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Incidence of Metaplasia in Decorticated Pleural Biopsies at a Tertiary Care Center: A Known But Unknown Entity

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Abstract: ***Metaplasia is defined as the conversion of one differentiated cell type to another mature differentiated cell type. In the respiratory system, metaplasia of the lining epithelium is a common occurrence, as a response to inflammation or injury. However, despite the pleura being the seat of various lesions, metaplasia of this serous lining remains largely unreported in the literature. In a tertiary care institute like ours, pleural decortications comprise a significant proportion of our histopathology caseload. We undertook this study to delve deeper into this histopathological entity.***

Keywords: osseous metaplasia, chondroid metaplasia, granulomatous pleuritis, pyo-pneumothorax

1. Introduction

Metaplasia is defined as the conversion of one differentiated cell type to another mature differentiated cell type and can include conversions between tissue-specific stem cells.[1] Although some forms of metaplasia are adaptive and may mitigate the effects of chronic injury, other types of metaplasia can result in significant dysfunction.

For example, squamous metaplasia of respiratory epithelium develops as a consequence of cigarette smoking and results in the loss of the normal mucociliary blanket, which is a major host barrier to infection and toxic substances in the environment.[2]

Pulmonary osseous metaplasia is a rare entity and is usually associated with some other form of chronic pulmonary disease, such as bronchiectasis, pneumonia, or pulmonary fibrosis.[3,4]

Being a tertiary care respiratory hospital, we receive a large no. of pleural tissue samples for a variety of indications, the author here documents the incidence of pleural metaplasia in decorticated pleural biopsies and describes the possible etiopathogenesis and clinical correlation of the same.

Aims and Objectives

1) To study the prevalence of pleural metaplasia in decorticated pleural biopsies.
2) To describe the morphological variations in pleural metaplasia.
3) To study possible etiopathogenesis, clinical and histopathological correlation of pleural metaplasia.

2. Material and methods

It was an observational, cross-sectional, descriptive study, conducted in the National Institute of Tuberculosis and Respiratory Disease, for a period of 5 years from January 2019 to Dec 2023 (prospective and retrospective).

During this duration, a total of 1501 decorticated pleural samples were received. Of these 112 cases showed histopathological evidence of pleural metaplasia. The cases include both males and females ranging from age 8 to 65 years.

3. Observations

A total of 1501 decorticated pleura were received in the Department of Pathology, NITRD, out of which 112 cases were reported as pleural metaplasia, in which 110 cases were osseous metaplasia, 1 case of chondroid metaplasia and 1 case with both osseous and chondroid metaplasia.

Table 1: Age-wise distribution of pleural metaplasia

Age (in years)	No of cases	Percentage (%)
<10	1	0.89
10-19	30	26.78
20-29	44	39.28
30-39	16	14.28
40-49	16	14.28
50-59	2	1.78
60-69	3	2.67
Total	112	100%

As seen in Table no 1., the majority of pleural metaplasia was seen in 3rd decade followed by 2nd decade.

- Gender predisposition in pleural metaplasia shows a male: female ratio = 2.5:1 (71.4% male against 28.57 % female cases).
- Site-wise distribution of pleural metaplasia shows almost equal distribution of the lesion, with 53% cases in the left lung and 47 % cases in the right lung.
- Correlation with clinical findings: All the cases of pleural biopsies received were clinically diagnosed as Pyo-pneumothorax or hydro-pneumothorax and the majority were associated with tuberculosis (81 cases).

Table 2: Histopathological association with pleural metaplasia

Diagnosis	No of cases associated with metaplasia	Percentage (%)
Non specific chronic pleuritis	86	76.78
Granulomatous pleuritis	25	22.32
Tubercular pleuritis	1	0.89
Malignancy	0	0
Total	112	100%

As mentioned in Table No. 2, the most common histopathological association with pleural metaplasia was nonspecific chronic pleuritis in 72% of cases, followed by granulomatous pleuritis in 15% of cases. One case was of tubercular pleuritis, while no case was associated with malignancy.

4. Discussion

Pleural metaplasia is extremely rare, with very few documented references. Furthermore, their association with clinical findings has not been described and there are no large series of pleural metaplasia in humans reported to date. Only a few isolated cases are documented in humans and animals. Hence awareness of these lesions is important.

Pleural metaplasia includes osseous metaplasia, chondroid metaplasia, mucous metaplasia, adipocytic and squamous metaplasia.[5,6,7,8] These metaplasia in the pleura and lung may occur as a response to injury or inflammation when fibroblastic tissue is stimulated or induced to form nonneoplastic bone and/or cartilage. New bone forms with or without a cartilage template and can be bordered by fibroblastic tissue.[9,10] Osseous metaplasia is seen as foci of eosinophilic osteoid or woven bone or basophilic mineralized bone that contain interspersed lacunae with osteoblastic rimming.[11] Foci of osseous or cartilaginous metaplasia must be distinguished from metastatic osteosarcoma or chondrosarcoma, respectively.[9,10]

Cecilia Ramırez-Hernandez et al described pleural metaplasia in 31 cases out of 50 lungs of cattle condemned for pleuritis (62%). In contrast to our study, they always contained adipose tissue (100%), some also contained hyaline cartilage (45.1%) and bone tissue (6.4%), but there were minimal inflammatory changes.[12]

A study by Cecilia Ramırez-Hernandez et al describes proliferative, fibrotic, and metaplastic lesions in the caudal pleura of cattle, which are a frequent cause of lung condemnation. They proposed that the metaplastic tissues originate from transdifferentiated mesothelial cells.[12]

5. Conclusion

In our study, the prevalence of pleural metaplasia is as high as 7.46 %, and most of the cases were associated with chronic inflammation and lesions like tuberculosis, which has a huge disease burden in a country like India. Identification of the pathophysiology and basis of pleural metaplasia is especially significant as pleural diseases are under-represented in literature. Furthermore, their potential association if any with preneoplastic disease of the pleura needs to be studied.

Pictures

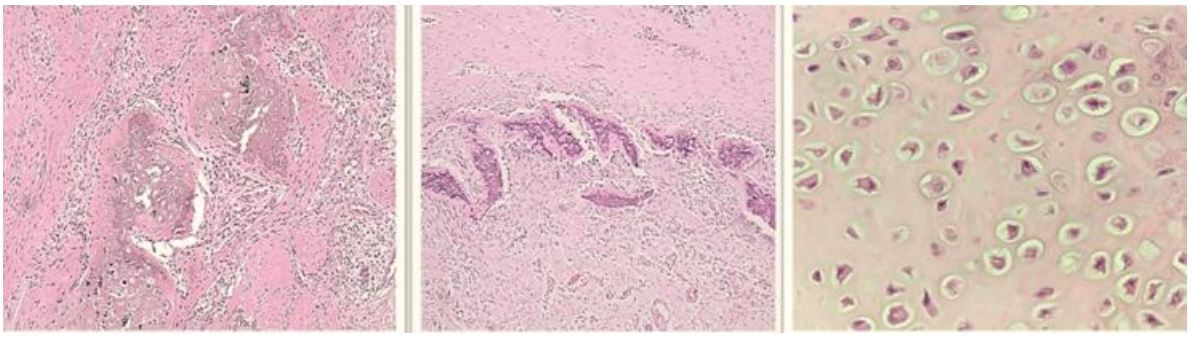

Figure 1: Shows Chondroid metaplasia

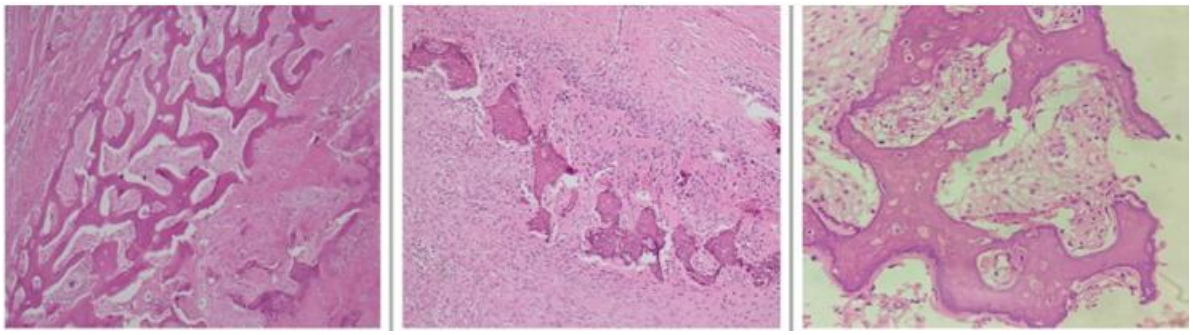

Figure 2: Osseous metaplasia

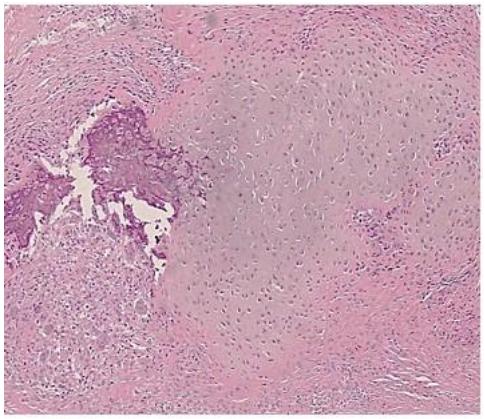

Figure 3: Osseous and chondroid metaplasia together in a case of granulomatous pleuritis

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