Papillary Carcinoma Thyroid presenting as Right Ventricular Outflow Tract Obstruction - A Case Report and Review of Literature

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Abstract

Cardiac metastasis from thyroid malignancy is a rare phenomenon, with an incidence of 2%. The metastatic presentation can be simultaneous or subsequent to the diagnosis of primary thyroid malignancy. Even when cardiac tissue has inherent properties to escape tumor seeding, among carcinoma thyroid, follicular and anaplastic subtypes are the most vulnerable for cardiac metastases. Papillary carcinoma thyroid very rarely produce cardiac metastases per se and cardiac chamber involvement is even more a rarity. Only 11 such cases of papillary carcinoma thyroid with cardiac chamber metastases have been reported in the literature. We present here a compilation of these cases along with ours. Our patient presented de-novo with right ventricular mass and outflow tract obstruction. Excision of the mass showed metastatic carcinoma thyroid and subsequently, completion thyroidectomy showed carcinoma thyroid. He received radioiodine ablation postoperatively and is clinically well at 10 months of initial presentation.

Keywords: Cardiac metastasis, Papillary thyroid carcinoma, Ventricular mass, RVOT obstruction.

INTRODUCTION

Metastatic involvement of heart occurs infrequently and the sites of primary in descending order of commonness are lung, lymphoma, breast, leukemia, stomach, melanoma, liver and colon [1]. Cardiac metastasis (CM) from thyroid malignancy is seen in 2% of patients. The largest published series on CM from thyroid carcinoma was by Catford et al., in which the commonest histologic subtypes were follicular and anaplastic among 54 patients, reported over 130 year period2. Lymphatic dissemination is the usual dictum in papillary carcinoma thyroid (PTC). To the contrary, we report here a patient with right ventricular outflow tract obstruction (RVOT) prospectively diagnosed as PTC.

CASE REPORT

A 62-year-old male, former-smoker, sought medical advice for complaints of diplopia, headache and exertional palpitations lasting for the past 6 months. The patient denied any chest pain, orthopnoea, paroxysmal nocturnal dyspnoea, syncope on exertion or bowel angina. He is a known hypertensive on oral medications. He reported no family history of cancer or personal history of cerebrovascular accident/transient ischemic attack. The past surgical history was remarkable for partial thyroidectomy done 18 years back, whose details were not followed up or unavailable. The primary physician noticed changes in electrocardiogram and referred the patient to higher centre for further management.

At presentation, there was clubbing and grade 1 pedal oedema. He was maintaining sinus rhythm with 75 beats per minute and a respiratory rate of 18 per minute. Blood pressure was normal and there was no carotid bruit. Cardiovascular examination was remarkable for pan systolic murmur in the lower left sternal border. Central nervous examination was within normal limits. Chest X-ray showed dilated superior vena cava with cardiothoracic ratio of 0.45; ECG showed sinus rhythm of 75 per minute, 90° axis, q in III aVF, incomplete RBBB, with QRS duration of 100ms and T inversion V1-V6.

On detailed Echocardiogram (Echo), ejection fraction was 61% and there was a 23x28 mm mass in the right ventricle attached to the inter-atrial septum.
causing severe right ventricular outflow tract (RVOT) obstruction (86/35 mm Hg) and right ventricular hypertrophy. The left ventricular function was normal. The routine blood values including complete blood counts, biochemistry and coagulation profile were within normal limits.

The patient underwent sternotomy after confirming the cardiac findings on preoperative transesophageal Echo. Per operatively a 3x3cm fleshy, broad based mass was seen arising from the outlet septum protruding into and obstructing the RVOT. The mass was seen extending into the interventricular septum as well. The tricuspid valve was normal. Maximal excision of the mass was done. Post-operative period was uneventful and Echo at discharge showed good biventricular function with no residual mass in the right ventricle.

Grossly, the excised greyish white masses measured 3.5x2x2 cm. Histopathological examination showed a neoplasm which contained atypical cuboidal cells with moderate cytoplasm, enlarged vesicular nuclei with fine chromatin predominantly in sheets and in follicular pattern as well (Fig-1a). The nuclei showed intranuclear grooves and occasional follicles contained thick colloid. A thin rim of vascular tissue with attached cardiac muscle bundles was seen at the periphery. The atypical tumour cells tested diffusely positive for TTF1 (Fig-1b). The patient entertained the diagnosis of metastatic papillary carcinoma thyroid (follicular variant) to right ventricle. On further workup, residual thyroid tissue concentrated Technetium99 (Fig-1c). Further, completion thyroidectomy done at local hospital showed carcinoma thyroid and he underwent radioiodine ablation for residual thyroid uptake. Currently, the patient is clinically well at 10 months of initial presentation.

**DISCUSSION**

Follicular and anaplastic carcinoma thyroid are well established to throw hematogenic metastases. However, PTC very rarely spreads hematogenously and involves the cardiac tissue. We present here a rare case of PTC with cardiac chamber involvement. Only 11 such cases have been reported in the literature, which are summarised in Table-1 [1-8].

CM may be silent (necropsy finding) or oppressive (cardiac rhythm disturbances, atrioventricular blocks, congestive heart failure etc.) in their clinical presentation. They are usually seen as part of disseminated metastases in a patient with established thyroid malignancy, but de-novo presentations also can be seen. Echo findings which suggest malignancy include cardiac mass with or without extension to major vessels, intramural mass and/or pericardial

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**Fig 1(a): Microscopy (H&E 400x) of excised ventricular mass showing tumour cells with enlarged vesicular nuclei in sheets and follicular pattern**

**Fig 1(b): Immunohistochemical staining (400x) of excised ventricular mass showing diffuse nuclear positivity for TTF1**

**Fig 1(c): Tc99 scan showing concentration in residual thyroid**
involvement. Our patient presented de-novo with RVOT obstruction due to right ventricular mass.

Generally, cardiac tissue is bypassed from tumor seeding by virtue of its low blood supply, high myocardial contractility and rapid coronary blood flow. Even then, CM does occur via hematogenous, lymphogenous or locoregional contiguous extension (intravascular or extravascular) routes [2]. Hematogenous dissemination and local intravascular extension are frequently observed in follicular thyroid carcinoma where there is a tendency towards angioinvasion and venous metastasization. Conversely, PTC tends to invade locally and disseminate by lymphogenous or locoregional contiguous extension (intravascular or extravascular) routes [2].

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The management of such CM is highly individualized. The detection at necropsy notifies its indolent behaviour at least in a subset, and hence they may possibly be observed. If the metastasis amount to cardiac decompensation, surgical intervention will help in preventing mortality. Our patient underwent surgical excision of the right ventricular mass, which was therapeutic at that time point and diagnostic for the diagnosis of metastatic carcinoma thyroid as well.

Table-1: Summary of PTC cases with cardiac chamber metastasis reported in literature till date

| Author / Year of publication (ref) | Age / Sex | Symptom (Duration) | Prior confirmation of thyroid malignancy | Cardiac chamber involved | Subtype of thyroid malignancy | Treatment received | Survival as reported |
|----------------------------------|-----------|--------------------|----------------------------------------|-------------------------|-----------------------------|-------------------|---------------------|
| Fukuda etal / 2000               | 62y/ M    | Chest pain, dyspnea, pretibial edema | Yes | RV, LV | PTC | Medical management, biopsy, Radiotherapy | 27 d |
| Seiki Hasegawa etal / 2002       | 78y/ F    | Heart failure, neck pain | No | RA | PTC | Surgery | 36 d |
| Kalyan Thippeswamy Anand etal / 2003 | 33y/ F    | Generalised weakness | No | RV | PTC with follicular variant | Surgical excision | NED at 1 yr fu |
| Seiichiro Sugimoto etal / 2006   | 61y/ M    | SVC syndrome | No | RA | PTC transformed to ATC | Surgery | 12 d |
| Sherif E. Moustafa etal / 2007   | 68y/ M    | Shortness of breath, 4 weeks | Yes | RV | PTC | Palliation | 2 weeks |
| Yuko Yamagami etal / 2008        | 74y/ M    | Nil | Yes | RA | PTC tall cell variant | Surgery | Alive at 2 years |
| Hooman Yarmohammadi etal / 2013  | 76y/ M    | Abnormal ECG | Yes | LV | PTC | NR | NR |
| Toshiyuki Ikeoka etal / 2014     | 66y/ F    | Acute myocardial infarction | Yes | LV, pericardium | PTC with anaplastic transformation | Palliation | 4 months |
| Gema Bruixola etal / 2014        | 73y/ F    | Heart failure | Yes | RA | PTC | Sunitinib | 7 months |
| Charles K. Lin etal / 2015       | 74y/ F    | Exertional dyspnea and palpitations, 2 days | Yes | RV | PTC | Permanent pacemaker | Expired |
| Present case                     | 62y/ M    | Exertional palpitations, 6m | No | RV | PTC with follicular variant | Surgical excision | On follow up |

Abbreviations: RA – right atrium, RV – right ventricle, LA – left atrium, LV – left ventricle, PTC – papillary thyroid carcinoma, NR – not reported.
Patient consent – obtained.

CONCLUSION

Thyroid carcinoma has extremely good survival outcome and deserve identification/better understanding of rare metastatic sites. This rare case highlights the surpassed mechanisms of tumor escape/invasion and thus adds to the literature.

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