Case Report

Mandibular metastasis of follicular thyroid carcinoma: A case report along with the concise review of literature

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Abstract

Metastasis is one of the most common consequences of malignant tumors, and it is one of the leading causes of morbidity and mortality. Metastatic cancers to oral cavity are extremely rare. Moreover, the true incidence has yet to be determined. Despite their rarity, they are important clinically, since they can be the first and the only evidence of spread in many situations. Breast, kidney, lung, prostate and gastrointestinal tract are the most common sources of metastases in the oral cavity. Thyroid carcinoma is the most prevalent type of endocrine cancer, yet it rarely spreads to the oral cavity. After papillary thyroid carcinoma, follicular thyroid carcinoma is the second-most frequent kind of thyroid cancer. Jawbones are more commonly affected than soft tissues. Literature research revealed that till date, 44 cases of metastatic follicular thyroid cancer to the jawbones have been documented with mandibular preponderance (40 cases). With the rising occurrence of oral metastatic tumors in recent years, it has become increasingly important to diagnose them early to avoid future consequences. We present here an unusual case of metastatic follicular thyroid cancer in the mandible of an elderly adult along with a comprehensive review of the literature.

Keywords: Carcinoma, follicular, mandible, metastatic, thyroid

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INTRODUCTION

Cancer is a complicated disease in which several basic processes are disrupted, including cell proliferation, death and cell migration.[1] Metastasis is the transfer of malignant tumor cells from their main site of genesis to distant areas, resulting in their colonization.[2] It causes morbidity and eventually death.[3] Metastatic tumors in the oral cavity are extremely rare, accounting for only 1%–2% of all cancers.[4] The breast, lung, kidney, prostate and gastrointestinal tract (GIT) are the most common main sites, and it affects both men and women.[5] Thyroid cancer is the most prevalent type of cancer in the overall endocrine system, and follicular thyroid carcinoma (FTC) is the second-most common type.[6] It generally spreads to the lungs and bones, and rarely to the oral cavity.[7] The jaw bone is more commonly implicated in the oral cavity than the oral mucosa.[8] And the mandible is affected more frequently than the maxilla.[9] Literature search reveals that 40 cases of metastatic FTC to the mandible have been recorded till date [Table 1]. We present another unusual case of metastatic follicular thyroid cancer (FTC) to the mandible in an elderly male

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Table 1: Cases of follicular thyroid carcinoma metastasizing to jaw bone reported till date in the literature[#]

Author (year)	Age (in yrs.)/sex	Site	Clinical presentation	Time to metastasis	Treatment	Survival and follow up
McDaniel *et al*. (1971)[51]	77/female	Right mandible	Pain, swelling	First manifestation	Hemi mandibulectomy, parotidectomy	NED (4 years)
McDaniel *et al*. (1971)[51]	48/female	Left mandible	Pain, swelling	First manifestation	NA	NA
Al-Ani (1973)[52]	60/female	Right mandible	NR	First manifestation	NA	NA
Ripp *et al*. (1977)[53]	61/female	Right mandible	NR	First manifestation	Cobalt teletherapy	DOD (1 year)
Draper *et al*. (1979)[33]	NA/female	Mandible	Ulcerated oral lesion	NA	Radiotherapy	NA
Osguthorpe and Bratton (1982)[34]	53/male	Right mandible	Slowly enlarging vascular lesion	First manifestation	Hemi mandibulectomy	NED (3 years)
Nishimura *et al*. (1982)[54]	74/female	Right mandible	NR	First manifestation	Chemotherapy	Alive (4 months)
Parichatikanond *et al*. (1984)[55]	42/female	Left mandible	NR	First manifestation	Hemi mandibulectomy	NA
Tovi *et al*. (1984)[35]	33/male	Left mandible	Mimicking AV malformation	First manifestation	Radioactive Iodine therapy	Died of thyroid crisis (17 days)
Kahn and McCord (1989)[56]	82/female	Anterior mandible	Painful oral swelling	32 years	Radiotherapy, radioactive iodine therapy, resection	Died (NED 1.5 years)
Hefer (1998)[57]	58/male	Maxilla	Left hard palate pain	NA	Resection	NED (2 years)
Vural and Hanna (1998)[29]	64/female	Right mandible	Tender pre-auricular mass	First manifestation	Radical resection, radioactive iodine therapy	Alive (6 weeks)
Agarwal *et al*. (1998)[58]	45/female	Left mandible	Facial swelling	First manifestation	Hemi mandibulectomy	Alive (2 weeks)
Anil *et al*. (1999)[13]	61/female	Right mandible	Mandibular swelling	8 years	NA	NA
Ostrosky *et al*. (2003)[59]	72/male	Anterior mandible	Painful vascular lesion	First manifestation	Resection	NA
Kaveri *et al*. (2007)[60]	65/male	Left mandible	Painless swelling	First manifestation	NA	NA
Araki *et al*. (2008)[61]	55/male	Left mandible	Painless swelling	NA	NA	NA
Ismail *et al*. (2009)[9]	70/female	Left mandible	Pain, loose teeth	First manifestation	NA	NA
Algahtani *et al*. (2009)[31]	66/female	Left mandible	Pathological fracture	First manifestation	Segmental Mandibulectomy	NA
Kumar *et al*. (2010)[62]	58/female	Left mandible	Painless facial swelling	First manifestation	Segmental Mandibulectomy	NED (2 years)
Yokoe *et al*. (2010)[63]	71/female	Left mandible	Painless facial swelling	First manifestation	Segmental Mandibulectomy	NED (48 months)
Rohilla *et al*. (2011)[11]	55/female	Edentulous mandible	Pain and swelling in lower right face	2 years	Radiotherapy	Alive (6 months)
Narain and Batra (2011)[14]	62/female	Right maxilla	NA	15 years	NA	NA
Bhadage *et al*. (2012)[64]	40/female	Left mandible	Facial swelling	First manifestation	NA	NA
Pasupula *et al*. (2012)[20]	40/female	Left mandible	Painful swelling in left parotid region	First manifestation	Excision	NA
Kim *et al*. (2013)[7]	46/female	Bilateral mandible	Bilateral cheek swelling	First manifestation	Hemi mandibulectomy radioactive iodine therapy	NED (12 months)
Kotina *et al*. (2013)[15]	55/female	Left mandible	NA	15 years	NA	NA
Vishveshwaraiah *et al*. (2013)[23]	56/female	Right mandible	Painless swelling on right side of face mimicking odontogenic tumour associated with paraesthesia of lower lip	NA	NA	NA
Vazifeh mostaan *et al*. (2013)[4]	58/female	Right mandible	Swelling on right side of face	12 years	Segmental mandibulectomy	NA
Naveena AK *et al*. (2013)[65]	70/female	Left mandible	Painful swelling	First manifestation	NA	NA
Kumar *et al*. (2013)[22]	31/female	Right maxilla	Swelling in right upper back region and mobile teeth	First manifestation	Radioactive iodine therapy palliative chemotherapy	NED (7 years)
Lavanya *et al*. (2014)[66]	76/male	Left mandible	Painless mandibular swelling	First manifestation	NA	NA
Zandi *et al*. (2014)[38]	73/male	Right mandible	Painful swelling on right lower jaw along with deep pain neck	First manifestation	NA	NA
Kori *et al*. (2015)[5]	50/female	Left mandible	Painful swelling on left lower alveolus	First manifestation	Segmental mandibulectomy Radioactive iodine therapy	NED (1 year)
Al Sheddi MA *et al*. (2015)[36]	46/female	Left mandible	Painful swelling, mimicking odontogenic tumour	First manifestation	NA	NA

Contd...

Table 1: Contd...

Author (year)	Age (in yrs.)/sex	Site	Clinical presentation	Time to metastasis	Treatment	Survival and follow up
Kori *et al*. (2015)[5]	40/female	Left mandible, ramus, maxilla	Painless anterior neck swelling for 35 years and swelling over left lower jaw for 2 years, associated with pain	First manifestation	Radioactive iodine therapy	NA
Hartinie *et al*. (2015)[67]	41/female	Right mandible	Painless swelling of the right lower jaw	First manifestation	Segmental mandibulectomy, Radiotherapy	NED (6 months)
Krishnamurthy *et al*. (2016)[12]	52/male	Left mandible	Rapidly increasing painful swelling of the left lower jaw, loose teeth, ulceration	First manifestation	Hemi mandibulectomy radioactive iodine therapy	NED (14 months)
Saha *et al*. (2016)[37]	70/female	Right mandible	Painful swelling on right side of the jaw along with the history of shortness of breath for last 1 month	First manifestation	Thyroidectomy, radiotherapy	NED till date
Loureiro *et al*. (2017)[68]	54/female	Left mandible	Painless swelling in the left jaw	First manifestation	NA	DOD
Varadarajan *et al*. (2017)[69]	73/female	Left mandible	Numbness and swelling of left mandible	First manifestation	Segmental mandibulectomy radioactive iodine therapy	NED (18 months)
Dave PK *et al*. (2018)[70]	71/male	Left mandible	Swelling on left jaw, loose teeth	First manifestation	NA	NA
Sathyanarayanan *et al*. (2019)[16]	68/female	Left mandible, ramus, angel	Painful swelling on the left side of the face	1 year after thyroidectomy	Hemi mandibulectomy, Bridging of defect with miniplate therapy, postoperative radiotherapy	Infection developed after 8 months in the region of the plate and led to sinus formation
Jeon YT *et al*. (2019)[71]	67/female	Right mandible	Facial and gingival swelling on right side	First manifestation with history of previous FTC	Hemi mandibulectomy, total thyroidectomy	NED till date
Present case (2020)***	55/male	Right mandible	Painless swelling on the right lower jaw in relation to 44-47	First manifestation	Referred to oncologist	Follow up continued

AV: Arteriovenous, NA: Not available, FTC: Follicular thyroid carcinoma, NED: No evidence of death, NR: Not reported, DOD: Died of disease

patient along with the concise review of cases published in the literature till date.

CASE REPORT

A 55-year-old male patient reported with swelling on the right side of the body of the mandible for the past 4–5 months associated with no pain and no obvious cervical lymphadenopathy. Intra-oral examination showed the presence of swelling in the right mandibular region [Figure 1a]. The patient had given no relevant medical history. Serum thyroglobulin's (Tg) levels were markedly elevated with the value of 1423.00 ng/ml (normal value-1.6–60 ng/ml) while serum T3, T4 and TSH levels were within the normal range.

Radiographic images revealed an osteolytic lesion in the mandibular right 44 to 47 region, which was round to oval and uncorticated along with thinning of the lower border on the same side with intervening radiopaque septae in the radiolucency [Figure 2a]. Computerized tomography (CT) scan showed an expansile destructive bony lesion involving the body of the mandible in the region of 44 till 47. The tumor caused expansion and perforation of both buccal and lingual cortical plates resulting in bulging of the tumor mass [Figure 2b]. CT scan also showed one enlarged level I b lymph node.

Based on clinical and radiological findings, provisional diagnosis of Ameloblastoma and Central Giant Cell Granuloma (CGCG) was made.

Incisional biopsy [Figure 1b] was performed and tissue was sent for histopathological examination. Hematoxylin and eosin (H and E) stained histopathological section revealed the presence of well-developed duct-like structures and numerous round to oval follicles lined by a single layer of cuboidal to low columnar epithelial cells. The lumen of follicles contained eosinophilic colloid-like material [Figure 3a]. Follicles and colloid-like material also showed positivity with periodic acid Shiff (PAS) staining [Figure 3b]. Tumor cells in areas formed macrofollicular patterns along with microfollicles [Figure 4a and b]. The trabecular and solid patterns of follicles were also present in few areas with tumor cells exhibiting mild pleomorphism and hyperchromatism [Figure 5a and b]. Stromal hyalinization was also seen [Figure 6a and b]. Based on histopathological findings, diagnosis of metastatic FTC to mandible was made. Immunohistochemical analysis (IHC) revealed that the tumor cells were immunopositive for Tg, thyroid transcription factor-1 (TTF-1) and paired box gene 8 (Pax8) and immunonegative for S100 protein and Calretinin [Figure 7]. The patient was referred to an oncologist for further management. Before publishing this paper, the patient's consent was obtained.

A comprehensive review of the English literature was performed using PubMed, Medline, Embase and Scopus databases. Papers describing FTC as a metastatic lesion in the jawbones were selected including terms: "thyroid," "cancer," "thyroid carcinoma," "thyroid cancer," "Follicular," "Follicular thyroid carcinoma," "metastasis," "malignancy" with "oral cavity," "maxilla," and "mandible,". Reports involving metastasis to the soft tissues and other facial structures were excluded. Data were extracted and compiled in a table. Data points obtained from the literature review included authors names and year of publication, age of patients, gender, primary histological diagnosis, site of metastasis, clinical

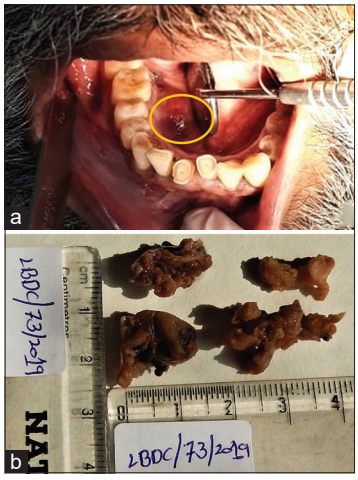

Figure 1: (a) Clinical photograph showing swelling in the posterior right-side lingual vestibule. (b) Photograph of gross incisional tissue

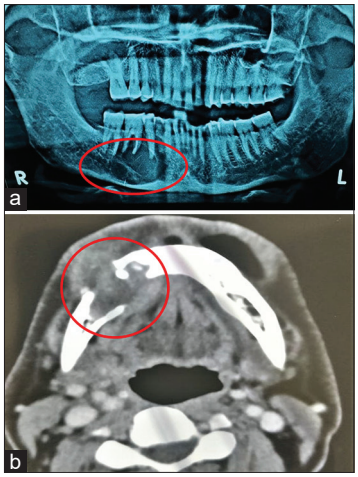

Figure 2: (a) Panoramic radiograph of patient showing a lytic lesion. (b) Computed tomography scan of the patient showing a lytic lesion with resorption of buccal and lingual cortical plates of the right-side posterior mandible

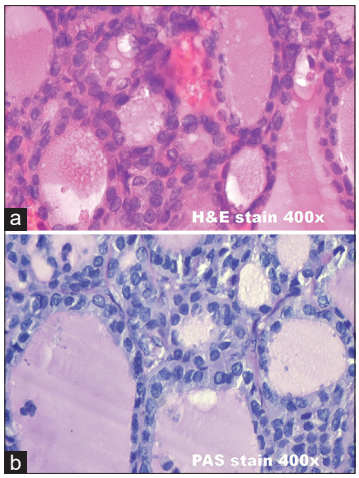

Figure 3: (a) Photomicrograph showing numerous round to oval follicles lined by a single layer of cuboidal to low columnar epithelial cells, containing eosinophilic colloid like material in the lumen (H&E stain, ×400) (b) photomicrograph showing colloid material to be weakly Pas positive (Per iodic Acid Schiff stain, ×400)

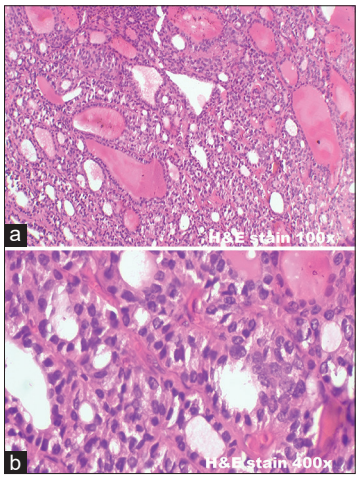

Figure 4: (a) Tumor cells forming macrofollicular and microfollicular pattern (H and E stain, ×100) (b) (H&E stain, ×400)

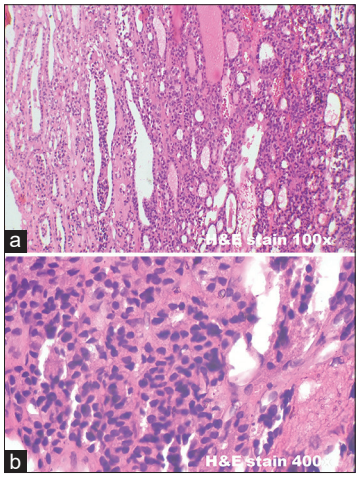

Figure 5: (a) Photomicrograph showing the trabecular and solid pattern of follicles with tumor cells exhibiting pleomorphism and hyperchromasia (H&E stain, 100x) (b) (H&E stain, ×400)

presentation, time to metastasis, treatment modality, survival outcome [Table 1].

DISCUSSION

Metastatic cancers to oral cavity are extremely rare and the true incidence is unknown.[4] According to the literature, these lesions account for only 1% of all oral cancers. They are frequently neglected in diagnosis due to their rarity for the following reasons: [10]

A. They are similar to squamous cell carcinoma, the most frequent malignant tumor of the jaw
B. The lesions are positioned in the center of the bone
C. Except in the most advanced stages, the patient has little subjective symptoms.

However, it is possible that the seeming rarity is due in part to a failure to diagnose metastatic malignancies in the jaws. Furthermore, because the jaws are not frequently inspected at autopsy, some abnormalities may be missed. As a result, the true incidence of metastatic cancers in the jaws may be higher.[11] These tumors, on the other hand, maybe of important clinical significance since, as in many cases, their presence may be the only symptom of an undiagnosed underlying malignancy or the first evidence of the recognized tumor's dissemination from its originating site.[12] Most of the cases, reported in the literature had oral metastasis as the first symptom of the disease. Anil *et al*. in 1999[13] documented a case with evidence of metastasis after 8 years, Rohilla *et al*. in 2011 provided a case with evidence of metastasis after 2 years,[11] Narain and Batra in 2011[14] and Kotina *et al*. in 2013[15] described a case with evidence of metastasis after 15 years. Vazifehmostaan *et al*. in 2013 described a case in which metastasis took 12 years.[4] After 1 year of thyroidectomy, evidence of metastases was found, according to Sathyanarayanan *et al*. in 2019.[16]

Breast, lung, kidney, prostate and GIT are the most common primary sites.[17,18] And the prevalence is different for both men and women.[11] Breast cancer is the most prevalent cause of metastatic oral cancer in women, whereas lung cancer, followed by prostate cancer, is the most common cause in men.[19] The most common site of metastasis to the oral soft tissues is the lung, while the most common site of metastatic cancers to the jawbones is the breast.[20]

Though thyroid cancer is the most frequent in the endocrine system,[21] it rarely spreads to the oral cavity.[22] Papillary, follicular, medullary and anaplastic thyroid carcinomas are its four histological variations.[23,24,11] While papillary and follicular variations are widely defined, readily curable, and

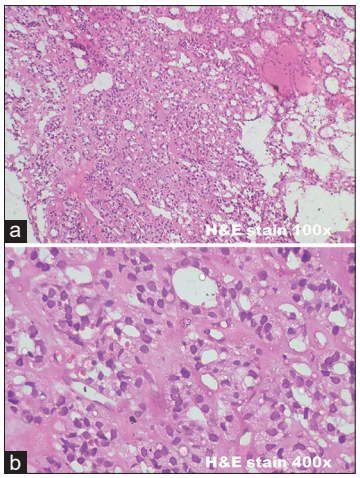

Figure 6: (a) Photomicrograph showing stromal hyalinization (H&E stain, ×100) (b) (H&E stain, ×400)

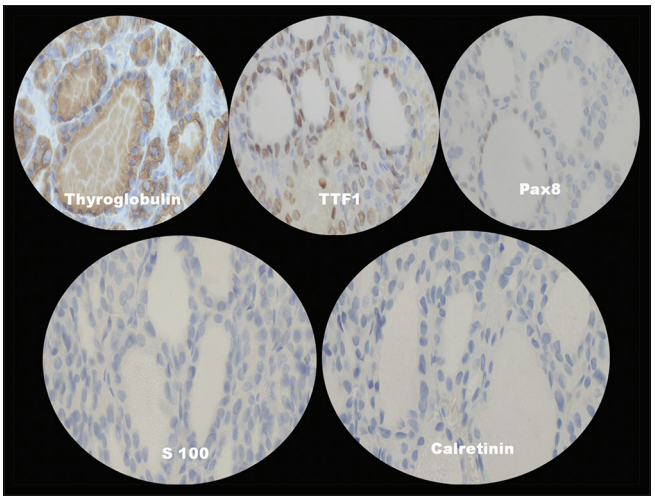

Figure 7: Immunopositivity for thyroglobulin, thyroid transcription factor-1 and Pax 8 and tumor cells are immunonegative for S100 and calretinin (×400)

usually have a favorable prognosis, FTC is more aggressive than papillary variant due to a mutation in the p21 Ras oncogene.[25,26] Distant metastases have been detected in 10%–15% of FTC patients. After the lungs, bone metastasis is the second most prevalent place.[27] The most common route of transmission is hematogenous, however, lymphatic spread is also preferable.[7]

Although the molecular basis for distant metastasis of thyroid cancer is unknown, current research suggests that embryonic processes involved in cell movements, such as epithelial to mesenchymal transition and collective cell motility, may be reactivated.[28]

The jaw bone is more commonly affected by these metastatic cancers than the oral mucosa.[8] The Mandible is more commonly affected than the maxilla in the jaw bone, with the body of the mandible, particularly the premolar-molar region, being the most commonly affected region.[9] This is due to the presence of rich red marrow and increased trapping of metastatic cells due to sluggish blood flow regulation in this region.[29] In addition, this marrow contains growth factors that may help some metastatic cancers colonize.[30] However, compared to other skeletal bones in the body, the jaw bone has a lower overall incidence of metastasis, which is likely due to the gradual replacement of red marrow by yellow or fatty marrow.[31] In our assessment of the literature, we found 44 cases with FTC metastasizing to the jaw bone. Out of them, 40 cases included the mandible, while just four cases involved the maxilla [Table 1]. It was discovered that the metastasis had primarily spread to one side of the jaw. Kim *et al*. in 2013 described one case in which the mandible was involved bilaterally.[7] The site of involvement in our case is also the mandible, which supports the same findings as shown in the numerous cases previously published, as shown in Table 1. FTC affects people in their forties and fifties, with a female predominance and a female: male ratio of 3.3:1.[24] There have been extremely few occurrences of FTC involving males in the published data. Out of 44 cases, 34 involved females and only 10 involved males [Table 1] and the average age of incidence was 58 years. This gender disparity could be attributable to the fact that males and females have distinct hormones. Infertility, irregular menstrual cycles, miscarriage, multiple pregnancies or live births, lactation suppressants, oral contraceptives and other non-contraceptives, and estrogens are all linked to an increased risk of thyroid cancer in women.[32] An unusual case of metastatic follicular carcinoma of the thyroid in an elderly man patient is presented in our case. Pain, swelling, loosening of teeth, and paresthesia are all common clinical signs in patients who are generally asymptomatic.[17] This tumor appears as a solitary nodule, a multinodular goiter or cervical lymphadenopathy at first.[23]

Mandibular metastasis can mimic other inflammatory conditions including periodontitis, periapical lesions or osteomyelitis, thus clinicians should be aware of these lesions. A primary oral soft -tissue malignancy with osseous invasion, as well as a second primary malignant mandibular bone lesion, should be examined with the appropriate medical history.[9]

Draper *et al*. in 1979[33] and Krishnamurthy *et al*. in 2016[12] both documented ulceration in their patients. A patient with a progressively growing vascular lesion was documented by Osguthorpe *et al*. in 1982.[34] In 1984, Tovi *et al*. described a lesion that looked like an AV malformation.[35] The growth, which resembled an odontogenic tumor, was described

by Al Sheddi *et al*. in 2015[36] and Vishveshwaraiah *et al*. in 2013.[13] In a case reported by Saha *et al*. in 2016, the patient also had shortness of breath for a month.[37] Another observation in the patient, according to Algahtani *et al*. in 2009, was pathological fracture.[31] Herein our case, the patient had no symptoms, no discomfort, no tooth loss or paraesthesia, and no visible cervical lymphadenopathy. FTC is occasionally associated with hoarseness of voice and neck pain,[23] but the majority of cases recorded in the literature indicated no such history, with the exception of Zandi *et al*. in 2014[38] and Kori *et al*. in 2015.[5] No such symptom was found in our case.

Fine-needle aspiration cytology, histology, X-ray, CT scan, magnetic resonance imaging, ultrasound, thyroid scan, serum thyroid profile and immunohistochemistry are all used to diagnose FTC. The histopathology of FTC might range from well differentiated to poorly differentiated. The microfollicular architecture is preserved in the well-differentiated tumor, which has follicles bordered with cuboidal cells containing an eosinophilic colloid-like substance. These characteristics of a well-differentiated tumor are associated with a favorable prognosis. Solid development, the absence of follicles, prominent nuclear atypia and substantial vascular and/or capsular invasion are all characteristics of poorly differentiated lesions, and these characteristics are linked to a worse prognosis.[23] Both follicular cells and colloid particles are stained positive with PAS.[39] In this case, radiographic examination revealed the involvement of the right mandible's body, as well as buccal and cortical plate expansion. When the clinical and radiographic findings were compared, the first provisional diagnosis made was either Ameloblastoma or CGCG. Because the findings matched the characteristics of these two lesions. However, based on the histological findings, Ameloblastoma was ruled out because there was no stellate reticulum between the follicles. And the lack of large cells indicated that the lesion was not CGCG. A final diagnosis of metastatic FTC was accorded since the histological picture in the present case showed the features of FTC. Tissue was sent for IHC examination to confirm our diagnosis. The pathologist employed a variety of markers to distinguish the lesion from other possible preliminary diagnoses. Tg, TTF-1, PAX8, Calretinin and S-100 were among them.

The most specific histogenetic markers for FTC are Tg, TTF-1 and PAX8. Other markers, include Galectin-3 (GAL-3), CD44, oncofetal fibronectin, telomerase, and high mobility group protein. RET/p56 rearrangement, have also been reported, but their efficacy has not been demonstrated.[40-42]

TTF-1 is a transcription factor that regulates thyroid-specific transcription of the Tg gene.[43] PAX8 is a transcription factor from the paired box (PAX) family that is expressed during thyroid gland organogenesis.[44] TTF-1 has shown to be expressed only in normal thyroid follicular cells and a few C cells in thyroid C-cell hyperplasia and thyroid neoplasms, including 100% of cases of FTC, according to studies.[40] PAX8 expression has been found mostly in thyroid and renal neoplasms, with a few cases in the bladder.[45] PAX8 expression in thyroid neoplasms was studied in several studies, with a positive rate of roughly 91%–100% in all FTCs. In our case, tumor cells showed immunopositivity with Tg, TTF-1 and PAX8 and immunonegativity with Calretinin and S-100.

Calretinin is a marker used to identify odontogenic tumors such as ameloblastoma and Keratocystic odontogenic tumor.[46] S-100 has been found to be immunopositive in cases of plexiform ameloblastoma, particularly in the stellate reticulum area, in numerous studies.[47] Because both markers were immunonegative in our case, it was a strong confirmation to rule out Ameloblastoma as a provisional diagnosis. Even though serum Tg levels are not diagnostic of clinical condition, they can rise as follicular cells grow, as in goiter and thyroiditis.[48] Serum Tg concentrations may rise dramatically in patients with a significant tumor burden, such as those with first distant metastases.[49] In our case, the same results were reported. Serum Tg levels were shown to be high in individuals with Metastatic FTC in many cases described in the literature.[50] In a patient with metastatic FTC to the mandible, Vishveshwaraiah *et al*. reported a serum Tg level of 480 ng/ml in 2013.[13] Thyroidectomy, radiation, chemotherapy, hemi mandibulectomy, resection and segmental mandibulectomy are all options for FTC treatment. Every case has a distinct survival rate, with the majority of cases displaying no signs of disease. Thyroid crisis kills a small percentage of patients, as shown in Table 1. A poor prognosis is linked to the existence of distant metastases. A 10-year survival rate of 27% has been observed for bone metastases of differentiated thyroid cancer. After 5 years, Brennan *et al*. found that 40% of patients with distant follicular metastases survived. Although oral cavity metastatic tumors are uncommon, early diagnosis of the metastatic disease improves overall survival and treatment outcomes.

CONCLUSION

Metastatic FTCs are critical because they might be the only indication of an undiagnosed underlying malignancy at a distant site, with metastatic lesions being the first or only clinical manifestation. The diagnosis of a metastatic lesion

in the oral region is difficult, both for the physician and the pathologist, due to its rarity. Recognizing that a lesion is metastatic and determining the site of metastatic spread is difficult. This case report adds to the growing list of rare examples of distant metastases of FTC to the mandible, emphasizing the importance of clinician attentiveness and knowledge while dealing with such situations.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient (s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initial s will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

Conflicts of interest

There are no conflicts of interest.

Abbreviations used

CGCG: Central Giant Cell Granuloma, CT: Computerized tomography, FTC: Follicular thyroid carcinoma, GIT: gastrointestinal tract, H-E: Hematoxylin and Eosin, IHC: Immunohistochemical analysis, PAS: Periodic acid shiff, Pax: Paired box gene, Tg: thyroglobulin, TTF-1: Thyroid transcription factor.

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