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ABOUT COVER

Editorial Board Member of *World Journal of Clinical Cases*, Hui-Jeong Hwang, MD, PhD, Associate Professor, Department of Cardiology, Kyung Hee University Hospital at Gangdong, Kyung Hee University College of Medicine, Seoul 05278, South Korea. neonic7749@hanmail.net

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CASE REPORT

Middle thyroid vein tumor thrombus in metastatic papillary thyroid microcarcinoma: A case report and review of literature

Yan Gui, Jun-Yi Wang, Xu-Dong Wei

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Yan Gui, Department of Otorhinolaryngology Head and Neck Surgery, The First Hospital of Lanzhou University, Lanzhou 730000, Gansu Province, China

Jun-Yi Wang, Department of Thyroid and Neck Tumor, Key Laboratory of Cancer Prevention and Therapy of Tianjin, Tianjin Medical University Cancer Institute and Hospital, National Clinical Research Center for Cancer, Tianjin 300060, China

Xu-Dong Wei, Department of Otorhinolaryngology Head and Neck Surgery, Gansu Provincial Hospital, Lanzhou 730000, Gansu Province, China

Corresponding author: Jun-Yi Wang, MD, PhD, Associate Chief Physician, Department of Thyroid and Neck Tumor, Key Laboratory of Cancer Prevention and Therapy of Tianjin, Tianjin Medical University Cancer Institute and Hospital, National Clinical Research Center for Cancer, West Huan-Hu Rd, Ti Yuan Bei, Hexi District, Tianjin 300060, China.
jzxsya@163.com

Abstract

BACKGROUND

Although papillary thyroid microcarcinoma (PTMC) is not considered a threatening tumor, in some cases, it can be aggressive. Metastatic thrombosis of papillary thyroid carcinoma, follicular thyroid carcinoma, Hürthle cell carcinoma, poorly differentiated thyroid carcinoma and anaplastic thyroid carcinoma have been reported in the literature, but there have been no reports about PTMC.

CASE SUMMARY

A 45-year-old woman presented with a thyroid mass and thrombosis in a middle thyroid vein during a physical examination. She had no symptoms, and the physical examination showed no positive signs. Subsequent ultrasonography-guided fine-needle aspiration biopsy results indicated an atypical lesion of ambiguous significance, with some actively growing cells (TBSRTC III) and the $BRAF^{V600E}$ mutation not present. This patient underwent left thyroidectomy, isthmus lobectomy, prophylactic central lymph node dissection and thromboembolectomy. Postoperative pathology showed papillary microcarcinoma of the left thyroid, and the thrombus in the middle thyroid vein was a tumor thrombus.

CONCLUSION

Middle thyroid vein tumor thrombus is an extremely rare condition in PTMC, but it does exist. Lobectomy and thromboembolectomy may be an option for patients with thrombi in the middle vein of the thyroid, and we strongly suggest close

follow-up of these patients.

Key Words: Thyroid neoplasms; Papillary carcinoma; Thyroid vein; Venous thrombosis; Surgery; Case report

Core Tip: We report the case of a 45-year-old woman presented with a thyroid mass and thrombosis in a middle thyroid vein during a physical examination. This patient underwent left thyroidectomy, isthmus lobectomy, prophylactic central lymph node dissection and thromboembolectomy. Postoperative pathology showed papillary microcarcinoma of the left thyroid, and the thrombus in the middle thyroid vein was a tumor thrombus. Middle thyroid vein tumor thrombus is an extremely rare condition in papillary thyroid microcarcinoma, but it does exist. Lobectomy and thromboembolectomy may be an option for patients with thrombi in the middle vein of the thyroid, and we strongly suggest close follow-up of these patients.

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INTRODUCTION

Papillary thyroid microcarcinoma (PTMC) is a variant of papillary thyroid carcinoma (PTC) that is defined by the World Health Organization as less than or equal to 1 cm in diameter[1]. Although PTMC is not considered a threatening tumor, in some cases, it can be aggressive. Metastatic thrombosis of PTC, follicular thyroid carcinoma (FTC), Hürthle cell carcinoma (HCC), poorly differentiated thyroid carcinoma (PDTC) and anaplastic thyroid carcinoma (ATC) have been reported in the literature, but there have been no reports about PTMC. We report the case of a 45-year-old woman with a middle thyroid vein thrombus. She underwent successful resection, and postoperative pathology showed papillary microcarcinoma of the left thyroid and a tumor thrombus in the middle thyroid vein. We reviewed the literature to identify reports of tumor thrombus and distant metastasis of PTMC.

CASE PRESENTATION

Chief complaints

A 45-year-old woman presented with a thyroid mass (Figure 1) and thrombosis (Figure 2) in a middle thyroid vein during a physical examination.

History of present illness

The patient came to hospital because of thyroid mass found in physical examination 3 mo before. She had no symptoms. The patient requested surgery because of the stress.

History of past illness

The patient was health in the past.

Personal and family history

The patient had no family history of thyroid carcinoma and no history of radiation exposure in childhood.

Physical examination

The physical examination showed no positive signs.

Laboratory examinations

Laboratory tests showed that triiodothyronine, free triiodothyronine, thyroxine, thyroglobulin, and thyroid-stimulating hormone levels were within the normal limits.

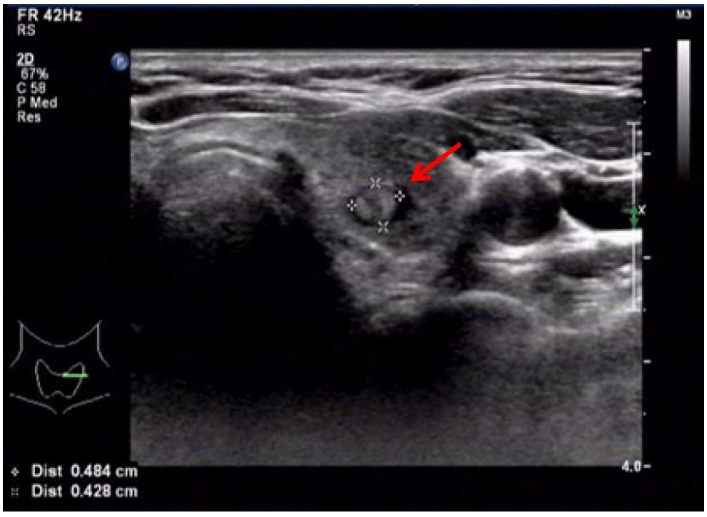

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Figure 1 A solid nodule in the left lobe of the thyroid by ultrasound examination.

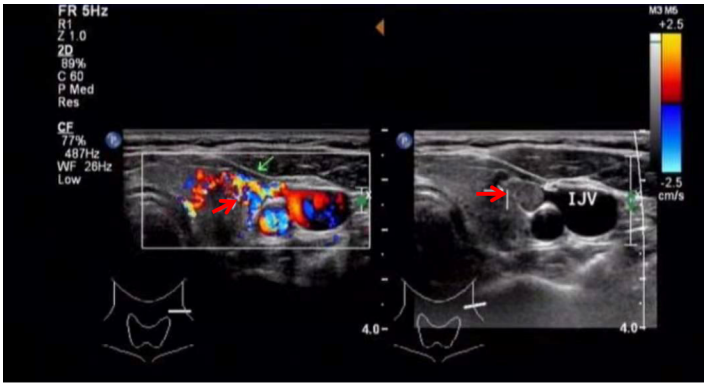

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Figure 2 Ultrasound examination revealed a medially echoic mass in the middle thyroid vein.

Imaging examinations

A solid nodule in the left lobe of the thyroid by ultrasound examination. Ultrasound examination revealed a medially echoic mass in the middle thyroid vein.

Ultrasonography-guided fine-needle aspiration biopsy

Subsequent ultrasonography-guided fine-needle aspiration biopsy results indicated an atypical lesion of ambiguous significance, with some actively growing cells (TBSRTC III) and the $BRAF^{V600E}$ mutation not present.

FINAL DIAGNOSIS

PTMC (pT1aN0M?). Middle thyroid vein tumor thrombus.

TREATMENT

The patient and her family were fully informed of the advantages and disadvantages of total thyroidectomy and lobectomy prior to surgery. The patient declined to undergo a total thyroidectomy. Intraoperative exploration showed that the mass was located in the middle and upper left lobe of the thyroid gland, adjacent to the capsule, but the capsule was not invaded. There was a round mass in the middle thyroid vein with a diameter of 0.8 cm. The middle thyroid vein was ligated distal to the mass and cut off. Rapid freezing pathological examination showed that both the left thyroid mass and the left middle

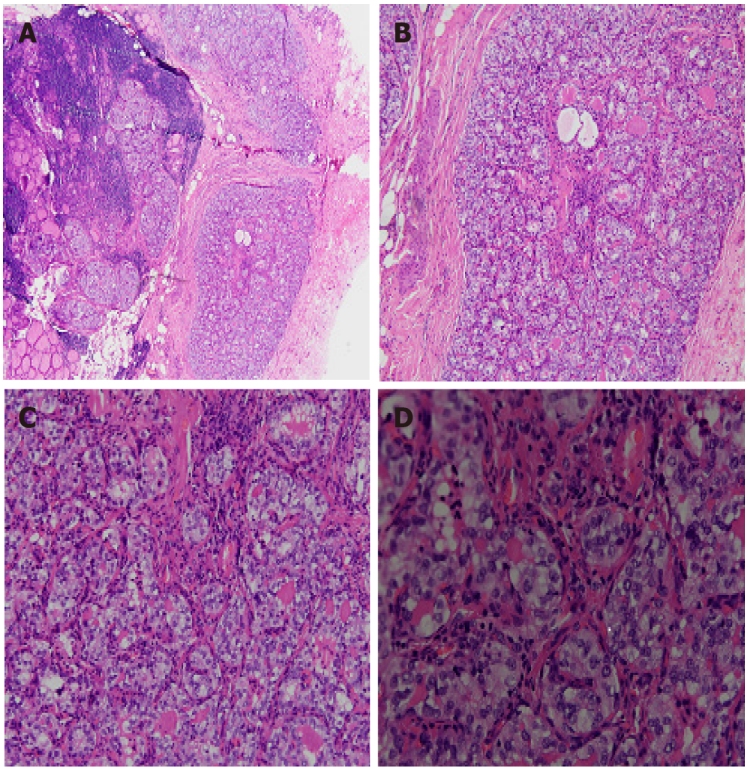

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Figure 3 Hematoxylin and eosin staining of left lobe thyroid mass, it shows papillary thyroid microcarcinoma. A: 4×; B: 10×; C: 20×; D: 40×.

thyroid vein mass were carcinomas. These results were communicated to the patient's family, and total thyroidectomy was again declined. Therefore, the patient underwent left thyroidectomy, isthmus lobectomy and prophylactic central lymph node dissection. Postoperative pathology showed papillary microcarcinoma of the left thyroid (single lesion, maximum diameter of 0.9 cm) (Figure 3), and the thrombus in the middle thyroid vein was a tumor (diameter of 0.6 cm) (Figure 4).

OUTCOME AND FOLLOW-UP

No metastases were observed in the central lymph nodes. Initial TSH suppression was treated with 75 μg levothyroxine. Three months later, ^{18}F-FDG positron emission tomography-computed tomography scanning did not detect local recurrence or distant metastasis (Figure 5). No complications occurred. Fearing recurrence and metastasis, the patient underwent genetic testing at a third-party testing facility. No genetic variation was detected in BRAF^{V600}, BRAF^{K601}, TERT, KRAS, NRAS, EIFIAX or RET. No gene fusion mutations were detected in PAX8/PPARγ, RET/PTC1, or RET/PTC3. Six months after surgery, the patient had no obvious discomfort, and no tumor recurrence or distant metastasis was observed. The patient took 50 μg levothyroxine once daily, and the serum TSH was 0.49 mIU/L.

DISCUSSION

Thyroid carcinoma that causes tumor thrombus is rare. Forty-seven cases have been reported in the English literature since May 1, 2021. The details of these cases are shown in Table 1. The patients included 12 males and 35 females; their ages ranged from 26 years to 84 years, and the median age was 62 years. The location of the thrombus included the brachiocephalic vein, internal jugular vein, superior vena cava, subclavian vein, innominate vein, middle cerebral artery, pulmonary vein, external jugular veins, axillary vein, right atrium, ascending aorta, pulmonary artery, valvular endocardium and right ventricle. In almost all cases, the thrombus was located in the large vessels. Our patient had a thrombus in the middle thyroid vein, which may represent early-stage disease. Early-stage diagnosis and treatment are of great significance to patient prognosis.

Pathological types included PTC, FTC, HCC, ATC and PDTC. Ten of these cases were PTC (one of the follicular variants of PTC, FVPTC), 24 were FTC, 3 were HCC, 1 was PDTC, 5 were ATC, 1 was ATC with HCC and 3 were not described in the literature. Most of these case reports did not describe the size

Table 1 Reported cases of vein tumor thrombus in thyroid carcinoma

Ref.	Sex	Age	Lesion size (cm)	Pathology	Blood vessel of thrombus
Banerjee and Chopra[2], 1972	F	60	-	FTC	Middle cerebral artery
Thompson *et al*[3], 1978	F	67	-	FTC	JV, BV, SVC, RA
Perez and Brown[4], 1984	F	48	-	FTC	SVC
Sirota[5] , 1989	F	61	-	PTC	Axillary vein
Thomas *et al*[6], 1991	M	60	-	PDTC	Bilateral IJV
Onaran *et al*[7], 1998	M	48	-	HCC	IJV
Onaran *et al*[7], 1998	F	48	-	-	IJV
Onaran *et al*[7], 1998	F	69	-	HCC	IJV
Bussani and Silvestri[8], 1999	F	67	-	FTC	Pulmonary artery, valvularendo-cardium
Wiseman *et al*[9], 2000	M	84	-	-	IJV, BV
Koike *et al*[10], 2002	F	26	7.8	PTC	BV
Yoshimura *et al*[11], 2003	F	65	-	ATC	IJV, SV
Panzironi *et al*[12], 2003	F	68	-	ATC	Bilateral IJV
Gross *et al*[13], 2004	M	49	3.2 × 2.5 × 3	ATC, HCC	IJV
Sugimoto *et al*[14], 2006	M	61	-	ATC	BV, SVC, RA
Taib and Hisham[15], 2007	F	45	-	FTC	IJV
Taib and Hisham[15], 2007	F	62	-	FTC	RA
Taib and Hisham[15], 2007	F	66	-	FTC	IJV, SVC, RA
Tripathi *et al*[16], 2008	F	48	-	FTC	BV, SVC, IJV
Yamagami *et al*[17], 2008	M	74	2	PTC	JV, IV, SVC, atrium
Hyer *et al*[18], 2008	F	81	-	FTC	IJV, SVC
Agrawal *et al*[19], 2009	M	48	-	FVPTC	IJV, SVC, SV
Wada *et al*[20], 2009	M	64	-	FTC	IJV, BV, SVC
Sanioglu *et al*[21], 2009	M	64	2 × 1.5	PTC	Ascending aorta
Wada *et al*[20], 2009	F	74	-	PTC	BV, SVC
Mugunthan *et al*[20], 2010	F	51	-	PTC	IJV,SVC,RA
Bukhari *et al*[23], 2011	M	67	-	FTC	SVC
Nakashima *et al*[24], 2012	F	54	-	FTC	IJV, SV, BV
Babu *et al*[25], 2012	F	68	-	PTC	IJV
Onoda *et al*[26], 2012	F	70	7	FTC	IJV, SVC
Stickel *et al*[27], 2013	F	77	-	ATC	RV
do Nascimento *et al*[28], 2014	F	54	-	FTC	IJV
Al-Jarrah *et al*[29], 2014	F	62	3 × 5	PTC	IJV
Dikici *et al*[30], 2015	F	52	5.5 × 5.5	PTC	IJV, IV
Luo *et al*[31], 2015	F	57	-	HCC	RA
Franco *et al*[32], 2015	F	59	-	FTC	IV
Manik *et al*[33], 2016	F	65	-	FTC	SVC, RA
Kawano *et al*[34], 2016	F	75	4.5 × 3	ATC	IJV, IV, SUV, sigmoid sinus
Chiofalo *et al*[35], 2018	M	58	5	FTC	IJV

Chiofalo *et al*[35], 2018	F	64	3 × 17	FTC	IJV
Chiofalo *et al*[35], 2018	F	75	3.5 × 2.3	FTC	IJV, IV
Jain *et al*[36], 2019	F	44	-	-	IJV
Khoo and Chen[37], 2019	F	57	17	FTC	SVC, RA
Lad *et al*[38], 2020	F	52	-	FTC	IJV, SVC, RA
Cassar and Stirrup[39], 2020	F	75	-	FTC	Inferior pulmonary vein, left atrium
Čolović *et al*[40], 2020	M	67	-	FTC	IJV,BV
Kavanal *et al*[41], 2021	F	64	-	FTC	BV

F: Female; M: Male; PTC: Papillary thyroid carcinoma; FTC: Follicular thyroid carcinoma; HCC: Hürthle cell carcinoma; PDTC: Poorly differentiated thyroid carcinoma; ATC: Anaplastic thyroid carcinoma; FVPTC: Follicular variant of papillary thyroid carcinoma; IJV: Internal jugular vein; SVC: Superior vena cava; SV: Subclavian vein; RA: Right atrium; RV: Right ventricle; IV: Innominate vein; BV: Brachiocephalic vein; JV: Jugular vein.

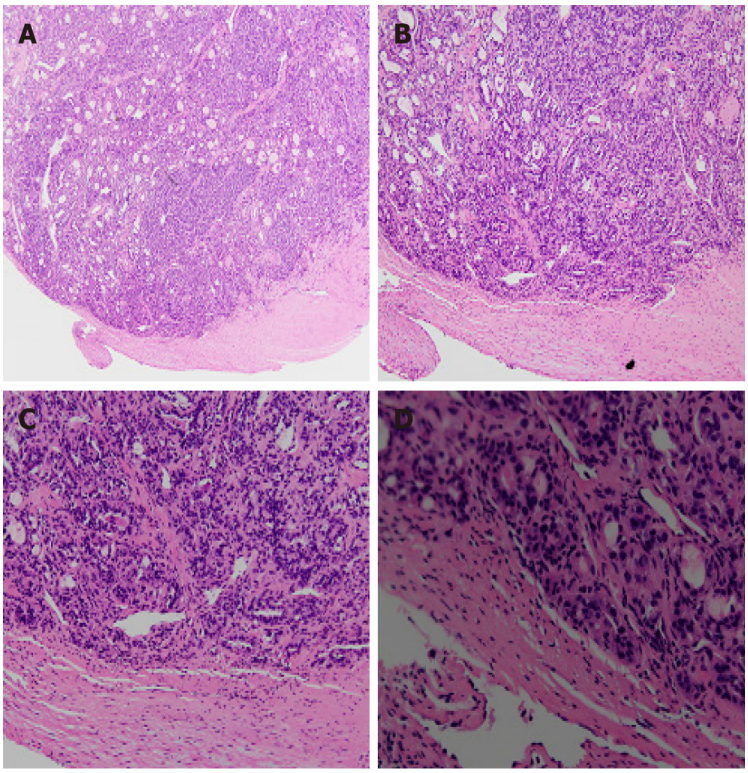

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Figure 4 Hematoxylin and eosin staining of the thrombus, it shows carcinoma tissues. A: 4×; B: 10×; C: 20×; D: 40×.

of the thyroid lesion. From the 12 cases with size data available, the maximum diameter of the lesions ranged from 2 cm to 17 cm (the average was 6.6 ± 5.2 cm). Our patient had PTMC (the maximum diameter was 0.8 cm), which had not been previously reported. Middle thyroid vein tumor thrombus in metastatic PTMC is extremely rare. It is necessary to consider how to perform TNM staging for such cases. Kawano *et al*[34] suggested setting management criteria. Unfortunately, there are still no related standards or guidelines for such criteria. Here, we emphasize the importance of aggressive treatment and close follow-up for these patients. Tumor cells are exposed to the circulatory system in this clinical presentation, and embolus shedding may also cause serious complications, such as pulmonary embolism. While there is a lack of objective clinical data to support this hypothesis, we will continue to monitor future occurrences.

In terms of treatment for tumor thrombi in metastatic PTMC, there is also no standard. Treatments include surgery, RAI therapy, external beam radiation therapy and chemotherapy. Most patients choose surgery combined with radioiodine therapy. Kavanal *et al*[41] reported that ^{131}I therapy as a single modality may be considered for a subset of patients who have been rigorously screened. If the pathologic type is PDTC with no surgical opportunity and refractory to radioactive iodine, targeted therapy such as tyrosine kinase inhibitors may be another choice for this subset of patients[42].

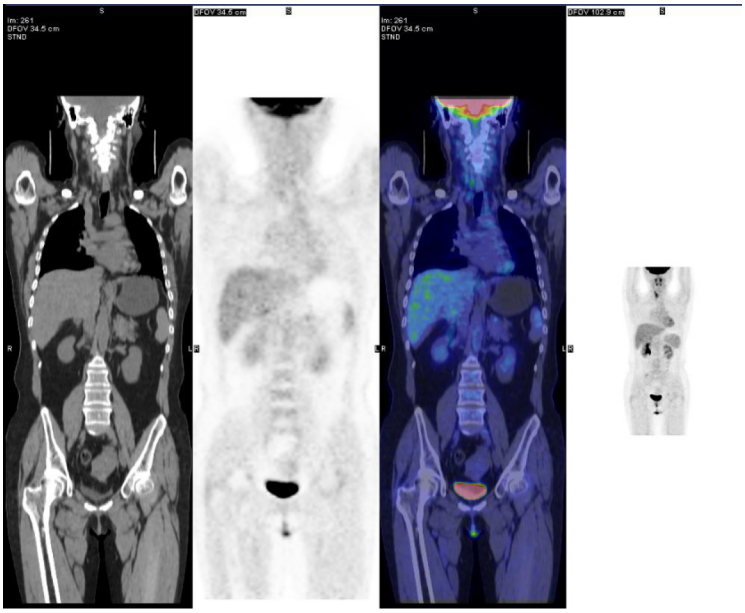

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Figure 5 Systemic positron emission tomography metabolism imaging showed no obvious signs of malignancy.

Overall, we have demonstrated a middle thyroid vein tumor thrombus in PTMC. Our patient will continue to attend follow-up appointments. In the absence of other risk factors, lobectomy and thromboembolectomy may be an option for patients with thrombi in the middle vein of the thyroid. We strongly suggest a close follow-up of these patients.

CONCLUSION

Middle thyroid vein tumor thrombus is an extremely rare condition in PTMC, but it does exist. Lobectomy and thromboembolectomy may be an option for patients with thrombi in the middle vein of the thyroid, and we strongly suggest close follow-up of these patients.

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FOOTNOTES

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ORCID number: Yan Gui 0000-0002-8130-9143; Jun-Yi Wang 0000-0002-4720-6634; Xu-Dong Wei 0000-0002-8543-1875.

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