

A Rare Case of Amyloid Goiter: Ultrasonographic Findings and Thioflavin T Staining

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ABSTRACT

Background: Clinically significant enlargement of the thyroid gland by amyloid deposition is rare. A case study of 22-year-old lady with gradual enlargement of the thyroid gland has been presented. Routine haemological, biochemical test including thyroid function tests were normal. Ultrasonographic findings were nonspecific. Amyloid goiter has to be differentiated from other types of goitre and malignancy. FNAC was found to be suspicious for the presence of amyloid. Special staining with thioflavin T confirmed amyloid deposition.

Keywords: Amyloid, Goiter, Ultrasonography.

INTRODUCTION

Amyloid is an abnormal protein present in various tissues or organs in many disease conditions. Presence of interstitial amyloid within the thyroid gland in a patient with clinical enlargement of thyroid is named amyloid goiter. Large goiter with normal thyroid function tests is a common presentation.

Amyloid goiter is a rare condition found in primary as well as secondary amyloidosis¹. It has to be differentiated from other types of goiter and malignancy. Amyloid deposition with goiter is also seen in 50-80% of cases with medullary thyroid carcinoma². When a known patient of amyloidosis presents with appearance of goiter, secondary amyloid goiter is suspected³. Cytological or histological tests are required to ascertain diagnosis. Surgery helps to relieve pressure symptoms and to ensure diagnosis. A case of 22-year-old lady with amyloid goiter is presented here.



CASE REPORT

A 22-year-old lady presented with a large thyroid swelling, which was increasing in size from the last 3 years. There was no history of pain, hoarseness or any pressure effects. Routine haematological biochemical investigations were normal. Thyroid function tests were normal with Anti Thyroid Peroxidase Antibody less than 250ml. Ultrasonography of thyroid gland showed diffuse goiter with hyperechoic thyroid parenchyma showing few areas of reticular pattern. Right lobe of thyroid measured 17 x 23 x 48mm, left lobe measured 19 x 22 x 42mm and isthmus measured 9mm anteroposteriorly. No defined focal mass isolated by ultrasound (Figures 1 and 2). Colour Doppler showed less vascularity of the gland. There was absence of cervical lymphadenopathy. Fine needle aspiration cytology (FNAC) revealed paucicellular field with thick geographic bluish material as blotches. Scanty follicular cells with absence of neoplastic cells were seen (Figures 3 and 4). These features raised the possibility of amyloid goiter. Repeat FNAC with 0.5% thioflavin T in 0.1 N HCL and a hydrophobic marker was used for

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Fig 1: Transverse sonogram of the thyroid gland



Fig 2: Longitudinal Colour Doppler image



Fig 3: Light microscopy (1x10 magnification) of Hematoxylin and Eosin stain.

staining the slide. The aspirate was positive for amyloid presence. Liver Function Test, Renal Function Test, C reactive protein, Erythrocyte Sedimentation Rate and serum electrophoresis were within normal ranges. As there were no

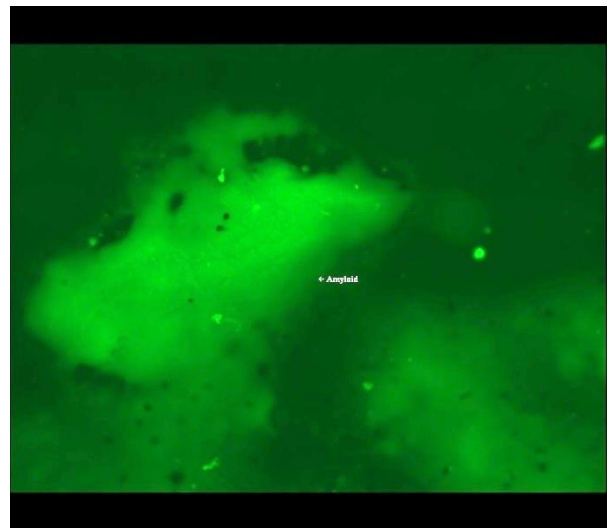


Fig 4: Fluorescent microscopy (1x40 magnification) of thioflavin T

pressure symptoms regular follow up without surgical treatment was planned.

DISCUSSION

Deposition of amyloid (an amorphous, predominantly extracellular eosinophilic material) in various tissues or organs is known as amyloidosis. Amyloidosis may be primary or secondary. Primary amyloidosis occurs spontaneously and often affects tissues of mesodermal origin including thyroid. Conditions related to secondary amyloidosis are chronic infections (e.g. tuberculosis), inflammatory conditions (bronchiectasis, rheumatoid arthritis, Crohn's disease, chronic renal failure, multiple myeloma)^{4,5}. Primary amyloidosis affecting thyroid is rare. Levillain described patients of amyloid goiter due to secondary amyloidosis⁶. Congo red, crystal violet and thioflavin T staining procedures are helpful to demonstrate deposition of amyloid. Immuno-histochemical techniques may help in differentiating amyloid A from other types of amyloid^{1,3}.

In 1855, amyloid infiltration of the thyroid gland in a patient with systemic amyloidosis was first reported¹. Frequently seen microscopic amyloid deposits have usually no clinical significance. In 1858, Beckmann reported amyloid in a person with thyroid enlargement. The word 'Amyloid goiter' was given by Eiselberg in 1904. Relatively fast progression of swelling and appearance of pressure symptoms is a common

feature in amyloid goiter. Patient presenting with amyloid goiter as the first manifestation of systemic amyloidosis is not common⁶. Common presentation is a rapidly enlarging anterior neck mass which is firm to hard in consistency. There is diffuse thyroid involvement which is commonly painless. Patient may present with pressure symptoms. Usually patients are clinically euthyroid. However altered thyroid function may be present^{4,5}. Amyloid deposition is usually diffuse and more or less uniform. Ultrasound is useful to show enlargement of thyroid gland, exclude discrete nodules and cervical lymphadenopathy. The thyroid gland usually shows diffuse hyperechogenicity or coarse echotexture⁷. Relative amounts of amyloid and fat account for the variety of sonographic findings. However the ultrasound findings are not specific for amyloid goiter.

FNAC may point towards the deposition of amyloid. Hematoxylin and eosin staining gives indication by showing eosinophilic amorphous material. Interstitial deposition of pink hyaline material can also be observed. However FNAC is not diagnostic in many cases^{8,9}.

Histological study of biopsied surgical specimen is a gold standard. This also helps to get rid of patients' pressure symptoms. In 1959, Vassar and Culling described use of thioflavin T as a marker for amyloid. This fluorochrome is a benzothiazole dye. Thioflavin dye binds to the cross- β structure in the amyloid fibrils. Amyloid fibrils give bright yellow green fluorescence ranging from 440 nm to 490nm¹⁰. Thioflavin T staining viewed under fluorescein gate with use of immunofluorescope microscope is easy to perform and also to interpret. It is sensitive to small amount of amyloid deposition.

As known, high sensitivity carries low specificity, the fact remains the same here also. Apart from amyloid, Thioflavin T staining is positive for presence of keratin, fibrin, and zymogen granules also. Congo red stain and electron microscopy are helpful in such cases. Thioflavin stain is not permanent as contrast to Congo red stain. Interpretation by Congo red staining requires more expertise and polarized light microscopy. Its sensitivity is low as the apple green birefringence by Congo red is difficult to visualize.

To document amyloid goiter however other causes of amyloid deposition in thyroid like hepatic or renal failure, multiple myeloma and familial Mediterranean fever should be ruled out. In cases with amyloid deposition, medullary thyroid carcinoma should also be ruled out. Calcitonin staining is helpful for this purpose². Systemic amyloidosis, plasma cell dyscrasias like multiple myeloma where there is amyloid tissue deposition should also be excluded. Patients with secondary amyloidosis have a better prognosis than with primary amyloidosis¹.

In conclusion, FNAC of the thyroid is helpful to show amyloid deposition. Thioflavin T staining is an easy way to confirm amyloid fibrils. Along with other tests, this is useful to diagnose a rare but an important entity of 'amyloid goiter'.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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