

CARDIAC HERNIATION WITH RIGHT HEART FAILURE AFTER LEFT PNEUMONECTOMY IN A PATIENT OF CARCINOMA BREAST: A CASE REPORT AND REVIEW

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Abstract:

Cardiac herniation is one of the rare conditions associated with a high mortality rate. We describe a case report of cardiac herniation with cardiogenic shock and right heart failure after left pneumonectomy in a young patient who had been treated for carcinoma breast [right side] two years back. An exploratory thoracotomy with reduction of cardiac herniation and meshplasty was undertaken. But the patient needed a second re-exploration through sternotomy, on CPB a few hours later for a suspected right atrial thrombus with massive dilatation of right atrium and ventricle as determined by transthoracic echocardiography. The patient succumbed five hours after the re-exploration. The literature is reviewed to reveal causative mechanisms and immediate remedial measures that need to be taken to identify and treat the problem.

Key words: Lung metastasis, Pneumonectomy, Cardiac herniation, Right Heart Failure

Case Report:

A forty-year-old non-diabetic, non-hypertensive, 55 kg female of average size and built who had been treated with surgery,

chemotherapy and radiotherapy for right sided carcinoma breast stage 2, two years ago, was admitted with a history of dry cough for a month. She was on oral dose of Tamoxifen. X-ray chest showed an obstructive collapse of lung on the left side. CT thorax revealed a left upper lobe mass that was suspected to be metastasis from breast. However three bronchoscopic FNAC's done in various hospitals during the past 3 months were positive for malignant cells with a suspected primary lesion of broncho- alveolar carcinoma. She underwent left pneumonectomy after pulmonary, cardiac and laboratory evaluation. Intraoperative and immediate postoperative period were uneventful. She was extubated on the table. She was conscious and pain free with thoracic epidural infusions of sensorcaine [0.125%] and fentanyl [5mcg/ml] and maintained her vitals [Table-1]

Four hours after the surgery, she developed one episode of acute hypotension [B.P 52/48mm Hg-MAP 48]. All other parameters were maintained. She was given a fluid challenge and low dose dopamine infusion was started. Within half an hour her B.P rose to 94/67mm Hg [73 MAP]. Arterial gasometry showed a metabolic acidosis. [Table-2]

The dopamine infusion was continued and she was put on BIPAP [8 / 7] to combat mild respiratory distress which was suspected to be due to congestive heart failure. A positive fluid balance of 1657ml was also noticed for which she received diuretics and restricted IV fluids.

Sixteen hours later, she was maintaining her vitals except for a mild sinus tachycardia [H.R-118/min]. She continued to be on BIPAP and dopamine infusion. Twenty four hours postoperatively, she continued to have a rising tachycardia [H.R. of 150/min.] and increase in the work of breathing. She was intubated and ventilated. An echocardiography was done. It revealed a cardiac tamponade. A portable X-ray chest confirmed the occurrence of cardiac herniation. By this time the patient's CVP had increased from 12 to 30 cms. H₂O.

The patient was immediately shifted to the OT and reexplored. Intraoperatively the apex and the left heart was seen to be herniated towards the left side through an open pericardial gap of 8 cm.size and beating feebly The right sided heart was full but no rotation of great vessels was seen. Internal defibrillator pads and pacing leads were kept ready while the pericardial defect was closed and meshplasty was done in the right lateral position. The patient was maintained on the vasopressors and shifted for further management to the ICU.

Soda bicarbonate was administered intraoperatively during 1st and 2nd explorations, at bicarbonate levels of 17.3 and 14.6 respectively, in view of persistent severe non responsive hypotension. Calcium was also administered by the cardiac anesthesiologists during the 2nd exploration when ABG showed a low serum calcium.

Six hrs after first re-exploration, TEE was done to reassess the right heart. Massive dilatation of right atrium and right ventricle was observed. An atrial thrombus was suspected. The patient was wheeled in the OT for a 2nd re-exploration under CPB. Intraoperatively no atrial thrombus was found. The right side of the heart was not functioning at all. The patient was managed with multiple inotropes and calcium but patient did not improve and succumbed to the complications.

Discussion:

A right to left mediastinal shift, following left pneumonectomy, occurs mostly through rotation with the aortic arch arranged in the sagittal plane. Cardiac herniation after lung surgery that has involved partial pericardiectomy is well described in the literature. When herniation occurs, sudden cardiogenic shock with signs and symptoms including arrhythmia, myocardial ischemia, and hypotension may develop in a previously stable patient.^{1,2} The mortality rate from such complications is between 30% and 64%.^{3,4} It is very important to diagnose this condition in time as delay in the treatment can be fatal.

A high degree of suspicion is required to diagnose cardiac herniation, but clinicians are often unfamiliar with the clinical and radiological findings. No single imaging technique is entirely reliable. Diagnostic tools include chest radiography, computed tomography, and transthoracic and transesophageal echocardiography. In this case the diagnosis was based on the portable chest radiography. [Fig.1]

Cardiac herniation per se can be treated simply and effectively through keeping the patient in the opposite lateral position, primary repair of the pericardial defect with direct suturing or with use of an autologous or synthetic patch. A meshplasty was done in this case but the right heart failure did not respond to the medical management, due to missed diagnosis and delayed treatment.

In ICU an observed rise in CVP, in this case was related to be due to an inadvertent fluid overload infused to combat a hypotensive episode before the diagnosis of cardiac herniation was suspected. The patient was treated with diuretics and subsequent fluid restriction. Respiratory distress preceded cardiac decompensation and was managed with support ventilation.

Implications:

1. In patients with history of chest radiotherapy especially for the right sided malignancy of the breast, a preoperative echocardiography must be undertaken to diagnose a pre-existent pulmonary hypertension.
2. CVP should be closely monitored and in an event of persistent rise beyond 20 cm of water, cardiac herniation with twisting of the great vessels should be suspected and promptly managed.

Conclusion:

We report here a rare case of left cardiac herniation associated with an irreversible right heart failure after an intra pericardial left Pneumonectomy, which resulted in mortality probably due to a late recognition and management.

Time	HR (/min)	BP (mmHg)	SpO ₂ (%)	CVP (cmH ₂ O)	Drugs	BiPAP/ IPPV	Remarks
Day-1 2 PM	104	90/64	100	12	Bupivacaine 0.125% + Fentanyl 25 mcg/hr		
5:30 PM	90	52/40	96	12	Dopamine		
6:15 PM		94/67 (73)	100		Dopamine		
Day-2 7:50AM	118	97/76	98	9	Dopamine	8/7	+ive Fluid Balance – 1657 ml
1 PM	125	105/72	98	12	Dopamine	10/6	
3:30 PM	130	92/64	95		Dopamine	14/6	
3:50 PM (24 hrs post op)	150	70/40		30	Dopamine + Noradrenaline	Intubated IPPV	
4 PM	155	74/40			Dopamine + Noradrenaline	1 st re-exploration	2-D Echo – Cardiac Temponade
4:15 PM (1 st Re-exploration)	144	68/36	98	38	Add: Dobutamine Adrenaline & Sodabibcarb infusion		Meshplasty in Right Lateral Position
9:30 PM		98/50		30	-do-		Urine: 10ml/hr
10:30 Pm	122	96/48			Add: Ca-Gluconate @ 10ml/hr	2 nd Re-exploration at 11:30 CPB	TEE: Massive Dilatation of Rt Atrium & Rt Ventricle
Day 3 2 AM		60/34	100	28	-do-	Rt. Heart not functioning	Pupils Dilated Non Reactive
4:15 AM	134	52/28			-do-		Expired at 5:05 AM

Table 1: Sequence of perioperative events

	pH	pCO ₂	pO ₂	HCO ₃	Lactate	BiPAP/IPPV	Hb
Day 1 8 PM (6.5 hrs after surgery)	7.26	35.5	138	16.9	1.4	8/7	
Day 2 8 AM	7.3	33.7	78.5	17.3		10/6	
9:30 PM	7.25	34.5	94.6	14.6	10.9	IPPV	13.5

Table 2: Arterial Blood Gases

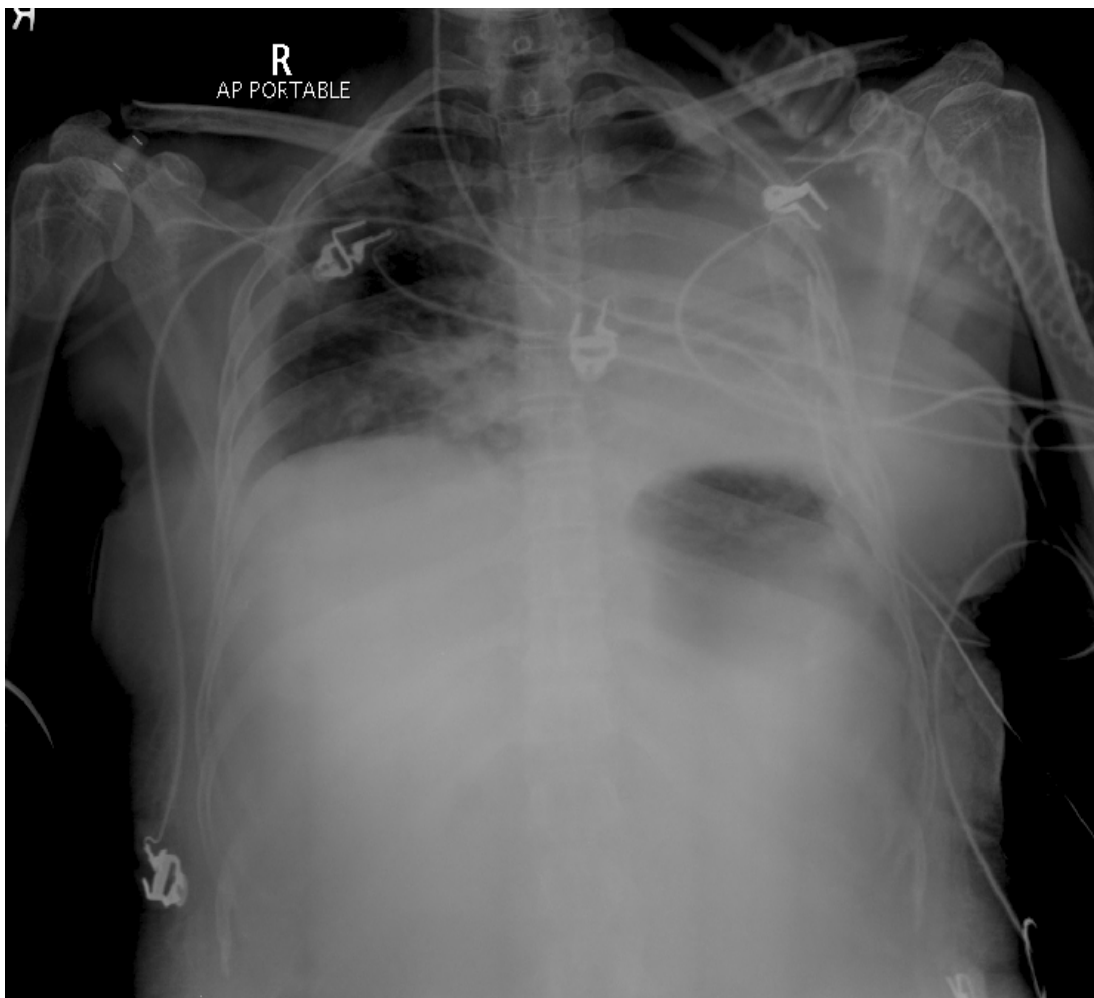


Fig. 1: X-Ray Chest showing left Cardiac Herniation

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