Original Article

Metastatic tumors in the jaw bones: A retrospective clinicopathological study of 12 cases at Tertiary Cancer Center

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Abstract

Introduction: The metastatic disease of the jaw bones is very uncommon and accounts for approximately 1% of all malignancies of jaw. The most common location is molar region of mandible. Metastasis may go undetected on a routine skeletal survey for assessment of metastasis and rarely includes jaw bones.

Aims and Objective: The aim of the study is to analyze primary malignancies in metastatic jaw tumors.

Materials and Methods: We retrospectively studied clinicopathological features of 12 patients of metastasis to jaw bones diagnosed at tertiary cancer center between 2003 and 2011. All H and E and immunohistochemical slides were reviewed by two pathologists and relevant details were noted.

Results: There were eight female and four male patients, with age range 12–71 years with metastases to jaws. All of them involved mandible with one case also showing the involvement of frontal sinuses. The types of metastatic tumors include adenocarcinoma (six cases), papillary thyroid carcinoma (four cases), carcinoma with neuroendocrine differentiation (one case) and neuroblastoma (one case). The diagnosis was made on biopsies in eight cases and on hemimandibulectomy in four cases. The primary site was known at the time of presentation only in four cases, all of them being thyroid carcinomas. Primary site was determined in seven cases after immunohistochemical workup on metastatic tumor and further investigations, whereas the primary site of carcinoma with neuroendocrine differentiation was unknown.

Conclusion: Metastasis to jaw bones is rare and may be the first manifestation of unknown primary. A lesion predominantly involving bone with unusual morphology should raise a possibility of metastasis.

Key Words: Jaw tumors, metastasis to jaws, oral cavity

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INTRODUCTION

The metastases from primary cancers are more often to the long bones, vertebrae and ribs. The metastases of malignant tumors to the jaw bones are very uncommon and account for approximately 1% of all malignancies of jaw.[1] The most common location is the molar region of mandible followed by the premolar area, angle-ramus, condyle and least common being coronoid process. Among metastases to oral cavity,

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jaw bones are common sites as compared to oral soft tissue.[1] The clinical presentation of metastatic tumors can be variable, which may lead to an erroneous diagnosis or may create a diagnostic dilemma. They may go undetected on routine skeletal survey for assessment of metastasis and rarely includes jaw bones. Nonetheless, metastatic disease should be considered in the differential diagnosis particularly when the patient presents with a history of a previous malignancy. Most of the information available on jaw bone metastasis is found in single case reports and only few large case series are published in the last 10 years.[2-6] Thus, the aim of this study was to describe the histopathological features of 12 cases of metastatic tumors to the jaw, seen in a single institution over a period of 10 years.

MATERIALS AND METHODS

In this retrospective study, the files and histopathological slides of 12 patients seen between 2003 and 2011 with metastatic lesions to the jaw were retrieved from the archives of Department of Pathology. Patients with primary tumors in the oral or the maxillofacial region with metastases to jaw bones were excluded from this study. All the H and E stained slides and immunohistochemical slides if available, were reviewed by two pathologists. Clinical features, including gender, age at diagnosis, site of the primary tumor and histopathological details were evaluated; however, presenting symptoms in some of the cases was not available, hence, have not been included in the study.

RESULTS

Out of 12 patients, eight were females and four were males, with age range 12–71 years. The mean age of presentation was 55 years. The primary site was identified in seven female patients. Most common primary site in females was thyroid (4/7, 57%) followed by breast (1/7, 14%), lung (1/7, 14%) and colon (1/7, 14%). Primary tumor site could not be traced back in one female patient who had metastatic carcinoma with neuroendocrine features. In three adult male patients primary tumor was from colorectal region in two cases and from lung in one case. Metastasis in one of the two cases of coloorectal carcinoma was initially suspected as osteogenic sarcoma before surgery. The primary site in one pediatric case was neuroblastoma [Figure 1]. Primary site was not known at the time of presentation in seven cases, and it was detected on further imaging workup, after diagnosis of metastatic disease. Thyroid primary was known in all four cases of metastatic papillary thyroid carcinoma at the time of diagnosis of metastatic disease.

The most common type of metastatic tumors included adenocarcinoma (6 cases, 50%), followed by papillary thyroid carcinoma (4 cases, 33%) [Figure 2], carcinoma with neuroendocrine differentiation and neuroblastoma comprised one case each (8%). All of them involved mandible with one case of metastatic neuroblastoma also showing the involvement of frontal sinuses. The demographic details of all the patients are shown in Table 1.

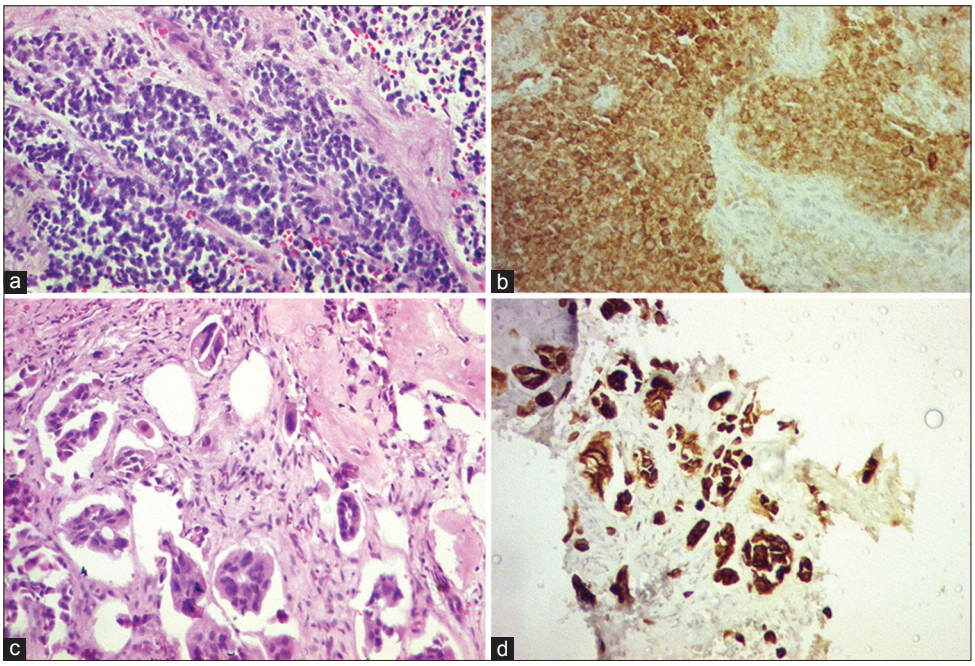

Figure 1: (a) Case 1: Neuroblastoma (H&E stain, ×40). (b) Case 1: Neuroblastoma sections stained with chromogranin (IHC stain, x100). (c) Case 5: Adenocarcinoma of the breast (H&E stain, ×100). (d) Case 5: CK 7 staining in adenocarcinoma, with primary in breast (IHC stain, x100)

Table 1: Demographic information of the patients and clinical data of the lesions

Case	Age	Sex	Procedure	Diagnosis	Primary site	Immunohistochemistry
1	12	Male	Biopsy	Neuroblastoma	Neuroblastoma	Chromogranin (+), NSE (+)
2	65	Male	Biopsy	Adenocarcinoma	Colorectum	CK20 (+), CK7 (−)
3	60	Female	Mandibulectomy	Papillary carcinoma	Thyroid	IHC not done##
4	71	Male	Biopsy	Adenocarcinoma	Lung	CK7 (+), TTF-1 (−), PSA (−)
5	60	Female	Biopsy	Adenocarcinoma	Breast	CK7 (+)
6	42	Female	Biopsy	Papillary carcinoma	Thyroid	TTF-1 (+), Tg (+), HBME-1 (+)
7	69	Female	Biopsy	Adenocarcinoma	Colon	IHC not done#
8	50	Female	Mandibulectomy	Papillary carcinoma	Thyroid	IHC not done##
9	59	Female	Biopsy	Adenocarcinoma	Lung	CK7 (+), CK20 (−), TTF-1(+)
10	46	Male	Mandibulectomy	Adenocarcinoma	Colorectum	CK (+), CK20 (+), CK7 (−)
11	70	Female	Biopsy	Carcinoma with neuroendocrine features	Unknown	EMA (+), CK (focal) Chromogranin (focal)
12	56	Female	Mandibulectomy	Papillary carcinoma	Thyroid	CK (focal), Tg (focal) CK7 (focal)

#Colonoscopy revealed primary in colon, ##Previous slides reviewed. IHC: Immunohistochemistry, NSE: Neuron-specific enolase, CK: Cytokeratin, TTF-1: Thyroid transcription factor-1, Tg: Thyroglobulin, HBME-1: Hector Battifora mesothelial-1, PSA: Prostate-specific antigen

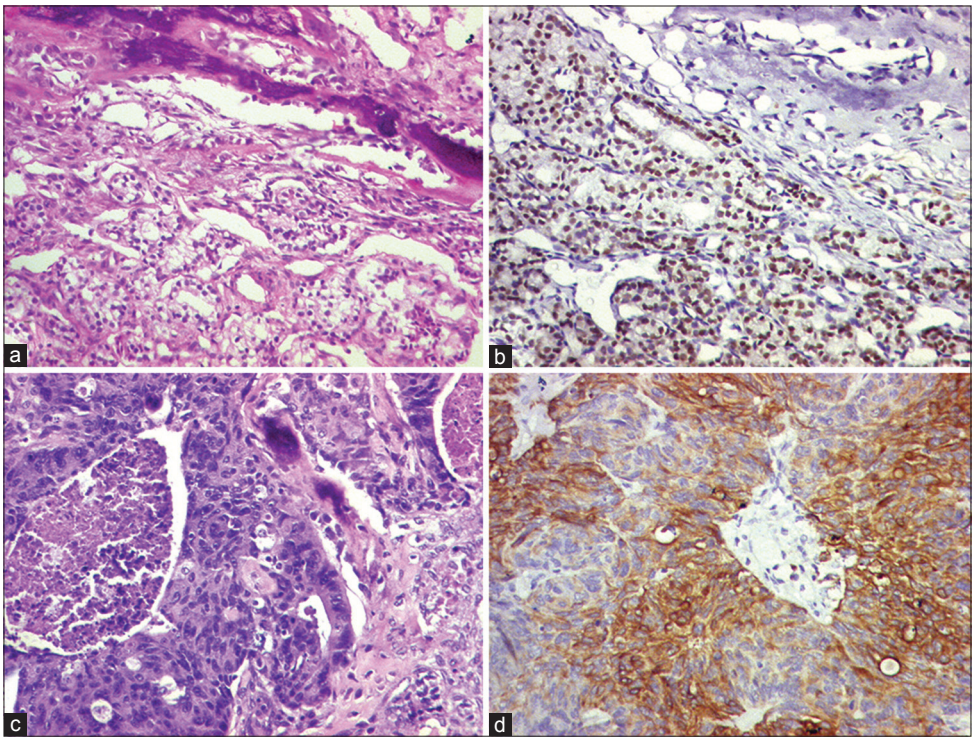

Figure 2: (a) Case 6: Papillary thyroid carcinoma (H&E stain, ×40). (b) Case 6: Thyroid transcription factor showing nuclear positivity in sections of papillary thyroid carcinoma that has metastasised to the mandible (IHC stain, x100). (c) Case 10: Colorectal adenocarcinoma (H&E stain, ×100). (d) TIF: Case 10 showing CK 20 positivity in colorectal adenocarcinoma (IHC stain, x100)

DISCUSSION

Metastasis is a consequence of complex biological cascade that begins with detachment of tumor cells from the primary tumor, spreading into the tissues, invading the lymphovascular structures followed by their survival in the circulation.[4,7]

It is estimated that 1% of all jaw tumors represent metastatic cancer.[1] A recent study by Thiele *et al*. have mentioned the incidence of distant metastasis accounting for 2.39% of all malignancies in the oral and craniomaxillofacial area, which is twice as high as previous published data; however, the authors could not identify specific reasons for such an increased incidence.[8]

In jaw bones, metastases are common in mandible (80–85%) followed by maxilla, but both are involved in 5% cases.[2,4,7,9] In this study, all cases showed mandibular involvement, however, in one case, frontal sinus was also involved in addition to the mandible. In a study by Antunes and Antunes, have described maxillary involvement in 50% cases, however, the authors did not comment on reasons for high incidence in the maxilla.[10]

An explanation for the mandibular predilection may be related to the larger amount of hematopoietic tissue having sinusoidal vascular spaces that provide easy access to tumor cells.[11] Furthermore, the pattern of blood supply to mandible compared to maxilla might be responsible for mandibular predilection.

All series consistently showed a significantly greater frequency of jaw metastases in patients over 50 years of age,[2,6,12] although scattered reports have shown involvement in children.[9,13] In this study, the mean age was 55 years (48.5 years in males and 58 years in females) including one child (12 years), this is also in accordance with studies done by earlier authors.

In this series, 67% of the patients were females and 33% were males with female to male ratio being 2:1. Most of the studies have mentioned similar kind of gender predilection.[2,4]

In the majority of studies, subjects had an undiagnosed primary cancer at the time the metastatic jaw disease presented; this study also supports the same finding. In their study, Hirshberg *et al*.[4,14] have mentioned that the most common site of origin of primary cancer in females is the breast, followed by the adrenal, colo-rectum, female genital organs and thyroid.For men, the primary site was the lung, followed by the prostate, kidney, bone and adrenal glands. D'Silva *et al*. have also mentioned that the most common primary in females is breast followed by the lung.[2] In this study, most common primary in female was thyroid followed by breast and in men, it was colorectum followed by the lung. There are few case reports of metastases from relatively uncommon sites such as esophagus and liver; however, we did not come across any metastasis from these sites in this study.[15,16]

According to most of the studies, the most common histological type of mandibular bone metastases from a variety of primary tumors was adenocarcinoma which is in agreement with the data from our series.

Metastases to the oral cavity are the first indication of an otherwise occult malignancy, in 29.4% of cases.[4] In our series, the metastatic lesion led to the diagnosis of the primary tumor in seven (64%) cases. In some instances, the primary tumor may remain occult, despite additional investigations as seen in one of our cases. In three of four cases of metastasis of papillary thyroid carcinoma, in which the primary was known, mandibulectomy had been performed as a part of therapy.

CONCLUSION

Metastasis to jaw bones is rare and may be the first manifestation of unknown primary. Diagnosis can be challenging for both clinician and pathologist. A lesion predominantly involving bone with unusual morphology should raise a possibility of metastases.

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Conflicts of interest
There are no conflicts of interest.

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