Editorial

CHEST INJURIES IN BATTLE CASUALTIES

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MJAFI 1997; 53 : 81-82

Introduction

The incidence of penetrating chest injuries is on the increase [1]. Incidence of chest injuries during Indo-Pak conflict in 1965 and 1971 were 8.1 per cent and 4.98 per cent respectively [2]. The front and back of the chest represent 20 per cent of body surface area hence higher incidence of injuries is generally expected. However a number of casualties die of massive internal haemorrhage.

Many centuries of effort have not prevented nations from engaging in conflict which cause countless injuries. Added to this is the pernicious entity called terrorism which takes off where war stops. It remains for the surgeon to cope with the results of these aberrations of civilisation.

Pathophysiology

Injury to vital chest viscera may cause massive haemorrhage and death before any medical aid can be rendered. If patients survive, the blood and/or air collection results in mechanical interference with cardiorespiratory effort. This is easily treated. The pathophysiologic changes are quick to manifest. Management thus calls for quick assessment and energetic treatment. High velocity missiles like rifle bullets cause extensive soft tissue damage. The entry and exit wounds may prove deceptive as bony structures can cause deflection. However the lack of knowledge of the circumstances of injury, type of weapon used and position of the victim often make accurate appraisal impossible.

Resuscitation

The result of all chest injuries is acute disruption of tissue perfusion with attendant hypoxia and metabolic acidosis. The basic principles of resuscitation include establishment of a functional air

way, control of major life-threatening haemorrhage, volume replacement, and lung re-expansion [4].

Definitive Management

General principles

Even small splinters can cause massive haemothorax. The diagnosis of intra-thoracic injury and its consequences is essentially clinical. Intercostal tube drainage is adequate in most patients, only 10-15 per cent requiring thoracotomy. Though a formal thoracotomy is a daunting prospect for the field surgeon, it must be resorted to as a life saving measure. Critically injured patients presenting with persistent haemothorax, major air leaks or cardiac tamponade are unlikely to sustain evacuation to a base hospital. Patients with chest injuries require blood transfusion and arrangements must be made for this. Gelatine polymer (Haemaccel) is a good alternative. Broad spectrum antibiotics must be given parenterally at the earliest.

Haemothorax

As mentioned above even small splinters can cause massive haemothorax. Most commonly bleeding is from a lacerated lung. As pulmonary arterial and venous pressures are low, the bleeding is usually self-limiting as the lung collapses and a clot forms. However bleeding from the chest wall and major pulmonary vessels may be massive leading to shock. Gross mediastinal shift also impedes venous return to the heart and cardiac output. This combination results in vital organ hypoxia and may end fatally. For these reasons a haemothorax must be evacuated. There is no role for needle aspiration. Evacuation of haemothorax should be performed by intercostal tube drainage. This serves to evacuate both air and blood. Alter-

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natively a chest tube with non-return valve may be used.

Pneumothorax

Lung lacerations yield both air and blood, sometimes more air than blood. The amount of air does not depend on the size of bronchus injured but more so on the "one-way valve" pathology of injured lung. A tension pneumothorax needs tube introduction as an emergency measure as described above. Tube introduction permits release of a large volume of air with dramatic improvement. Persistent air leak is evidence of major bronchial injury which calls for a thoracotomy.

Surgical emphysema

Surgical emphysema is a sign of either lung, bronchus, tracheal or oesophageal injury. Air gets into the chest wall planes and spreads quickly. Surgical emphysema starting in the root of neck is usually indicative of major bronchial or tracheal injury. Treatment lies in the introduction of an intercostal chest tube drainage. Tracheal injury may need endotracheal intubation or a tracheostomy.

Open pneumothorax

A missile wound creating a hole in the chest wall produces a sucking wound of the chest. This leads to lung collapse and mediastinal shift as the hole competes with the glottis during inspiration. As a first aid measure the wound must be sealed with dressings and elastoplast. The field surgeon must excise and close the wound and institute tube drainage. Local lung injury can also be tackled through the wound. Usually multiple rib fractures do not require early intervention other than local infiltration to reduce pain. Large chest wall defects can be packed with povidone iodine (Betadine) gauze and strapped with elastoplast.

Cardiac tamponade

The treatment is immediate pericardiocentesis. Relief is usually immediate. In case of persistent tamponade, a thoracotomy and cardiac repair is required. Inotropic and antiarrhythmic support is usually required in these patients postoperatively [6]. The indications for thoracotomy must be very clear cut and the forward surgeon must not indulge in "foreign body chasing". At the same time patients requiring urgent thoracotomy must be oper-

ated on as they are unlikely to sustain evacuation.

Indications for thoracotomy

- a) Initial drainage of over 1 L of blood and/or subsequent drainage of over 100 mL/h.
- b) Massive persistent air leak.
- c) Cardiac tamponade not relieved by pericardiocentesis.
- d) Intrathoracic foreign body more than 2.5 cm in size, ragged in shape and near a vital structure.
- e) Persistent bleeding into the trachea.
- f) Thoraco-abdominal injuries.

Lung Injuries

Lung lacerations are repaired in 2 layers using horizontal mattress catgut sutures followed by continuous silk sutures. Large tears with evidence of major vascular and bronchial injury should be dealt with by lung resection taking care to doubly ligate all vascular pedicles.

DOs for Chest Injuries

1. Do carry out adequate and prompt resuscitation.
2. Do insert a chest tube as soon as possible.
3. Do evacuate the patient in semireclining position with oxygen on flow.
4. Do provide adequate postop physiotherapy.

DONTs for Chest Injuries

1. Do not give IPPR unless indicated.
2. Do not perform thoracotomy unless indicated.
3. Do not "chase" foreign bodies.
4. Do not strap chest wall injuries involving small segments.

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