VIDEO-ASSISTED THORACOSCOPIC SURGERY (VATS) IN CHEST-LUNG INJURIES

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Abstract: *a hemodinamically stable patient presenting with persisting bleeding through his chest tube is a classic indication for early thoracoscopic interventient VATS in trauma. The source of bleeding and air leaks can be identified and often threated: bleeding and perforated pulmonary segments can be resected, and chest wall bleeding can be coagulated or sutured. Non or partially drainable hemothoraxis an indication for thoracoscopy. Coagulated blood can be mechanically mobilized, and aspirated or primary bleeding may be stopped. Correct placement of the drainage is part of optimized therapy along with inspection of all intrathoracic organs and surfaces. The advent of VATS revolutionizes the practice of surgery within a short span of time, videoassisted thoracic surgery (VATS) has became an acceptable approach to a wide range of thoracic postraumatic procedures. The use of VATS as a diagnostic modality is recentl establised. VATS is still in evolution. In this study we evaluate the accuracy of radiological test and the outcame after VATS evacuation of retained hemothorax and the associated intrathoracic injuries in patients with fluid chest injury treated in 1st surgical clino-thoraco-esophagial department from Emergency Academic Hospital.*

INTRODUCTION

It is estimated that chest trauma occurs in 30-40 % of injured patients, admitted to trauma counters (1,2).The problem of retained hemothorax in the patients with penetrating trauma is well regognized. Frequently the patients with undrained pleural collection often trauma have severe injury, have multiple rib fractures. And others associated injuries, are ventilator dependent, and have confusing diagnostic picture. (3,4)Furthermore, the developpment of advanced imaging tehniques(5,6,7) and minimal acces surgery (8,9) has created controverssy in the management of chest trauma. CT scans often diagnose plural collections and pulmonar abnormalities, that are not fully appreciated on rouutine chest radiography.(10,11) Retained hemothorax occurs in 5% to 30% of patients with chest trauma (12) and is a major risk factor for the development of empyem. If untracted, it can lead to fibrothorax, lung entropment and inpaired pulmonary funtion. Therefore, accurate diagnosis and early treatment are crucial if morbidity and in particular mortality are to be reduced (13).After brain injury it is the second most common system involved in a multiply system injured patient representing a substantial proportion of the total injuries assessed and treated. Hemothorax or a hemopneumothrorax comprises a significant proportion of patients presenting with chest trauma (14,15). Surgical intervention has not played a major role in the treatment of hemothorax as the need for thoracotomy to avoid life treating intrathoracic bleeding is infrequent (16,17).Also, the significant morbidity of thoracotomy has limited it's widespread utility , and patients have been treated predominantly with nonoperative measurs chest thoracotomy tube aplication, or VATS, but consecutive measures can be associated with inadequate evacuation of the hemothorax in a substantial subset of trauma patients. (18)Thoracotomy for bleeding is reserved for 15% of such patients (19,20). The residual blood that remains undrained in the thraheic cavity after malplacement of pleural tube, obstruction of it's lumen, is already infected and is an ideal vidus for infection (21, 22).The advancement of VATS has in part resolved the dilema between routine thoracotomy for evacuation of undrained hemothorax and observation of the patients (23,24). The thoracoscopy is much easier and more effective when done soon after trauma.

OBJECTIVES

In this study we evaluate the accuracy of radiological tests and outcome after VATS evacuation of retained hemothorax an the associated intrathoracic injuries in pacients with flail chest injury reated in I-st Surgical Clinic Thoraco-esophageal department from Emergency Academic Hospital.

PATIENTS AND METHODS

Of 700 patients admitted between january 2000 and december 2012 for injuries to the chest 57 (8%) were evaluated (group 1). Prospectively to see if they had retained hemothorax. This patients had opacities on the chest radiograph (Rx,48 hours after admission with normal blood pressure (Inger).Opacitie of the chest radiograph.The study group with flail chest(group2),91 (15%) patients comprised all patients with three or more ribs broken in two locations..Data retrieved for each patient with flail chest included mechanism of injury , including hemothorax, pneumothorax, pulmonary contusion, diaphragmatic injury, tracheobrachial injury, major pulmonary location requiring thoracotomy, great vessels or cardiac rupture.In this patients, the mechanical ventilation were larger than 24 hours. The HRDS was definedas sever hypoxia (Pa O2 < 60 torr) more than 72 hours despite high levels of oxygen support (Fi O2> 60%)All 58 patients within flail chest had a computer tomograph (CT) of the chest. In all pacients with more than 500ml residual blood on CT, have a emergency thoracoscopy or thoracotomy with pleural drain. Emergency thoracotomy for lung contusion with retained hemothorax and bloodclot.For VATS,after deflated

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lung, on a 0^0 optic camera examin the thoracic cavity. Two other parts was inserted around the third to fourth intercostal spaces on at the some level in the antherior axillary line. As soon as the blood was removed by suction, the pleura was irrigated and avacuated with suction, and clots was sent for bacteriology. The pleural cavity was drained with two tubes.The thoracic CT was show residual blood and no air leak or fluid drainage more than 2ml/ hour, their tubes removed, about Davies concept in thoracotomy drainage. (25)

Of 700 patients with thoracic injuries.91 (13%) patients were with fluid chest injury, 57 (8%) were found to have retained hemotorax.

In fluid chest associated intrathoracic injuries were pneumothorax, heomothorax (69%) and pulmonary contusion (upper chest).ARDS (acute respiratory distress syndrome) developed in 26% of patients.

With flail chest and 68% of all patients with flail chest required intubation with or without thoracostomy.

In patients with complex chest flail injuries, the mortality rate was 32%.

In undrainded hemothorax the intervention was: standard thorax radiography and CT, 48 hours after admission and with VATS within 3-6 day of spitalisation.

RESULTS

Eleven patients underwent early thoracoscopy, no mortali-ty and minimal pain after VATS evacuation of blood colection. For prediction the need of evacuation of hemothorax , CT was the most important test, with or within clinical evaluation of patients.

From 700 pacients with thoracic in juries, 91 (13%) pacients were with flail chest injury (Group 1), 15 (2%) was found to have retained hemothorax (group 2). In first (groupe 1) 10 % of all rib fractures was flail injuries. Group 2 was compared with simple costal fractures, for concurrent intrathoracic lessions (table 1)Flail chest and simple costal fractures and intrathoracic injuries.

Table no. 1. Flail chest and simple costal fractures and intrathoracic injuries (table1)

Flail injuries n=91			Non Flail injuries n=700		
	Nr%		Nr%		P value
Hemothorax	46	47	150	19	<0.0001
Pneumothorax	41	46	240	30	<0.01
Hemopneumothorax	63	69	244	32	<0.0001
Pulmonary Contusion	41	46	57	15	<0.0001
Diaphragm injury	2	2	14	30	>0.5
Brachial injury	0	0	1	0.2	>0.5
Pulmonary laceration	2	2	4	1.5	>0.5

Patients with flail chest was more likely to have pulmonary contusion occur than was the patients with fractures (46/19 %).In flail chest we have a high incidence of hemothorax and pneumothorax.In this study more than 60 of 91 flail chest cases (69%) accurred either one or the other injury, compared with 39% of the 700 patients with simple rib fractures; this were highly statistically significant (P<0.0001).The data about occurence of other intrathoracic injuries, comparing with the incidence of this injuries in patients with simple of these injuries in patients with simple rib or costal cartilage fractures, was no signigicant diffeence (P<0.1).The incidence of ARDS(acute respiratory distress syndrome) higher among flail chest injuries patients, and of 711 patients with flail chest surviving more than 72 hours, 19 met the criterion for ARDS (26%), in groups 2 categories, 9% has ARDS.This difference was significant (p<0.0001).In group 1 cases 66% of the patients requiered mechanical ventilation more than 24 hours, because of the presence of hypoxia, hypercapnea or airway compomise, the interval of ventilation was with a mean of 22 days, in contrast no percent of patients from Group 2 requiered mechanical ventilation for larger than one day. The difference is statistically significant (P <0.001).

The mortality rate in Group 1 was 32 percent (table2).

Table no. 2. Causes of death among patients with flail chest

	NR	I%
MSOF	6	20
ARDS	5	16.6
Intracranial injury	6	20
Blunt Cardiac injury	1	3.3
Exsanguination abdominal wound	3	10
Hemorrage with pelvic fracture	1	3.3
Exsanguination chest wound	4	13.3
Cardiac failure	4	1.3
Total	30	100%

Six pacients from 30 death becomes the intracranial injury, and seven patients death with exsanguinating wounds. In category 2, five patients had bad emergency exploratory laparotomy for intraabdominal in juries, 20% from the patients (12 cases) had thoracostomy for evacuation of undrained intrathoracic blood, the blood collection had evidence on the CT of the chest. Three patients with undrainded blood collection developed empyenas, drained by open thoracotomy with decortication.

EMPYEM DRAINED WITH THORACOTOMY

In this groupe, the thorax radiograph done 48 hours, after admission did not provide reliable information about parenchymal injuries, and the presence of the fluid collection. This observation is confirmed with the wrong interpretation of the chest radiograpf from surgeon in 27 cases (48%), and in 26 (47%) cases, the indication of the nature of the opacity were unsuccesful.

The positive interpretation of CT was in 97% correctly.The management that would have been instituted on the basis of the thorax radiograph findings was changed from non-operative treatment to operation or viceversa in 17 cases (30%).

a) Plain chest radiograph underestimating the presence of retained hemothorax.
b) CT showed a fluid collection estimated 700 ml
c) the collection was evacuated thoracotomy on the third day after admission, with 700 ml blood drained

Fig 2:

a) Both the surgeon and radiolagist interpreted as showing considerable residual fluid after the thoracostomy.

b) thoracic CT showed that the opacification was almost excusively a parenchimal contusion.

The drained blood volum with thoracostomy was 680 ml (300-1250 ml) and was well corelated with CT.

After thoracostopy the first tube was removed a mean of two days postoperative (range 1-5) and the second one a mean of three days(range 2-10).

In groupe 2, we observed complications. In three cases, one pneumonia, one urinary infection, one branctoplural fistula in the ninth postoperative days. The patients with lung contusion, one pacient with blunt thoracic injury died because o serious lung contusion, with fulminat ARDS syndrome (Inge).

CONCLUSION

Flail chest patients highly associated with pulmonary contusion, pneumothorax and hemothorax and the majority of

patients need mechanical ventilation for many days.

The VATS in hemothorax evacuation is effective, and need for very good results early intervention in selected patients.

In patients without relevant lung contusion, pulmonary disfunction needs up to 5 days to be clinical manifest indicating the inflamatory origin of the pulmonary dysfunction.

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