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Case Report

An Extremely Rare Case of a Follicular Thyroid Cancer Metastasis to the Ovary: A Case Report

Zahra Aslam[1,*], Maya Uppal[2], Harpreet Uppal[1]

[1]Ear, Nose and Throat Surgery, University Hospitals of North Midlands NHS Trust, ST4 6QG Stoke-on-Trent, UK
[2]The University of Buckingham Medical School, MK18 1EG Buckingham, UK
*Correspondence: zj.aslam@gmail.com (Zahra Aslam)
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Abstract

Aims/Background: Follicular thyroid cancer (FTC) is a well-differentiated, low-risk cancer of the thyroid gland accounting for approximately 10–15% of all thyroid cancers. The only definitive management of FTC is surgery. Whilst distant metastasis can occur, spread to the ovaries is rare, with only two reported cases. Therefore, we present the third known case of a patient with a primary follicular thyroid cancer that developed ovarian metastases and review the current literature. **Case Presentation**: A 50-year-old female with a more than 10-year history of a multinodular goitre presented to the Ear, Nose and Throat Surgery, University Hospitals of North Midlands NHS Trust at a tertiary specialist centre with worsening compressive symptoms. A total thyroidectomy was performed and was histologically confirmed as a minimally invasive follicular thyroid cancer. She received radio-iodine ablation therapy. Unexpectedly, uptake was identified in the right ovary on a post-treatment (ablation) nuclear medicine (NM) thyroid I-131 scan and upon further imaging, a cyst was noted within the right ovary. **Results**: A bilateral salpingo-oophorectomy and hysterectomy were performed, which revealed a metastatic follicular thyroid carcinoma. Further post-op imaging was unremarkable, and the patient remains disease-free 18 months after her original thyroidectomy. **Conclusion**: Appropriate multidisciplinary team (MDT) discussion, as well as detailed imaging and biopsies if indicated, are paramount to obtaining an accurate diagnosis. Surgical resection and radioactive iodine treatment should be considered in appropriate cases in order to control local disease.

Keywords: thyroid cancer; follicular; adnexal disease; ovarian neoplasm; struma ovarii; endocrine

1. Introduction

Follicular thyroid cancer (FTC) is a well-differentiated cancer of the thyroid gland, accounting for 10–15% of all thyroid cancers. FTC is characterised by follicular cell differentiation, capsular and vascular invasion. It is considered a relatively low-risk thyroid cancer with high-risk markers being tumour size, capsular and vascular invasion, distant metastases, older age at presentation and male sex [1].

Biopsies cannot solely confirm diagnoses of FTC; therefore, surgery is definitively diagnostic and thus recommended [2].

Definitive management is related to risk and varies from simple lobectomy for local cancers to total thyroidectomy, thyroid stimulating hormone (TSH) suppression, radioactive iodine +/- subsequent excision of metastases for more extensive tumours [3].

Follicular thyroid metastases can occur, with an incidence of 6–20%—most commonly to bones and lungs [1]. Other sites of distant metastases have, however, been rarely reported on [4]. Ovarian metastases are commonly as a result of spread from a primary gastrointestinal (GI) tract tumour, or less so, a breast malignancy [5]. Ovarian metastases from an FTC primary are incredibly rare, with only two reported cases in the literature.

We therefore present the third known case of a patient with a primary follicular thyroid malignancy that developed ovarian metastases and review current literature regarding the above phenomenon, providing valuable insight into the metastatic nature of a commonly regarded low-risk thyroid cancer, considering the limited literature on this topic.

2. Case Report

A female in her 50's was referred to a tertiary Ear, Nose and Throat (ENT) centre with increasing compressive symptoms from a large, long-standing multi-nodular goitre (10-year-plus history). A computed tomography (CT) scan of the neck confirmed a large retrosternal goitre (Fig. 1). Ultrasound scan (USS) demonstrated multiple U2 nodules, including a large cystic nodule (Fig. 2). Blood tests confirmed normal thyroid hormone levels.

The patient was otherwise fit and healthy, had undergone menopause 2 years prior and had no significant past medical history. There was no documented family history of thyroid cancer. Clinical examination confirmed a large nodular goitre, and no enlarged neck nodes were palpated. The longstanding presence of the goitre and ultrasound imaging confirming U2 nodules suggested a benign multinodular goitre; there was no indication of malignancy. In view of increasing compressive symptoms, the patient

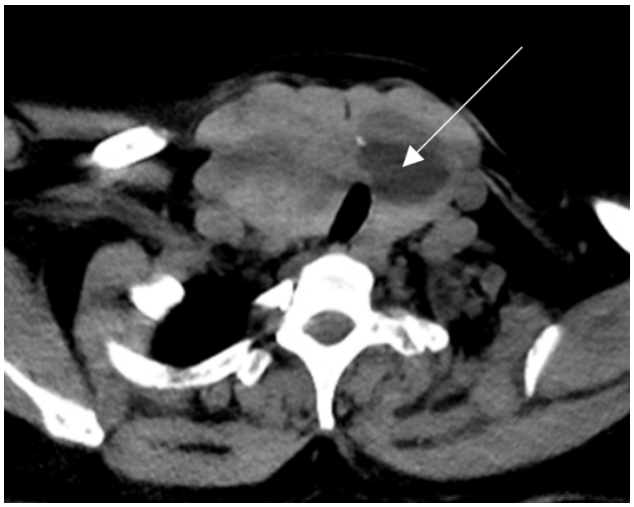

Fig. 1. Computed tomography (CT) neck. An axial slice of a CT neck showing a predominantly cystic nodule compressing the airway (arrow).

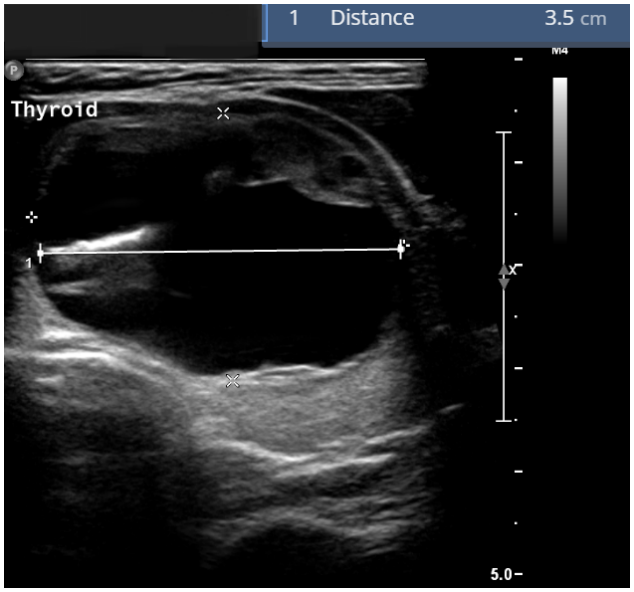

Fig. 2. Ultrasound scan. An ultrasound scan showing a predominantly cystic nodule of the thyroid lobe measuring 3.5 cm, involving a septum and minimal solid tissue along the wall of the nodule.

requested surgery. She subsequently underwent an elective total thyroidectomy.

Unexpectedly, histology identified a right-sided minimally invasive follicular carcinoma (pT3a pNX LV0 R0, maximal tumour diameter 6 cm). There were no high-risk features such as lymph node involvement, vascular invasion or aggressive pathological features and the tumour was completely excised. After discussion in the thyroid multidisciplinary team (MDT) meeting, she was offered postoperative radio iodine ablation 3 months post-surgery and thyroid stimulating hormone (TSH) suppression.

Her post-treatment radio iodine scan demonstrated expected uptake in the neck but also surprisingly uptake in the right ovary (Figs. 3,4). Magnetic resonance imaging (MRI) was requested, which revealed a well-defined unilocular cystic lesion with a small solid component identified in the right ovary (Fig. 5). A CT chest was unremarkable. In view of these unexpected findings, her case was referred to the gynaecology MDT (4 months after the post-treatment MRI).

In view of the patient's post-menopausal status and wishes, a total hysterectomy and bilateral salpingo-oophorectomy were performed (10 months after initial thyroidectomy) over a cystectomy alone with the aim of definitive local control and mitigating the risk of contralateral involvement, consistent with the patient's informed consent. Histology revealed a metastatic follicular thyroid carcinoma to the right ovary, benign endocervical and endometrial polyps and a benign leiomyoma. Fimbrial ends of the fallopian tubes were not identified.

With respect to the ovarian histology, this confirmed a cyst measuring 18 $\times$ 14 $\times$ 20 mm filled with yellow colloid-like material. It was lined with flattened to low cuboidal epithelial cells without cilia or mucin. There were no papillary nuclear features. The cells stained positively with AE1/AE3, cytokeratin 7 (CK7), thyroid transcription factor 1 (TTF1), paired box protein 8 (PAX8) and thyroglobulin in keeping with thyroid origin. Wilm's tumour 1 (WT1) was negative. There were no background struma ovarii or teratomatous components (Figs. 6,7). The morphological and immunohistochemical features were in keeping with a metastatic follicular carcinoma and confirmed that the lesion was distinct from a primary ovarian tumour and struma ovarii.

The patient's thyroglobulin and anti-thyroglobulin antibody levels were not elevated. Cancer antigen 125 (CA125) blood tests were not measured.

Following her gynaecological surgery, a further iodine uptake scan was performed, which confirmed normal physiological uptake of iodine within the body. A positron emission tomography (PET) scan was also requested, which did not reveal any sinister findings.

Longterm follow up consisted of clinical examination in the clinic alongside blood tests for TSH, T4, T3 and thyroglobulin at 6-monthly intervals initially.

The patient remains under surveillance and remains disease-free 18 months after her original thyroidectomy.

The Care Checklist has been attached as **Supplementary Material** associated with this article.

3. Discussion

Corrado et al. (2014) [6] published a detailed report reviewing the literature between 1929 and 2013. They were only able to identify 5 reported cases of metastatic spread from thyroid cancers to the ovaries, 4 of which were papillary thyroid cancer, but only 1 case was of follicular thyroid

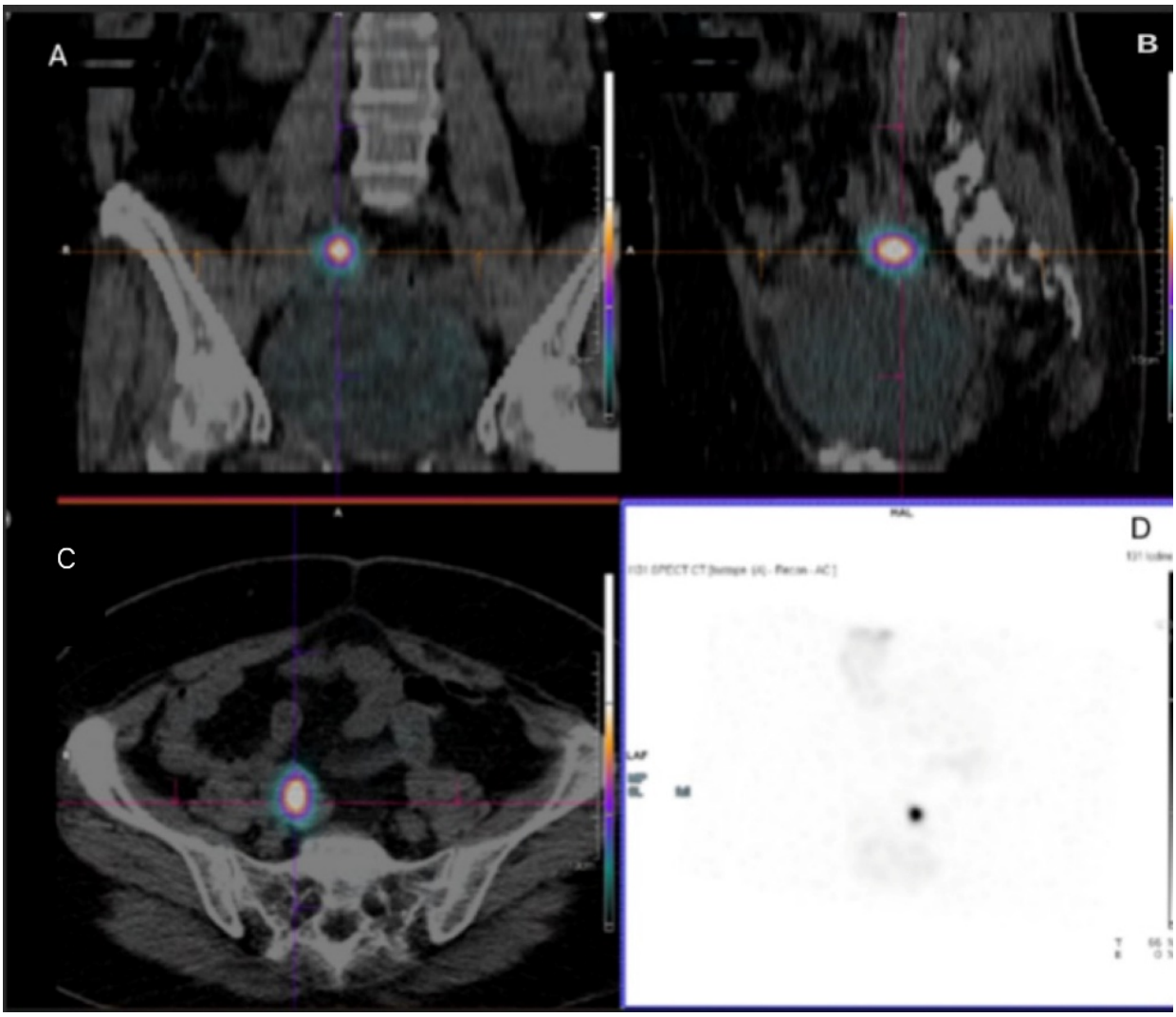

Fig. 3. Single-photon emission computed tomography/computed tomography (SPECT/CT) pelvis. Images showing a marked increase in focal I-131 uptake in a right adnexal lesion. (A) Coronal view. (B) Sagittal view. (C) Axial view. (D) Whole body view.

cancer (the same case reported by Young et al. [7]). These were the only cases comprehensively reported, and all represented well-differentiated thyroid cancers. Ten other historical cases were mentioned and included metastases from anaplastic and medullary thyroid cancers (mainly autopsy studies). No further information about these cases were available.

Unfortunately, this lack of information remains a limitation of our report however by detailing this case, we are able to add to the current evidence base, enabling more awareness of the possibility of ovarian metastasis from a follicular thyroid cancer.

Young et al. [7] described a case of an ovarian metastasis from a primary follicular carcinoma of the thyroid that was treated 12 years prior. The ovarian metastasis was discovered 6 months after a cerebral metastasis was excised. Unfortunately, the patient quickly succumbed to widespread metastatic disease.

Recently, Tejedo-Flors et al. [8] published a report of a follicular thyroid cancer (FTC) metastasising to the ovary. They describe a 29-year-old patient who underwent a staged total thyroidectomy for a FTC followed by radioactive iodine (RAI) treatment. The post-therapy whole body scan showed increased activity in the cervical lymph nodes. Fluorodeoxyglucose positron emission tomography and computed tomography (FDG PET-CT) scan confirmed metastases in the cervical neck nodes as well as pulmonary nodules and an adnexal mass. A subsequent oophorectomy confirmed a metastatic FTC with no features of teratoma. She received a second dose of RAI, and the post-therapy scan showed no change in the cervical or pulmonary nodules and no pelvic uptake. Both described cases had multiple sites for metastasis, unlike our case, which had only one site (ovary).

All other cases that were identified within our search were due to struma ovarii—a benign ovarian teratoma in which thyroid tissue is the predominant tissue found within

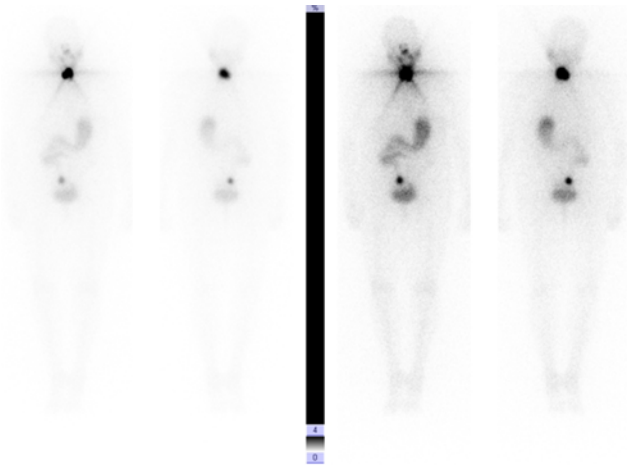

Fig. 4. Nuclear medicine (NM) planar images. Regional planar images of NM thyroid scan post I-131 therapy showing intense multifocal uptake within the thyroid remnant and right adnexal lesion.

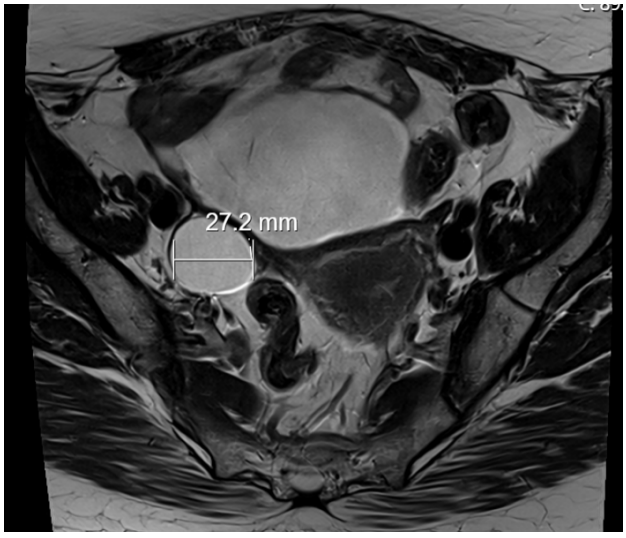

Fig. 5. Magnetic resonance imaging (MRI) pelvis. An axial T2-weighted MRI image of the pelvis showing a 27.2 mm diameter (predominantly water signal) right ovarian cyst.

the tumour. These thyroid-filled teratomas are not as a result of metastatic spread from the thyroid, but exist as the primary tumour themselves. Whilst they can undergo malignant change, there is no evidence of a primary thyroid malignancy as the thyroid gland itself is not involved. It is therefore vital that these follicular thyroid cancers metastasizing to the ovary are distinguished from cases of struma ovarii.

Detailed whole-body imaging with biopsies as appropriate and thyroglobulin estimations are mandatory as well as MDT discussion. Unfortunately, there is a paucity of literature recommending the optimum treatment for these cases. However, treatment in the form of surgical resection and post-operative radioactive iodine treatment could

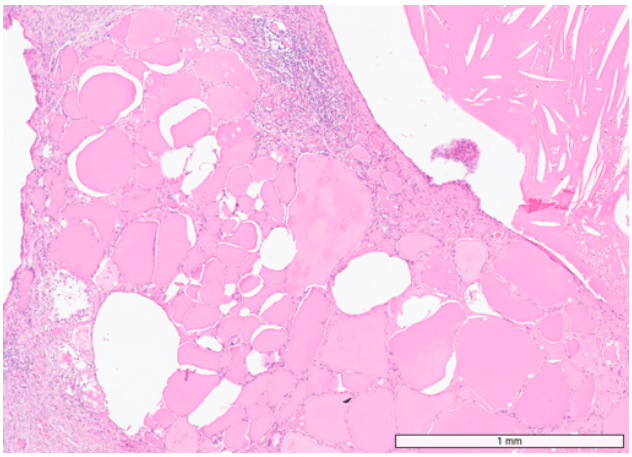

Fig. 6. Ovarian metastasis haematoxylin and eosin stain. Low-medium power haematoxylin and eosin staining of the ovarian metastasis showing a mixture of small and large, well-formed thyroid follicles containing colloid (×30).

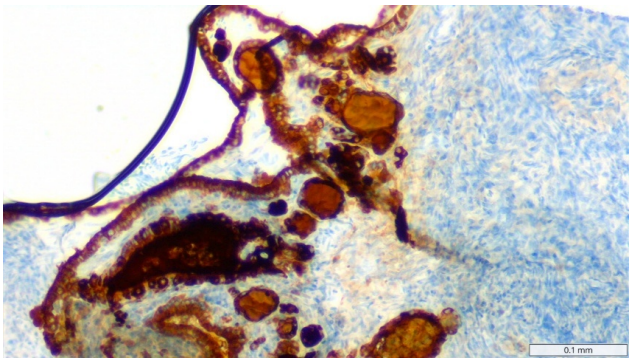

Fig. 7. Ovarian metastasis thyroglobulin stain. Thyroglobulin immunohistochemistry of the ovarian metastasis showing positive cytoplasmic staining of the cells and colloid (×100).

be considered in selected cases in order to manage local disease.

4. Conclusion

Follicular thyroid cancer metastasis to the ovary is an extremely rare occurrence with only a handful of cases reported in the literature. The case report highlights the presentation and management of this highly unusual entity and underpins the importance of differentiating a primary thyroid cancer metastasis from a struma ovarii. Despite the paucity of evidence on the management of these extremely rare entities, enbloc excision of lesions followed by radioactive iodine treatment should be considered for local control in appropriate cases.

Learning Points

• In cases of suspicious ovarian lesions in patients with a history of follicular thyroid cancer, metastatic spread should be considered.

• Diagnostic challenges may arise from distinguishing struma ovarii from ovarian follicular thyroid cancer metastasis.

• Expert review of histology, whole body imaging and MDT discussion is paramount in determining the best treatment options.

• Whilst ovarian metastases from follicular thyroid carcinomas are extremely rare, surgery and postoperative radioactive iodine treatment can be considered in order for local control and therefore such patients should be counselled appropriately.

Availability of Data and Materials

All the data of this study are included in this article.

Author Contributions

MU, ZA and HU designed the work. MU performed the literature search and review. ZA wrote the article, including obtaining images. HU was responsible for revising the manuscript. All authors contributed to the important editorial changes in the manuscript. All authors read and approved the final manuscript. All authors have participated sufficiently in the work and agreed to be accountable for all aspects of the work.

Ethics Approval and Consent to Participate

This case report was conducted in accordance with the Declaration of Helsinki. Written informed consent was obtained from the patient for publication of anonymized medical data.

Acknowledgment

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Conflicts of Interest

The authors declare no conflicts of interest.

Supplementary Material

Supplementary material associated with this article can be found, in the online version, at https://doi.org/10.31083/BJHM55372.

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