

• CASE PRESENTATION •

Incidental aortic metastasis from papillary thyroid adenocarcinoma: a case report from Medical-Legal Directorate (MLD) in Iraq

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ABSTRACT

In patients with cardiovascular events, such as myocardial infarction or aortic dissection, without known risk factors for cardiovascular diseases, the neoplastic disease should be considered a differential diagnosis. This report presents a case of a 65-year-old woman without a known history of cardiovascular diseases or cancer, referred to the Medico-Legal Directorate for postmortem examination to disclose the cause of sudden death. On gross and microscopic examinations, including immunohistochemical staining, she was discovered to have a rupture aortic aneurysm secondary to metastatic papillary adenocarcinoma of the thyroid gland. This case illustrates the value of autopsy in unexpected death..

Key words: Autopsy, incidental, aorta dissection, cardiovascular complication, cardiovascular disease, thyroid cancer, ruptured aortic aneurysm.

INTRODUCTION

Primary and secondary malignancies of the aorta are very rare conditions. Primary tumours mainly involve the intimal wall of the aorta, in which sarcoma is the tumour of the aorta detected most often.¹ Secondary tumours involve the aorta through the adventitia, either by continuity or through secondary infiltration from lymph node metastases, and very rarely through the vasa vasorum of the aorta.

Only a few cases of secondary aortic neoplasms are described in the literature. Secondary involvement of the aorta can occur from a variety of neoplasms. Nevertheless, the most common malignancies to present with aortic invasion are lung cancer, oesophageal cancer, and thymoma.²⁻⁵

We report a case of metastatic invasion of the aortic vasa vasorum due to papillary thyroid adenocarcinoma, diagnosed postmortem accidentally.

CASE PRESENTATION

A dead woman, 65 years old, was referred to the Histopathology Division of the Medicolegal Directorate in Baghdad/ Iraq, in March 2022 for a postmortem examination. The woman died suddenly without reporting any significant chronic medical illness before.

On autopsy examination, the external examination showed no significant traumatic changes, and the internal examination showed pleural effusion, ruptured thoracic aortic and hemopericardium. Otherwise, examination of other organs was within normal. A blood sample was withdrawn and sent for serological and toxicological examination, and they were negative.

We took many tissue biopsies from those looking suspicious of having a medical illness, and they were sent for histopathological examination at our department. Tissues were processed and fixed in 10% formalin solution, dehydrated in different concentrations of alcohol and embedded in paraffin wax. Serial sections

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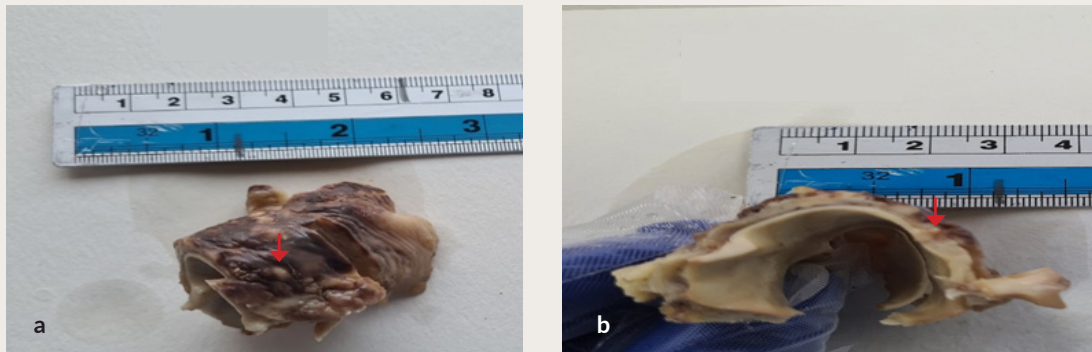


Figure 1 (a-b) | The macroscopic photograph of the thoracic aortic biopsy from ruptured aneurysm showed whitish nodules on the outer surface of the vessel wall (red arrow).

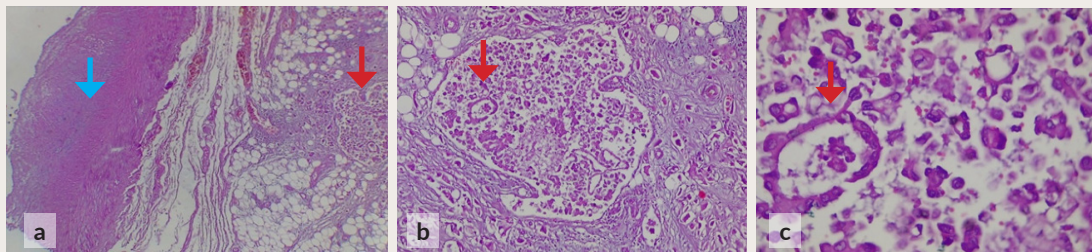


Figure 2 (a-b-c) | The microscopic view of tumor cells in aortic (hematoxylin and eosin staining). a : diffuse malignant infiltration of atypical neoplastic cells to the vasa vasorum/ red arrow, aortic wall/blue arrow(original magnification X4). b: tumor cells in the aortic adventitia (original magnification X10). c: Red arrows point to neoplastic cells(original magnification X40).

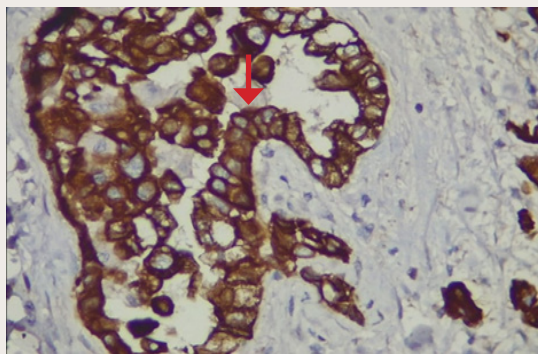


Figure 3 | Immunohistochemical stain of CK7 .Red arrows point to positive neoplastic cells (original magnification X40).

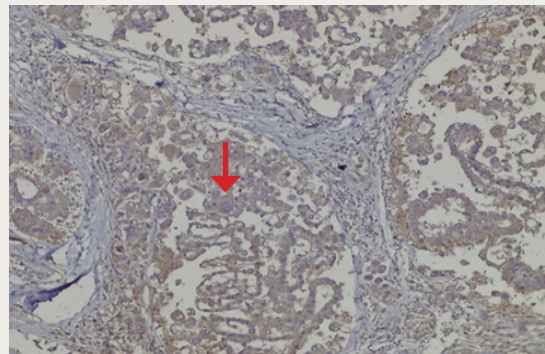


Figure 4 | Immunohistochemical stain of TG .Red arrows point to positive stain of neoplastic cells (original magnification X40).

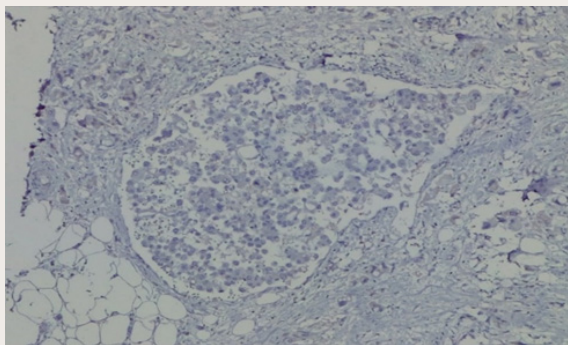


Figure 5 | Immunohistochemical stain- negative (original magnification X40).

of 3 mm thickness are prepared, deparaffinized and stained with hematoxylin and eosin stains. An experienced histopathologist examined the slides.

The macroscopic examination of the thoracic aortic biopsy from the ruptured site showed a dissected aortic aneurysm with whitish nodules on the outer surface of the aortic wall, [see figure 1\(a-b\)](#). The microscopic examination revealed diffuse infiltration of the adventitia by atypical cellular proliferation with the following features:

- The nuclei are enlarged, elongated, and overlapped.
- The chromatin was clear and marginated.
- The nuclear membrane was irregular, with nuclear grooves and pseudo-inclusions.

This atypical cellular proliferation is arranged in a glandular growth pattern with hemovascular spread to the vasa vasorum, [see figure 2 \(a-b-c\)](#).

Three panels of immune-histochemical stains were done. **The first** showed a positive expression of CK7 and a negative expression of CK20, suggesting that the tumour originates from above-the-diaphragm organs like the lung, breast, and thyroid or the female genital tract organs like the uterus and ovaries, [see figure 3](#). **The second** panel showed a positive expression of TTF-1, typical of lung and thyroid cancer; therefore, we excluded the possibility of female genital tract origin. **The third** panel showed a positive expression of TG, PAX8 and weak NAP-A, highly sensitive and specific markers of thyroid adenocarcinoma, [see figure 4](#). A negative expression of GATA-3, GCD-FP-15, HMB-45, synaptophysin, calcitonin and calretinin excluded the possibility of breast cancer, melanoma, neuroendocrine tumours, and chest wall cancer, respectively, [see figure 5](#).

The histopathological examination was done for the ruptured thoracic aorta only. No other organs were examined as no apparent abnormalities were found during the autopsy examination. Depending on the macroscopic and microscopic features of atypical neoplastic cells located on the outer surface of the tho-

racic aortic wall, their nuclear criteria and the immune-histochemical stain results, the final diagnosis was a ruptured thoracic aortic aneurysm due to metastatic papillary thyroid adenocarcinoma.

DISCUSSION

Cardiovascular disease and cancers are the two most common causes of death worldwide. Although they are often present together, vascular metastasis leading to fatal cardiovascular events is extremely rare. Many clinical manifestations may accompany malignant aortic neoplasms, regardless of whether the tumour is primary or metastatic. These include but are not limited to embolic events to different organs, aortic aneurysms and dissection.²⁻⁵

In an observational study, Sturgeon et al. revealed that one in ten cancer patients do not die from malignancy but from associated cardiovascular conditions; cancer patients have an average 2–6 times higher mortality risk due to cardiovascular disease than the general population.⁶

Primary aortic malignancy is highly rare, with sarcoma considered the most common type.⁷⁻⁸ Aortic malignancies affect the structure of the medial layer of the aorta. Primary aortic tumours have been associated with aortic dissection.⁹⁻¹¹

Secondary aortic manifestation of neoplastic disease is very rare. Only a few cases of aortic dissection caused by secondary tumours involving the aorta have been reported. Ugurlu et al. present a case of typical ascending aortic dissection associated with metastatic carcinoma originating from the lungs. This metastatic infiltration of the vasa vasorum of the aorta by neoplastic cells may have caused aortic dissection by altering the media.³

Tsuchida et al.⁴ have reported a case of systemic metastases of adrenocortical carcinoma invading the aortic wall, causing intramural hematoma of the aorta with the formation of a pseudo-lumen accompanied by disruption of the vasa vasorum.

In this presentation, we are reporting the death of a woman due to acute rupture of the thoracic aorta (aortic dissection) with hemopericardium. The macroscopic examination of the thoracic aortic biopsy from the ruptured site showed dissected aortic aneurysm and whitish nodules on the outer surface of the aortic wall. On the other hand, the microscopic examination showed diffuse infiltrations of the aortic wall by atypical neoplastic cells located primarily within the vasa vasorum.

The location of the aneurysm, absence of cardiovascular risk factors, rapidly evolving aneurysms and whitish nodules on the outer surface of the thoracic aorta drew our attention towards aortic metastasis as a potential cause for this presentation.

At the time of histopathological examination, we did not have any tissue from the potential primary site of cancer, like the lungs, thyroid, breast, and genital tracts. We depended on immunohistochemical diagnosis to search for the primary origin.

The Immunohistochemical study showed positive expression for CK7, TG, TTF-1, PAX-8 and weak for NAP-A; all these tumor markers are highly sensitive and specific for thyroid cancer.¹²⁻¹⁶ While negative expression of GATA-3, GCDPF-15, calcitonin, synaptophysin, HMB-45, and calretinin were used to exclude other metastasis of them the breasts and neuroendocrine tumours

Based on the microscopic features and immune-histochemical stains, we concluded that the aortic rupture aneurysm was due to secondary metastasis to the aortic wall from a papillary thyroid adenocarcinoma. Papillary thyroid carcinoma is the most frequent neoplastic tumour of the thyroid gland. Frequent sites of metastasis are bone, lung, skin, brain, and kidney.¹⁷ Massive invasion into the great veins of the neck and mediastinum has rarely been reported.¹⁸⁻²⁰

CONCLUSION

Cardiovascular events induced by malignant

neoplasms are rare and can present with various clinical manifestations. In patients with cardiovascular events, such as myocardial infarction or aortic dissection, without known risk factors for cardiovascular disease, the neoplastic disease should be considered a differential diagnosis. This case illustrates the value of autopsy in unexpected deaths, as neither the underlying disease nor the immediate cause of death was suspected antemortem.

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Abbreviations: Cytokeratin 20 (CK20), Cytokeratin 7 (CK7), Gross cystic disease fluid protein 15 (GCDFP-15), Human melanoma black (HMB-45), Napsin A (Nap-A), Paired box gene 8 (PAX8), Thyroglobulin (TH), Thyroid transcription factor 1(TTF-1).

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