CASE REPORT – OPEN ACCESS

International Journal of Surgery Case Reports 37 (2017) 83–86

Contents lists available at ScienceDirect

International Journal of Surgery Case Reports

journal homepage: www.casereports.com

A rare presentation: A case report of osseous metaplasia and mature bone formation in a follicular adenoma of the thyroid

Nadia Aurora[a], Insia Hashmi[a], Subhasis Misra[b], Nail Aydin[b,*]

[a] Texas Tech University School of Medicine, Amarillo, TX, USA
[b] Surgical Oncologist, Department of Surgery, Texas Tech University School of Medicine, Amarillo, TX, USA

ARTICLE INFO

Article history:
Received 12 April 2017
Received in revised form 12 June 2017
Accepted 12 June 2017
Available online 17 June 2017

Keywords:
Osseous metaplasia
Mature bone formation
Follicular adenoma of thyroid
Case report

ABSTRACT

INTRODUCTION: Cases of multinodular goiter, thyroid hyperplasia, follicular adenoma, papillary thyroid carcinoma, and anaplastic thyroid carcinoma have been reported with histopathologic findings of osseous metaplasia (OM), bone marrow metaplasia (BMM), ectopic bone formation (EBF), ossification, and extramedullary hematopoiesis (EMH). To date no report of a follicular adenoma with OM and mature EBF in the absence of EMH has been reported in the English language.
PRESENTATION OF CASE: 63-year-old woman with an incidental finding of thyroid nodule unable to be biopsied. One area was found to contain OM with mature EBF and without vascular invasion. The surrounding tissue was unremarkable, and no malignancy was found.
DISCUSSION: Ectopic bone formation and osseous metaplasia in a thyroid nodule has an extensive differential diagnosis, from thyroid related pathologies to parathyroid causes, congenital syndromes, and hamartomas. A common theory amongst these is the role of basic fibroblast growth factor (bFGF) and bone morphogenetic protein-2 (BMP-2), signaling factors involved in cellular proliferation and growth.
CONCLUSION: This is the first case report of a follicular adenoma with OM and EBF in the absence of EMH. In this case, this adenoma was an incidental finding and the patient had no symptoms or accompanying laboratory abnormalities. Her benign presentation underscores the importance of awareness of the more common changes a thyroid nodule can undergo, such as hemorrhagic, cystic, and fibrotic changes, as well as the rarer changes of calcification with eventual ossification.

1. Introduction

Thyroid nodules are common amongst the general population, with estimates placing the prevalence up to 6% upon physical exam examination and palpation, and up to 85% on autopsy examination [1]. These nodules can undergo hemorrhagic, cystic, and fibrotic changes, and rarely will calcify or ossify. Cases of multinodular goiter, thyroid hyperplasia, follicular adenoma, papillary thyroid carcinoma, and anaplastic thyroid carcinoma have been reported with histopathologic findings of osseous metaplasia (OM), bone marrow metaplasia (BMM), ectopic bone formation (EBF), ossification, and extramedullary hematopoiesis (EMH) [2–11]. These cases are exceedingly rare. To date no report of a follicular adenoma with OM and mature EBF in the absence of EMH has been made in the English language. In line with SCARE criteria, we present a case of osseous metaplasia and mature bone formation in a follicular adenoma of the thyroid [20].

2. Case history

A 63-year-old woman was investigated after an incidental finding of a thyroid nodule on MRI done for cervical spondylitis. The nodule was not palpable on physical exam nor did she have compressive symptoms or abnormal values of TSH or free T4. She underwent thyroid ultrasound demonstrating a normal left lobe and a circumscribed hypoechoic nodule with internal echoes measuring 2.2 × 2.2 × 2.3 cm overlying the lower pole of the right lobe. Due to the significant calcification of the nodule, fine needle aspiration of the nodule was unsuccessful. The patient was referred to our academic surgical oncology clinic.

Her vitals were within normal physiological limits for her age. She was a daily smoker with more than 35 pack years. She did not have any previous radiation exposure to her head or neck. Her past medical history is significant for bilateral infiltrating ductal carcinoma of her breasts requiring chemotherapy, bilateral mastectomy, and reconstruction. The patient also had family history of lung can-

* Corresponding author at: Texas Tech University School of Medicine, Department of Surgery, Division of Surgical Oncology, 1400 S. Coulter St. Amarillo, TX 79106, USA.
E-mail addresses: nadia.aurora@ttuhsc.edu (N. Aurora), insia.hashmi@ttuhsc.edu (I. Hashmi), subhasis.misra@ttuhsc.edu (S. Misra), nail.aydin@ttuhsc.edu (N. Aydin).

http://dx.doi.org/10.1016/j.ijscr.2017.06.031

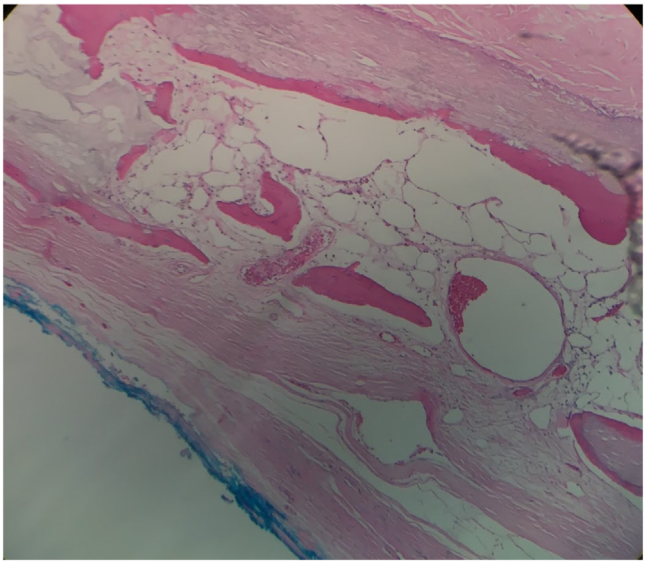

Fig. 1. area of lamellar bone and fatty infiltrate located adjacent to the calcified thyroid capsule. No evidence of megakaryocytes or other marrow elements.

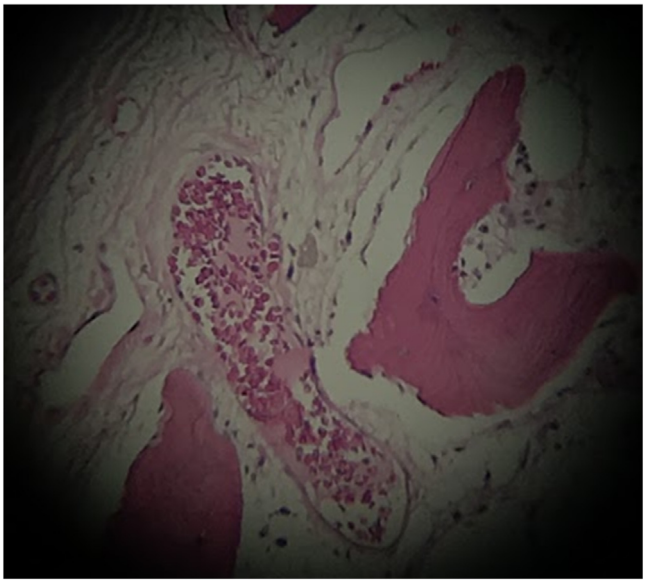

Fig. 2. Mature bone showing characteristic lamellar structure and lacunae.

cer and benign brain tumor, and denied family history of breast, ovarian, colon, or prostate cancer.

After failing the attempt to biopsy, the patient underwent right thyroid lobectomy under general anesthesia. The right thyroid lobe measured 14.5 g, 6.0 × 3.0 s 2.0 cm. The cut surface was tan-brown variegated revealing red-brown spongy parenchyma and a 2.8 × 2.5 × 1.6 cm nodule in the lower pole. The nodule itself was encapsulated by a thick, fibrotic, calcified capsule. Microscopic examination revealed the nodule to be a follicular adenoma. One area was found to contain OM with mature EBF and without vascular invasion (Figs. 1 and 2). The surrounding tissue was unremarkable, and no malignancy was found.

3. Discussion

This is the case first report of a follicular adenoma with OM and EBF in the absence of EMH. In this case, this adenoma was an incidental finding and the patient had no symptoms or accompanying laboratory abnormalities. Her benign presentation underscores the importance of awareness of the more common changes a thyroid nodule can undergo, such as hemorrhagic, cystic, and fibrotic changes, as well as the rarer changes of calcification with eventual ossification. A study of incidental thyroid nodules found that 20% of those identified on imaging required further workup, and only 2.3% of those requiring further evaluation were diagnosed with malignancy [12]. However, the strongest correlation of malignancy was presence of calcification, as was seen in this case during attempt to biopsy. The clinical significance of further workup upon identification of calcification is again substantiated by this case.

Ectopic bone formation and osseous metaplasia in a thyroid nodule has an extensive differential diagnosis, from thyroid related pathologies to parathyroid causes, congenital syndromes, and hamartomas. A common theory amongst these is the role of basic fibroblast growth factor (bFGF) and bone morphogenetic protein-2 (BMP-2), signaling factors involved in cellular proliferation and growth [11]. The pathophysiology of this is not quite understood, however a proposed explanation is increased BMP-2 (bone morphogenetic proteins) in calcified thyroid gland. BMP is a group of proteins that are found in demineralized bone and are associated with ectopic bone formation. These proteins initiate bone formation by inducing local ossification and synthesizing ground substance and collagen.

In this patient with an incidental finding of a thyroid nodule during an MRI done for cervical spondylitis, a malignant cause such as papillary thyroid cancer or congenital hamartomas is less likely given her clinical presentation. Nodular hyperplasia, follicular adenoma, and parathyroid related causes are reasonable alternatives due to the less aggressive nature of the disease. This case not only exemplifies a unique presentation, but also displays overlapping findings on histopathology addressing possible causes in both benign and malignant disease processes.

OM, EBF, EMH, and BMM have been reported in benign conditions such as nodular hyperplasia and follicular adenoma. Nodular hyperplasia has the most reported cases of findings of these pathologic processes [2–8]. The reported cases had varied combinations of these pathologic findings (see Table 1), with most suggesting the aid of bone morphogenic proteins (BMPs) in OM and EBF. These proteins play a vital role in bone formation, primarily in initiation of ossification. Follicular adenoma, as in this case, is another benign condition where OM and mature EBF can be found [9,10]. However, the case reports that identified this finding had concurrent EMH, which was absent in this case.

Cases of thyroid malignancy presenting with findings of ossification have also been published, but have not shown EBF [11]. Papillary thyroid carcinoma is the thyroid malignancy most commonly associated with ossification [12]. Mature bone formation is of higher suspicion in diagnoses of papillary thyroid carcinoma compared to other malignant or benign pathologies in the thyroid gland.

Hyperparathyroidism has been a cause of heterotopic ossification (HO) in many patients, especially those with CKD and spinal cord injury. Heterotopic ossification is defined as lamellar bone formation in soft tissues. In the study of HO in spinal cord injury, 12 of the 96 subjects developed HO.12 Nine of these 12 had secondary hyperparathyroidism, with levels ranging from 72 to 169 pg/mL. A proposed mechanism is that parathyroid hormone (PTH) enhances BMP activity in premature osteoblasts which can lead to HO [12,13]. A clinical review of literature done in 2013 states that twenty percent of spinal cord injuries exhibit HO afterwards. However, this HO usually affects the hip and knee joint [14].

Many congenital syndromes can show ossification of heterotopic structures. Fibrodysplasia ossificans progressiva is a rare congenital disorder that can cause heterotopic bone formation. Inflammation of soft tissues in injury throughout life can cause