

Cholesterol Granuloma of the Thyroid Mimicking Malignancy

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Cholesterol granuloma (CG) is a rare benign disease that radiologically resembles malignancy in solid organs. CG, which occurs commonly in the middle ear, is found in many organs, such as the paranasal sinuses, breast, pancreas, gallbladder, kidney, orbit, testis, peritoneum, parotid gland, liver, spleen, and jaw.¹ Only 3 cases of CG of the thyroid have been reported. In 2 of those cases, abnormal lipid metabolism caused CGs involving multiple organs, and the patients were diagnosed with Erdheim-Chester disease.^{2,3} In the other case, there was no abnormal lipid metabolism or involvement of multiple organs except the thyroid.⁴ The current case demonstrated that CG could be misdiagnosed as a malignancy on preoperative imaging studies.

Case Report

This study was approved by the Institutional Review Board of the Armed Forces Medical Command, Korea (approval number: AFMC-16085-IRB-16-076).

A 51-year-old man without any notable symptoms presented with an incidental finding of 2 masses in the left thyroid. These lesions were identified on imaging studies such as chest computed tomography (CT), which were performed as part of a private health screening. Ultrasonography (USG) revealed that the first mass in the left upper thyroid had an irregular margin and was heterogeneous, taller than wide, and hypoechoic (**Figure 1**). Contrast-enhanced CT showed a small (<0.5 cm) nonenhancing mass. A fine-needle aspiration biopsy (FNAB) of this mass was considered nondiagnostic (Bethesda category I) due to the lack of cells. USG revealed a second mass, 2.1 cm in size with a well-defined margin, which was a mixed cystic-solid without any features suggestive of malignancy. FNAB of the second mass

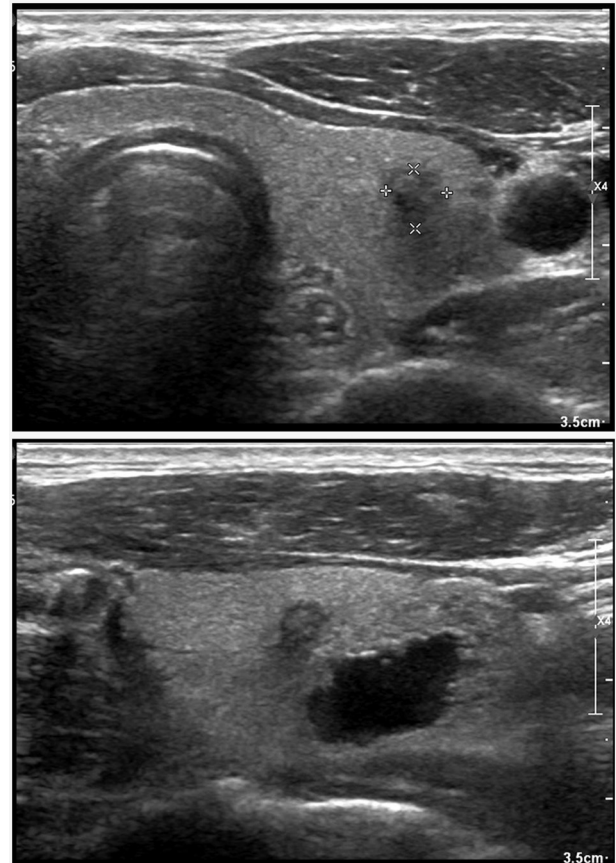


Figure 1. Neck ultrasonography of cholesterol granuloma, which is 0.5 × 0.5 cm in size and has an irregular margin. This tumor is also a heterogeneous, taller than wide, and hypoechoic.

revealed the presence of atypia or a follicular lesion of undetermined significance (Bethesda category III). There were no

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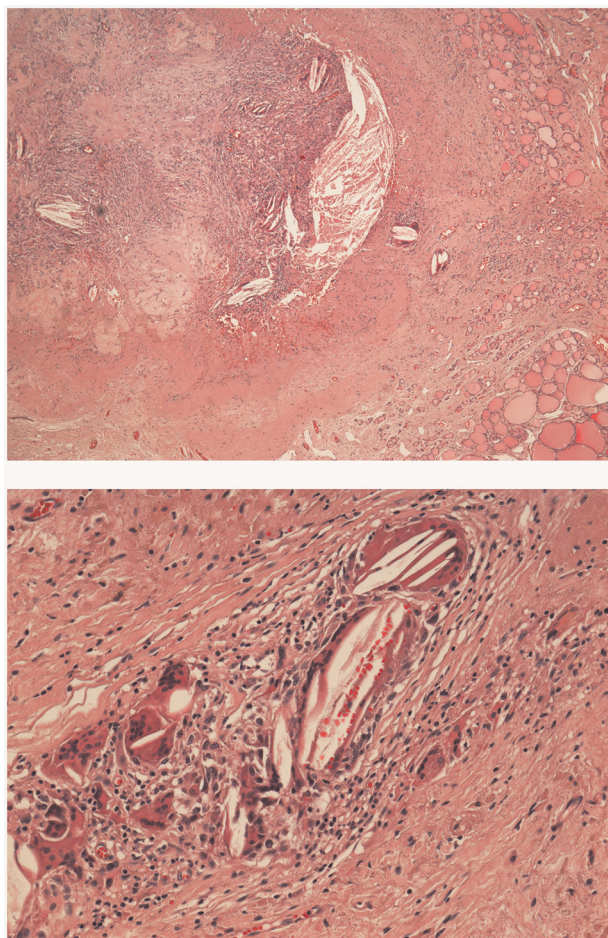


Figure 2. Multiple cholesterol crystals were arranged in irregular arrays in the thyroid ($\times 40$) and surrounded by histiocytes and giant cells ($\times 200$).

enlarged cervical lymph nodes. A repeat FNAB of the first mass was recommended; however, the patient elected to undergo lobectomy owing to his fear of the possibility of malignancy. On surgical examination, the first mass in the left upper thyroid gland was firm, with an irregular margin; the second mass, which was dark brown, colloidal, and about 2.1×2 cm in size, had a smooth capsule. The cut surface of the first mass displayed an irregular margin and was yellowish, infiltrative, and homogeneous. Histopathological analysis of the permanent section revealed a CG in the first mass and nodular hyperplasia in the second mass. Microscopy showed mainly stromal connective tissue along with a few distorted slit-like glands. Multiple cholesterol crystals were arranged in irregular, parallel arrays and were surrounded by giant cells (**Figure 2**), findings that were compatible with a CG.

Discussion

Pathologically, CG shows fibrous granulation tissue, containing many cholesterol crystals, and is surrounded by foreign body giant cells. Nonetheless, there is limited knowledge regarding the cause of CGs. The obstruction-vacuum theory could explain CGs in pneumatic tracts and

supports the choice of drainage as treatment.¹ Low pressure induced by mucosal occlusion in the pneumatic tracts triggers hemorrhage within the petrous apex. Anaerobic breakdown of blood products releases cholesterol, which is involved in the formation of a CG by a foreign body reaction.¹ CGs in pneumatic tracts form a liquefied lesion. Therefore, they are typically drained by needle aspiration without excisional procedure. The treatment of CGs in the middle ear requires chronic drainage into another air-containing cavity. CGs in the paranasal tissues have been treated with endoscopic drainage.¹ Some authors reported spontaneous resolution of a petrous apex CG. However, it is difficult to diagnose CG in solid organs as the nature of the mass is different. Some authors reported that the pathogenesis of CG in the breast was diagnosed as mammary periductal inflammation, which can lead to secretions leaking into the parenchyma. Consequently, CG in the breast has been clinically misdiagnosed as a malignancy.⁵ Furthermore, positron emission tomography–CT incidentally revealed increased fluorodeoxyglucose uptake in the pancreas and breast. Therefore, many studies emphasized that excisional biopsy is needed to rule out malignancy and to confirm the diagnosis of CG.¹⁻⁵ Although only minor cases have been reported, CG of the thyroid shows a homogeneous low density with no enhancement. Core needle biopsy could cause the CG to collapse and can help acquire the CG specimen along with multiple cholesterol crystals.

In conclusion, fortunately, CG is a benign lesion and extremely rare in the thyroid. However, it was challenging to distinguish CG in the thyroid from a malignancy based on preoperative imaging findings. If FNAB of the thyroid nodule is nondiagnostic or returns negative results in patients with abnormal lipid metabolism such as hyperlipidemia, CG should be considered, and a core needle biopsy is recommended. In cases where there is continued uncertainty regarding the diagnosis of the thyroid lesion, diagnostic surgery should be considered to diagnose a CG lesion in the thyroid that mimics a malignancy. We suggest that further research is needed on how to better differentiate CG from malignancy on nodule evaluation.

Author Contributions

Won Woong Kim, article drafting, article revision, final approval.

Disclosures

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