



CT-BASED EVALUATION OF NECROTIC CONSOLIDATION WITH ITS CLINICAL CORRELATION AND MANAGEMENT IMPLICATIONS : A CASE SERIES

Radiology

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ABSTRACT

Necrotising pneumonia is a severe complication of community-acquired pneumonia characterised by liquefaction and cavitation of lung tissue, associated with high morbidity and mortality. Contrast enhanced CT evaluation of chest has definitive role in not only detecting the necrotic pulmonary tissue but also to look for co-existent lung/pleural pathologies. This article outlines the CECT features of the necrotizing consolidation, with the management implications in these patients.

KEYWORDS

BACKGROUND:

Necrotizing consolidation is an uncommon, severe complication of pneumonia. It is characterized by destruction of the underlying lung parenchyma resulting in multiple small, thin-walled cavities and is often accompanied by empyema and bronchopleural fistulae. It has been characterized radiographically by findings of consolidated lung with peripheral necrosis and multiple small cavities, and may be rapidly progressive.

OBJECTIVE:

To evaluate ten cases of necrotic consolidation based on their CT findings and to help guide in the management.

METHODOLOGY:

This study was carried out in a span of 1 year with 10 cases who were clinically diagnosed with sepsis and had respiratory complaints. They were suspected to have non-resolving pneumonia and were advised CECT-Chest study in the department of Radiology, New Civil Hospital, Surat.

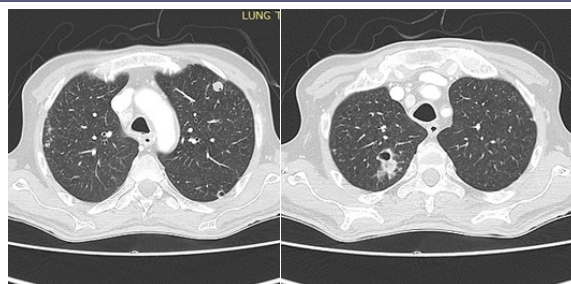
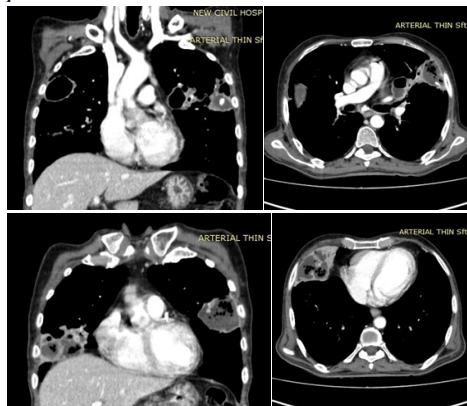
RESULTS:

Radiological evaluation extent of consolidation. Out of ten patients studied, all had non-resolving necrotic consolidation with co-existent bronchopleural fistula, empyema, pulmonary nodules in different cases. All these cases received initial medical management and most needed surgical intervention for management.

CASE SERIES:

Ten patients were imaged with contrast enhanced CT scan over a period of 1 year at New Civil Hospital, Surat and scan images of some of these have been shown here.

CASE 1: [block arrow – Rasmussen aneurysm] [red arrow – septic emboli]

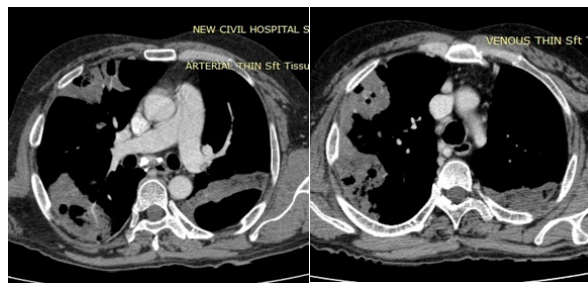


Above images show dense patch of non-enhancing necrotic consolidation with multiple air-foci in it.

Also seen are focal dilations of subsegmental branches of pulmonary artery (Representing Rasmussen's aneurysm) with few subpleural cavitating nodules seen (Representing septic emboli).

All above findings suggested Koch's etiology likely.

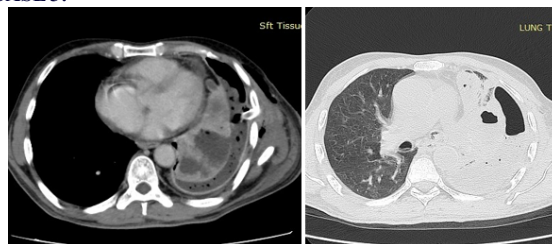
CASE 2:

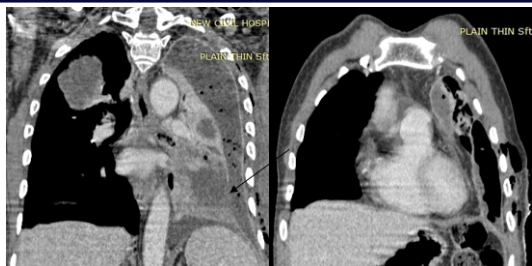


The above images show non-enhancing hypodense areas with internal cavitation in them noted in right upper and lower lobe and left upper lobe with calcified mediastinal lymphadenopathy.

Possibility of infective etiology – Koch's likely.

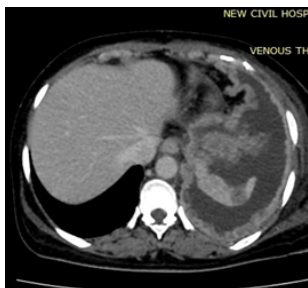
CASE 3:





In the above images, left lung shows necrotic consolidation patch with its subsequent rupture into the pleural cavity with no pleuro-pulmonary interface appreciated (shown by black arrow) due to the rupture with resultant left sided pneumothorax. Another similar patch of consolidation with predominant non-enhancing necrotic component seen in the right upper lobe.

CASE 4:



The above image shows a small non-enhancing area in the posterobasal segment of left lower lobe.

CASE 5:



The above images show patches of necrotic consolidation with foci of calcification in right upper lobe and right lower lobe.

CASE 6:



These images show two communicating lung-abscesses with air-fluid levels in the right lung parenchyma.

OBSERVATIONS AND RESULTS:

Case	Age	Sex	Medical history	SOFA score
1	4	M	No significant history	10
2	48	M	Smoker	12
3	32	M	Non-smoker, HTN	9
4	42	F	No significant history	13
5	3	F	No significant history	12
6	7	M	No significant history	7
7	5	M	No significant history	11
8	57	M	Chronic Smoker, alcoholic	13
9	53	M	Smoker, DM	10
10	59	F	Non-smoker	11

Case	Radiological findings, other than necrotic consolidation	Management
1	with lung abscess	Pneumonectomy done
2	With broncho-pleural fistula	Decortication
3	With septic emboli	Medical management
4	With consolidation rupture into pleural cavity with resultant pneumatocele formation	Inadequate response to antibiotics; Decortication done
5	With Rasmussen aneurysm	Transcatheter embolization
6	With chronic empyema	Video-assisted thoracoscopic surgery done
7	With pulmonary thrombo-embolism	Medical management and thrombectomy
8	With lung abscess	Pneumonectomy
9	With surrounding nodules and atelectatic band formation	Medical management
10	With Bronchopleural fistula	Decortication done

From the table, it is inferred that necrotic consolidation is very frequently associated with lung abscess, pneumatocele formation, empyemas and bronchopleural fistula formation.

DISCUSSION:

In the present study, 10 cases of necrotic consolidation which included 4 pediatric cases and 6 adult cases were studied radiologically and the surgical intervention needed in these patients were evaluated.

Their course was associated with significant radiographical evidence of lung damage and prolonged hospitalisation. *S. pneumoniae* and *Staphylococcus* were among the most commonly isolated organisms in these patients.

Radiographic criteria for NP include the loss of normal pulmonary parenchymal architecture and the presence of areas of decreased parenchymal enhancement, representing liquefaction, that are progressively replaced by multiple small air or fluid filled cavities^{[1][2]}. The pathophysiology of NP is thought to be one of massive pulmonary gangrene, tissue liquefaction and necrosis^[3] but the precise pathways leading to this massive damage have not been well established.

Lying on a spectrum between lung abscess and pulmonary gangrene^[4,5], necrotizing pneumonia is characterized by pulmonary inflammation with consolidation, peripheral necrosis and multiple small cavities^[6]. Compromise of the bronchial and pulmonary vascular supply^[7,8] has the potential for devitalization of lung parenchyma. The lack of blood supply to the underperfused areas impedes delivery of antibiotics, allowing for uncontrolled infection and further destruction of lung tissue. Pulmonary gangrene is the "final stage in a continuum of progressive devitalization of pulmonary parenchyma"^[8] and is characterized by "sloughing of a pulmonary segment or lobe"^[8].

Managing patients with necrotizing pneumonia is challenging because there are no firm guidelines outlining when to proceed from medical to surgical management. Surgical management includes: Management of pleural disease including empyema or bronchopleural fistula, and management of progressive parenchymal necrotizing infection. When an operation is deemed necessary, the goals of surgery are to control the ongoing sepsis, drain the empyema, unroof lung abscesses, resect or debride necrotic tissue, re-expand the lung and protect the contralateral lung from spillage while trying to avoid large spatial voids and large bronchopleural fistulas^[1]. Video-assisted thoracoscopic surgery, decortication and wedge resections are other options available.

CONCLUSION:

CT thorax is indicated for patients with progressive pneumonia or nonresponding pneumonia, and may show evidence of necrotizing pneumonia with other co-existent pleural and pulmonary parenchymal abnormalities. All these cases should receive initial medical management followed by surgical intervention, if necessary. Our study showed most cases eventually need surgical intervention and earlier surgical intervention if there is no improvement in the patient's condition, is encouraged nowadays.

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