Signature: © Pol J Radiol, 2016; 81: 268-269
DOI: 10.12659/PJR.896757

Polish Journal of Radiology
www.PolRadiol.com
LETTER/CORRESPONDENCE

Received: 2015.11.19
Accepted: 2015.11.25
Published: 2016.06.07

Authors' Contribution:
A Study Design
B Data Collection
C Statistical Analysis
D Data Interpretation
E Manuscript Preparation
F Literature Search
G Funds Collection

Jugular Vein Invasion Diagnosis and Prognosis in Thyroid Carcinomas

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Summary

Diagnosis of venous jugular invasion by means of traditional imaging is very rarely reported in the literature. Doppler ultrasound definitively helps to diagnose the tumor thrombus, the extent, and helps in redefining the TNM stage of such an aggressive thyroid tumor.

MeSH Keywords: Neoplasm Recurrence, Local • Thyroid Neoplasms • Venous Thrombosis

PDF file: http://www.polradiol.com/abstract/index/idArt/896757

Further to the interesting paper by Dikici et al., published in the 2015 July issue of the Polish Journal of Radiology entitled "A rare complication of the thyroid malignancies: Jugular vein invasion" [1], we congratulate the authors and would like to make further comments.

This case report describes jugular vein tumor invasion due to local thyroid malignancy recurrence of papillary origin in a 52-year-old female patient.

As the disease-free interval amounted to nineteen years after subtotal thyroidectomy (no histopathology was provided), we guess that the 55-mm invasive neck tumor could be a *de novo* papillary thyroid carcinoma (PTC) arising from the post-operative thyroid remnant that further invaded the jugular vein, rather than an authentic nodal recurrence. Biology tests display high levels of thyropexoxydase antibodies that are consistent with chronic autoimmune thyroiditis, a condition associated with a 67- to 80-fold higher incidence of malignant lymphoma compared to the standard population [2].

Furthermore, a large cervical mass with ipsilateral metastatic lymph node better fits *de novo* PTC than an extremely late tumor recurrence [3]. Interestingly, PTCs display gross venous invasive features in 1.5% of histopathologic specimens, and are associated with more aggressive behavior at diagnosis with a higher incidence of tumor recurrence [4].

This contrasts with the very low incidence of neck and central vein invasion of malignant thyroid origin depicted with imaging means. Dyers et al. and Marcy et al. reported their experience regarding superior vena caval occlusion (SVCO) of thyroid origin and found symptoms ranging from no symptoms, ipsilateral arm/neck swelling to typical clinical SVC syndrome (one third each) [5,6]. The SVCO clinical incidence ranged from 0.34 to 0.8%, mostly due to aggressive tumors including dedifferentiated or anaplastic thyroid carcinomas [6]. Moreover, some PTCs may present a double tumoral component during their evolution [7]. The poorly differentiated component may explain the abrupt change in tumor growth and spread; however, little is known about the degree of histological differentiation of the primary and neck adenopathy in Dikici et al. case report [1].

Two various US features have been reported in PTCs including nonspecific and characteristic features. The latter display strong hypoechogenicity, microcalcifications, higher than large nodule, high stiffness on elastography and irregular margins. Limited extra-capsular spread of thyroid tumor into the sternothyroid muscle or perithyroid soft tissues may be depicted on US color Doppler [8], and corresponds to T3 stage according to the TNM classification [9].

When extra-thyroid tumor spread progresses within the neck soft tissues and abbuts on the neck vessels, the T stage is T4a and means surgical resectability. Direct IJV lumen invasion can occur as the primary thyroid tumor,

the thyroid bed tumor recurrence, or the nodal recurrence destroying the IJV wall. The so-called "extra-luminal vascular invasion of the internal jugular vein" is classified as T4b when tumor thombus reaches mediastinal innominate veins as reported in Dikici's report [1,9]. However, interestingly in the presented case, the thyroid tumor invasion feature was different, firstly because of the absence or limited extra-capsular spread and also because the tumor growth that started from an intra-thyroid tiny vein lumen and progressed through the left median thyroid vein downwards to the IJV lumen with an intact IJV venous wall. This US feature is easily depicted when performing the Valsalva manoeuver [8] and should be mentionned to the head&neck surgeon prior to surgery. Using the endocavitary US probe in a craniopodal position at the sternal notch may show thrombus spread into the mediastinal innominate or SVC veins, thus defining the stage T4b.

Doppler spectral analysis provides information about the location, side, and degree of occlusion of the central vein lumen by assessing spectral waveforms of subclavian veins and IJV on both sides [10]. Invasion of primary tumor through the medial thyroid vein into the IJV lumen with an intact IJV wall is called "direct intra-luminal spread". This feature can be related either to primary or secondary tumors to the thyroid gland of renal origin. Metastases to the thyroid behave like an invasive primary tumor that invades the inferior vena cava (IVC) via the renal vein lumen, showing "direct intra-luminal spread" as reported in Dikici et al. primary PTC case report [1,11].

Imaging of thrombus in the IJV lumen should always be followed by color Doppler US assessment to differentiate CT/MRI contrast medium-enhanced thrombus from unenhanced cruoric thrombus (due to venous stasis/extrinsic compression]. As previously stated by Dodd et al. [12], presence of arterial wave forms within the intraluminal IJV thrombus is the signature of malignant origin of the venous thrombus even in a non-dilated IJV. Extraluminal tumor thrombus spread (T4b) should be differentiated from direct intraluminal spread of the internal jugular vein T3 in Dikici et al. report [1].

In case of bulky hypoechoic thyroid tumor, the absence of venous invasion might argue for malignant non-Hodgkin's thyroid lymphoma rather than anaplastic carcinoma, namely in a clinical context of ancient chronic autoimmune thyroiditis [13].

Last but not least, local arterial carotid invasion/degree of circumferential predicts tumor invasion when more than 270° [14] and reflects TNM T4b stage on US. This should be mentionned at preoperative work-up to plan a vascular graft if not contraindicated. In our experience, arterial invasion was depicted in aggressive anaplastic or dedifferentiated follicular thyroid carcinomas whereas less aggressive well-differentiated tumors such as malignant oncocytomas/poorly differentiated follicular tumors may display local venous IJV invasion [6].

To conclude, we advocate for IJV/SCV US assessment using Valsalva maneuver to depict intraluminal gray scale thrombus, and color Doppler and spectral analysis to diagnose tumor thrombus malignancy and extent to SVC.

Conflict of interest

No disclosure.

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