

## Case Report

# Cholesterol Granuloma of Chest Wall – A very Rare Benign Tumour

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### Abstract:

*Cholesterol granuloma is a rare benign tumour and is described as inflammatory granulation that occurs in response to the deposition of cholesterol crystals. It is found most commonly in the paranasal sinuses or temporal bones, but there are also rare reports of their occurrence in the peritoneum, parotid gland, lymph nodes, thyroglossal duct, kidney, liver, and spleen. Involvement of the ribs has rarely been described previously. We report a case of cholesterol granuloma involving chest wall in second intercostals space of a 74-year-old male who presented with a slowly growing lesion of the anterior aspect of right side of the chest.*

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### Key Words :

Cholesterol granuloma, benign tumour.

### Introduction:

Primary bone tumors involving the chest wall are uncommon. In a Mayo Clinic series, 89% were malignant and only 11% were benign. The most common benign bone tumors are chondroma and osteochondroma. Non neoplastic lesions such as fibrous dysplasia, eosinophilic granuloma, and aneurysmal bone cyst also occur in the chest wall. Cholesterol granuloma is a rare benign clinical entity that has been found in many organs or body tissues; however, involvement of chest wall and rib has been reported only rarely.<sup>1</sup> It is comprised of a foreign-body giant cell reaction that forms in response to the presence of cholesterol crystals.

### Case Report:

A 72-year-old diabetic hypertensive male presented with a painless swelling on the right anterior chest wall, which had been gradually growing in size over a period of 6 months. It was associated with mild dyspnea. He denied any recent experience of trauma. He used to smoke which was given up 2 years back. He was on medication for bronchial asthma and hyperlipidemia which were well controlled. With these complaints he consulted

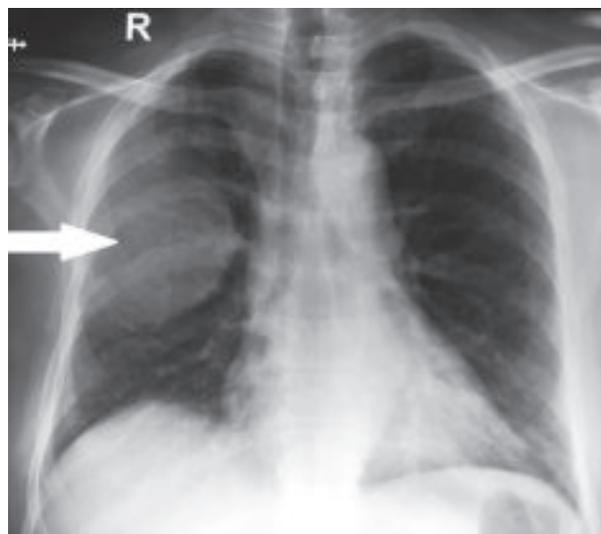
with a local physician who advised him a chest X-ray which revealed a well circumscribed mass lesion on the periphery of right lung field at the level of 2<sup>nd</sup> intercostal space. Then he underwent CT guided FNAC, which initially suggested malignancy. Later, he consulted with an Oncologist and repeat FNAC and core biopsy was done; which revealed non-malignant lesion. CT and MRI of chest showed: dumbbell shaped intra & extra thoracic well defined mass lesion suggesting benign lesion. So he was referred to cardiothoracic surgery for surgical management.

On physical examination, a hard and fixed mass was palpated. Laboratory findings revealed no lipid abnormalities (170 mg/dL serum cholesterol and 81 mg/dL serum triglyceride). A Chest X-ray disclosed a bone lesion accompanied by mild sclerotic change at the right second rib (Fig 1).

CT scan of the chest revealed A well-defined homogeneous soft tissue density mass measuring about 5.1 x 6.5 cm is noted in the right retro-mammary space extending to chest cavity with widening of the intercostal space between 2<sup>nd</sup> and 3<sup>rd</sup> ribs abutting the parietal pleura. 2<sup>nd</sup> rib is not

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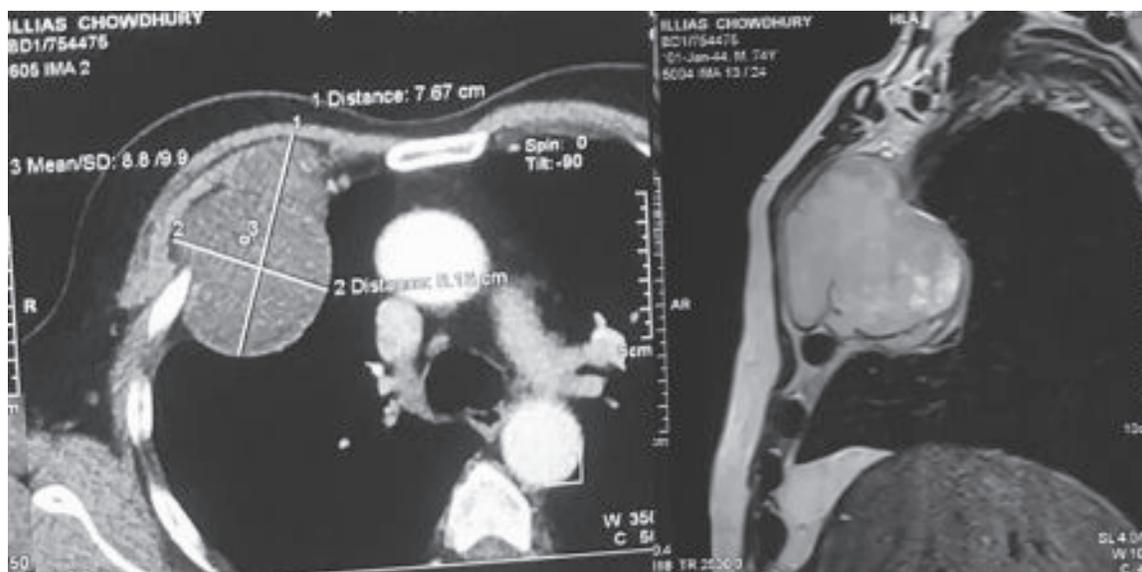


**Fig-1:** Chest X-ray disclosed a bone lesion (Black Arrow) accompanied by mild sclerotic change around the right second rib.

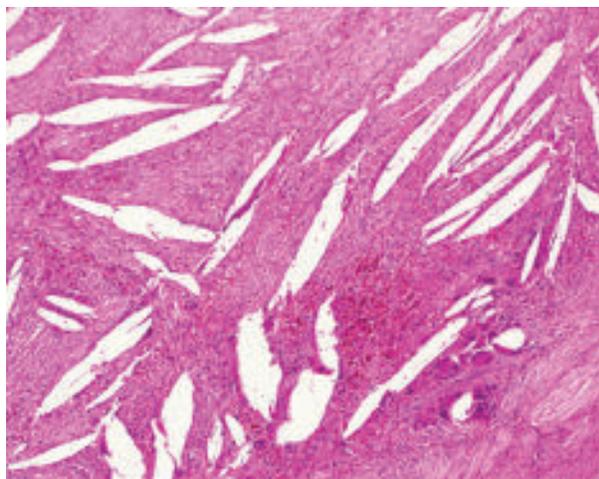
well visible. Post contrast scan revealed no abnormal enhancement of the lesion. MRI of chest showed extra-parenchymal and extra pleural dumbbell shaped well defined mass lesion in the right upper thorax with partial component projecting into the anterior chest wall through the 2nd and 3rd intercostal space. The lesion is heterogeneously iso to hyperintense on T2W sequences, hypointense on T1W images and shows predominantly peripheral enhancement with thick rind of tissue (about 1.5 cm) along its inferior aspect

where it abuts the parietal pleura. No evidence of internal hemorrhage or septations noted. The fat planes with overlying anterior chest wall muscles (pectoralis) and underlying pleura appear intact. The features are suggestive of benign lesion. Features are of benign lesion likely schwannoma with cystic degeneration. (Fig 2).

Because the imaging findings suggested a tumorous condition, which could be low-grade malignant or benign, it was decided to perform surgical resection for accurate diagnosis and appropriate treatment. Intraoperatively, 6cm X 5cm well circumscribed encapsulated cystic lesion identified. The lesion was adherent to the surrounding structures in 2<sup>nd</sup> ICS. Which was eventually ruptured during dissection and huge amount of white cheesy materials delivered out of it. Cyst wall was excised thoroughly from the chest wall and then right pleural cavity was entered through right anterior thoracotomy. The cyst wall was found to be adherent to visceral pleura through a layer of fibrous tissue and was removed. Pathologic examination revealed numerous cholesterol clefts surrounded by foreign body giant cells and a small number of lymphocytes, findings that are consistent with cholesterol granuloma. He had an uneventful post-operative recovery and was discharged from hospital on 5<sup>th</sup> day after operation. Subsequent follow-up at OPD revealed no complication.



**Fig-2:** CT scan showing A well-defined homogeneous soft tissue density mass measuring about (5.1 x 6.5 cm) (Black arrow).



**Fig.-3:** *Histopathology showing cholesterol granuloma.*

### Discussion:

Cholesterol granulomas are frequently described occurring in the temporal bone as a result of inflammatory ear disease.<sup>1</sup> However, they are not exclusive to this location. An intraventricular cholesterol granuloma near the septum pellucidum thought to be secondary to remote head trauma from a motor vehicle collision was previously reported.<sup>2</sup> Orbitofrontal cholesterol granulomas have been associated with trauma as miniscule as a bee sting,<sup>3</sup> and have been shown to recur after incomplete excision.<sup>3-5</sup> Some of these have been reported to exhibit evidence of dysplasia of the adjacent bone, suggesting a pre-existing bony or vascular anomaly as a possible etiology.<sup>6</sup> Renal cholesterol granulomas were thought to be associated in separate cases with hypercholesterolemia or atheromatous cholesterol emboli and epithelioid angiomyolipoma.<sup>7,8</sup> In the breast, the inciting event was postulated to be duct ectasia or periductal inflammation.<sup>9</sup> Previously reported anterior mediastinal cholesterol granulomas have been associated with prior trauma and multilocular thymic cyst.<sup>2,10,11</sup> Pancreatic cholesterol granuloma with peritoneal dissemination has been observed and may have been due to prior episodes of acute pancreatitis.<sup>12</sup> There has been a case of multiple cholesterol granulomas associated with multiple endocrine neoplasia type-1, thought to be caused by systemic distribution of pancreatic enzymes.<sup>13</sup>

Regarding the general theory of the pathogenesis of these lesions, the prevailing wisdom believes

that a traumatic or inflammatory event incites tissue hemorrhage. Subsequent erythrocyte degeneration, coupled with a local milieu of inflammatory cytokines, attracts immune cells to the region. Cholesterol from the destroyed cell membranes forms crystalline complexes which provoke a foreign body giant-cell reaction.<sup>14</sup> This process can result in a slow-growing mass which has the potential to be locally aggressive.<sup>2</sup> Hyperlipidemia, cholesterol emboli, and impaired lymphatic drainage may also play a role in the formation of these lesions.<sup>7,10</sup>

Osseous metaplasia is an extremely rare and pathogenically mysterious feature of cholesterol granulomas that has been reported only twice before in the literature: in the breast and fallopian tube.<sup>9,15</sup> It is theorized to be the result of pluripotent cell, mesenchymal cell, and fibroblastic differentiation into osteoblasts due to stimulation by pro-inflammatory cytokines such as interleukins and transforming-growth-factor-beta, and bone morphogenetic proteins.<sup>16</sup>

It is not clear what factors precipitated the formation of a cholesterol granuloma in our patient. Several factors are generally reported, including high serum cholesterol levels,<sup>7</sup> trauma, and ear diseases such as chronic otitis media and cholesteatoma.<sup>18</sup> Our patient didn't have any history of trauma. His lipid profiles were within normal limits as well. However, he had been suffering from chronic suppurative otitis media which might be related to the formation of his cholesterol granuloma.

The imaging findings of these masses are not specific to cholesterol granuloma and may simulate different entities, both baleful and benign. Such mimics include dermoid cyst,<sup>6</sup> pancreatic cystic neoplasms,<sup>12</sup> craniopharyngioma, renal cell carcinoma,<sup>8</sup> breast cancer and invasive thymic neoplasm. The unfortunate consequence of this is that unnecessary, potentially harmful interventions could be performed for this ultimately benign entity.<sup>14</sup> In the cases of cholesterol granulomas that are causing clinical symptoms, surgical excision is the treatment of choice.

### Conclusion:

Cholesterol granuloma of the rib is an extremely rare benign condition. Given that it is a benign

and curable lesion, early recognition and management is important, and because it can mimic a malignant neoplasm, surgical resection should be considered.

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**Conflict of Interest - None.**

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