A, Samdanci E. Metastatic renal cell carcinoma to the condyle of the mandible. J Craniofac Surg 2012;23:e302-3.

200. Pritchuk KM, Schiff BA, Newkirk KA, Krowiak E. Intractable bleeding from solitary mandibular metastasis of hepatocellular carcinoma. World J Gastroenterol 2009;15:A22.

201. Curtin J, Radden BG. Mandibular metastasis from a primary adrenal tumor. Clin Gastroenterol Hepatol 2009;7:A22.

202. Pires FR, Azevedo RS, Ficarra G, Cardoso AS, Carlos R, et al. Metastatic renal cell carcinoma metastatic to the oral cavity as a presenting sign: A case report and literature review. J Endod 2011;37:110-3.

203. Enokiya HS, Inoue T, Shibahara T, Shimono M. A rare case of mandibular metastasis of hepatocellular carcinoma: Autopsy, immunohistochemical, and ultrastructural examination with review literature. Oral Med Pathol 2008;12:33-48.

204. Huang SF, Wu RC, Chang JT, Chan SC, Liao CT, Chen IH, et al. Metastatic renal cell carcinoma to the condyle of the mandible. Int J Oral Maxillofac Surg 1992;50:754-9.

205. Pritchuk KM, Schiff BA, Newkirk KA, Krowiak E. Intractable bleeding from solitary mandibular metastasis of hepatocellular carcinoma. World J Gastroenterol 2009;15:A22.

206. Wang CL, Yacobi R, Pharoah M, Thorner P. Ewing's sarcoma: A case report. Oral Med Pathol Oral Radiol Endod 2010;109:e22-7.

207. Sasaki H, Ohara N, Minamikawa T, Umeda M, Komori T, Kojima N, et al. Gingival metastasis from ovarian mucinous cystadenocarcinoma as an initial manifestation (a rare case report). Kobe J Med Sci 2008;54:E174-82.

208. Deeb ZE. Metastatic renal cell carcinoma to the head and neck region. Oral Oncol Extra 2004;40:50-3.

209. Kelles M, Akarcay M, Kizilay A, Samdanci E. Metastatic renal cell carcinoma to the condyle of the mandible. J Craniofac Surg 2012;23:e302-3.

210. Puranik AD, Purandare NC, Dua S, Deodhar K, Shah S, Agrawal A, et al. Isolated mandibular condylar metastases: An uncommon manifestation of recurrent cervical cancer. J Cancer Res Ther 2013;9:108-10.

211. Galen DM. Mandibular metastasis of endometrial carcinoma diagnosed via a dental radiograph. J Am Dent Assoc 1998;129:1595-8.

212. HSu HC, Huang FY, Eng HL. Cheek mass as a presentation of metastatic rectal cancer. Chang Gung Med J 2002;25:345-8.

213. Roemer SM, Nicholas TR, Hirose FM. Metastatic chondrosarcoma to the maxilla: Review of the literature and report of case. J Oral Surg 1976;34:180-2.

214. Myall RW, Morton TH, Worthington P. Melanoma metastatic to the mandible. Report of a case. Int J Oral Surg 1983;12:33-6.

215. Wang CL, Yacobi R, Pharoah M, Thorner P. Ewing’s sarcoma: A case report. Oral Med Pathol Oral Radiol Endod 2010;109:e22-7.

216. Tatlidil R, Gozubuyuk MM. Mucinous adenocarcinoma of lung presenting as oral metastasis. Ann Plast Surg 1991;71:597-602.

217. Balibrea JL. Gingival metastasis as first sign of a rectal cancer. Coloproctology 1998;20:229-32.

218. Narayana Rao P, Reddy N, Reddy B, Raju V, Reddy R, Reddy R. Metastatic renal cell carcinoma presenting as a clear cell tumour in the head and neck region. Oral Oncol Extra 2004;40:50-3.

219. Jayasooriyan PR, Attygalle AM, Tilakaratne WM. Metastatic renal cell carcinoma presenting as oral metastases: A case report. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2010;109:e22-7.

220. Curtain JA, Flemming DK, Dane JN, Ang DB. Metastatic lesion of the anterior mandible with an occult primary: A case report. Spec Care Dentist 2006;26:76-80.

221. Pritschuk KM, Schiff BA, Newkirk KA, Krowiak E, Deeb ZE. Metastatic renal cell carcinoma to the head and neck. Laryngoscope 2002;112:1598-602.

222. Gomes AC, Neto PJ, de Oliveira e Silva ED, Savio E, Neto IC. Metastatic adenocarcinoma involving several bones of the body and the cranio-maxillofacial region: A case report. J Can Dent Assoc 2009;75:211-4.
Radiol Endod 2006;102:62-6.

233. Hirshberg A, Shnaiderman-Shapiro A, Kaplan I, Berger R. Metastatic tumours to the oral cavity - pathogenesis and analysis of 673 cases. Oral Oncol 2008;44:743-52.

234. Abdul-Karim FW, Kida M, Wentz WB, Carter JR, Sorensen K, Macfee M, et al. Bone metastasis from gynecologic carcinomas: A clinicopathologic study. Gynecol Oncol 1990;39:108-14.

235. Morgan JW, Adeoock KA, Donohue RE. Distribution of skeletal metastases in prostatic and lung cancer. Mechanisms of skeletal metastases. Urology 1990;36:31-4.

236. Chantrain CF, Feron O, Marbaix E, DeClerck YA. Bone marrow microenvironment and tumor progression. Cancer Microenvironment 2008;1:23-35.

237. Rubin MM, Jui V, Cozzi GM. Metastatic carcinoma of the mandibular condyle presenting as temporomandibular joint syndrome. J Oral Maxillofac Surg 1989;47:507-10.

238. Wolujewicz MA. Condylar metastasis from a carcinoma of the prostate gland. Br J Oral Surg 1980;18:175-82.

239. Voy ED, Fuchs M. Anatomical studies of the blood vessel structure in the temporomandibular joint area. Fortschr Kiefer Gesichtschir 1980;25:2-5.

240. Jones DC. Adenocarcinoma of the esophagus presenting as a mandibular metastasis. J Oral Maxillofac Surg 1989;47:504-7.

241. Marinella MA. Metastatic large cell lung cancer presenting with numb chin syndrome. Respir Med 1997;91:235-6.

242. Burt RK, Sharifman WH, Karp BL, Wilson WH. Mental neuropathy (numb chin syndrome). A harbinger of tumor progression or relapse. Cancer 1992;70:877-81.

243. McClure SA, Movahed R, Salama A, Ord RA. Maxillofacial metastases: A retrospective review of one institution’s 15-year experience. J Oral Maxillofac Surg 2013;71:178-88.

244. Ahuja S, Ernst H. Osteoblastic bone metastases in medullary thyroid carcinoma. Strahlenther Onkol 1991;167:549-52.

245. Chen HL, Chang WH, Shih SC, Pang KK, Bair MJ. Trismus and trigeminal neuralgia in one patient with colon cancer. J Natl Med Assoc 2008;100:740-2.

246. Sanchez Aniceto G, Garcia Penin A, de la Mata Pages R, Montalvo Moreno JJ. Tumors metastatic to the mandible: Analysis of nine cases and review of the literature. J Oral Maxillofac Surg 1990;48:246-51.