Update Management of Blunt Chest Trauma

An essay
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Laboratory Studies

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Complete blood cell count

A complete blood cell (CBC) count is a routine laboratory test for most trauma patients. The CBC count helps gauge blood loss, although the accuracy of findings to help determine acute blood loss is decreased. Other important information provided includes platelet and white blood cell counts, with or without differential **(Feliciano and Rozycki, 1999)**.

Arterial blood gas

Arterial blood gas (ABG) analysis is important in thoracic trauma patients. ABG determinations are an objective measure of ventilation, oxygenation, and acid-base status, and their results help guide therapeutic decisions such as the need for endotracheal intubation and subsequent extubation **(Shapiro., et al., 1994)**.

Serum chemistry profile

Patients who are seriously injured and require fluid resuscitation should have periodic monitoring of their electrolyte status. This can help to avoid problems such as hyponatremia or hypernatremia. The etiology of certain acid-base abnormalities can also be identified, eg, a chloride-responsive metabolic alkalosis or hyperchloremic metabolic acidosis **(Bickell., et al., 1997)**.

Coagulation profile

The coagulation profile, including prothrombin time/activated partial thromboplastin time, fibrinogen, fibrin degradation product, and D-dimer analyses, should be monitored in patients who receive massive transfusions (eg, >10 U packed RBCs). Patients who manifest hemorrhage that cannot be explained by surgical causes should also have their profile monitored **(Owings.,et al., 2000)**.

Serum troponin levels

Troponin is a protein specific to cardiac cells. Elevated serum troponin I levels correlate with the presence of echocardiographic abnormalities in patients with possible blunt cardiac injuries; however, troponin I levels do not help predict the occurrence of complications that may require admission to the hospital. Accordingly, their routine use in this clinical situation is not well supported **(Salim., et al., 2001)**.

Serum myocardial muscle creatine kinase isoenzyme levels

Measurement of serum myocardial muscle creatine kinase isoenzyme (creatine kinase-MB) levels is frequently performed in patients with possible blunt myocardial injuries. The test is rapid and inexpensive. This diagnostic modality has recently been criticized because of poor sensitivity, specificity, and positive predictive value in relation to clinically significant blunt myocardial injuries **(Andersen., et al., 1986)**.

Serum lactate levels

Lactate is an end product of anaerobic glycolysis and, as such, can be used as a measure of tissue perfusion. Well-perfused tissues mainly use aerobic glycolytic pathways. Persistently elevated lactate levels have been associated with poorer outcomes. Patients whose initial lactate levels are high but are rapidly cleared to normal have been resuscitated well and have better outcomes **(Abramson., et al., 1993)**.

Blood type and crossmatch

Blood is drawn for typing and crossmatching in patients who have sustained serious traumatic injuries, especially those predicted to require major operative intervention **(Feliciano and Rozycki, 1999)**.

List of Abbreviation

A&E : Accident and emergency
ABG : Arterial blood gases
ARDS : Adult respiratory distress syndrome
CBC : Complete blood cell count
COPD : Chronic obstructive pulmonary disease
CPB : Cardiopulmonary bypass
CVP : Central Venous Pressure
CXR : Chest X-ray
DPL : Deep pulmonary laceration
ECG : Electrocardiography
ED : Emergency department
ET : Emergency thoracotomy
FAST : Focused Assessment for the Sonographic Examination of the Trauma Patient
INR : International normalized ratio
ISS : Injury severity score
MRI : Magnetic Resonance Imaging
MVA : Motor vehicle accident
NG : Nasogastric tube
PEEP : Positive end-expiratory pressure
RA : Right Atrium
RBCs : Red blood cells
RV : Right ventricle
SCT : Spiral CT
TEE : Transesophageal echocardiography
TENS : Transcutaneous electrical nerve stimulation
TTE : Transthoracic echocardiography
VATS : Video-assisted thoracic surgery
VSD : Ventricular septal defect

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It is an essay for describing the different types of blunt chest trauma, and the best ways for its management. It also describes recent advances in diagnosis and treatment.

Introduction

Introduction

References to thoracic wounds are found in the oldest medical writings. The Egyptian physician Imotep(3000 B.C) treated thoracic injuries by simple techniques. In the fourth century B.C Hippocrates treated rib fractures by rest and stabilization of the chest wall with banding. The Greeks and Romans described packing open chest wounds suffered by gladiators in ancient Rome. Much of the 20th Century history of treatment of chest trauma had advanced considerably with the development of anesthesia, antibiotics, and radiology, and we will try in this article to highlight the recent advances in the management of blunt chest trauma.

Estimates of thoracic trauma frequency indicate that injuries occur in 12 persons per million populations per day. Approximately 33% of these injuries require hospital admission; thoracic injuries are directly responsible for 20-25% of all deaths attributed to trauma. Furthermore, chest trauma is implicated as a contributing cause of death in an additional 25% of patients who die from their injuries **(Abu-Ali., et al., 1995)**.

The most important cause of significant blunt chest trauma is motor vehicle accidents (MVAs). MVAs account for 70-80% of such injuries. Falls and acts of violence are other causative mechanisms. Blast injuries can also result in significant blunt thoracic trauma. Trauma is the leading cause of death, morbidity, hospitalization, and disability in Americans aged 1 year to the middle of the fifth decade of life. As such, it constitutes a major health care problem. According to 1994 statistics, approximately 94,000 accidental deaths occur annually in the United States **(Battisttella and Benfield, 1994)**.

Pathophysiology of blunt chest trauma involves derangements in the flow of air, blood, or both in combination. The pain associated with these injuries can make breathing difficult, and this may compromise ventilation **(Marcus, 1995)**.

The clinical presentation of patients with blunt chest trauma varies widely and ranges from minor reports of pain to florid shock. The chest radiograph (CXR) is the initial radiographic study of choice in patients with thoracic blunt trauma. Chest CT scans are more sensitive than CXRs for the detection of injuries such as pneumothoraces and pulmonary contusions.Helical CT scanning and CT aortography are being used more commonly in the diagnosis of patients with possible blunt aortic injuries **(Omert., et al., 2001)**.

Rib fractures are the most common blunt thoracic injuries. Ribs 4-10 are most frequently involved. Rib fractures do not require surgery. Pain relief and the establishment of adequate ventilation are the therapeutic goals for this injury. Flail chest occurs when 3 or more consecutive ribs are fractured in 2 or more places, a free-floating, unstable segment of chest wall is produced **(Locicerso and Mattox, 1999)**.

Blunt mechanisms cause approximately 33% of diaphragmatic injuries. Most diaphragmatic injuries recognized clinically involve the left side, although autopsy and CT scan–based investigations suggest a roughly equal incidence for both sides. Most injuries are best approached via laparotomy. An abdominal approach facilitates exposure of the injury and allows exploration for associated abdominal organ injuries **(Lomanto., et al., 2001)**.

Pneumothorax in blunt thoracic trauma is caused when a fractured rib penetrates the lung parenchyma. In practice, many patients with traumatic pneumothoraces also have some element of hemorrhage, producing what is called a hemopneumothorax.

Hemothorax is the accumulation of blood within the pleural space; it can be due to bleeding from the chest wall or to hemorrhage from the lung parenchyma or major thoracic vessels. Hemothoraces are evacuated using tube thoracostomy **(Wintermark and Schnyder, 2001)**