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MISTAKES IN APPROACH TO PATIENT WITH SEVERE TRAUMA

Abstract: Missed injuries are those that have not been diagnosed in the initial 48–72 hours upon admission, i.e. in the phase when a trauma patient is being stabilized. Those are most commonly the injuries that no one has in mind. Missed injuries are not the ones that are left for diagnostics at a later point when the vital signs have stabilized and all the necessary interventions that may not be delayed have been performed. In this case, further diagnostics is pending, but it may happen that no follow-up is done! The data concerning the frequency of missed injuries vary, and the references state that the percentage of such injuries and errors in managing patients is anywhere between 8% and 29%.

The abdomen, in trauma, is usually considered the “black box”. The abdominal examination is one of the most important procedures in all trauma protocols, but it does happen that the examination itself or the interpretation of positive results are overlooked! The injuries to the diaphragm are quite often missed, particularly if the diaphragm opening is small.

An early compensation represents an introduction to the scenario of failing to recognize a cardiac tamponade. Sternal fissures are often missed because lateral imaging is not preformed. Injuries to the sternum raise suspicion of other major trauma!

Very young patients and the elderly, immunodeficient patients, pregnant women are individuals with special needs in trauma treatment

As missed injuries pose a major risk to patients and have a high importance to the forensics, they should definitely receive more attention in the discussions within the professional scientific circles.

Key words: missed injuries, politraumatized patient, common mistakes

Introduction

Missed injuries are those that have not been diagnosed in the initial 48–72 hours upon admission, i.e. in the phase when a trauma patient is being stabilized. Those are most commonly the injuries that no one has in mind. Missed injuries are not the ones

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that are left for diagnostics at a later point when the vital signs have stabilized and all the necessary interventions that may not be delayed have been performed¹. In this case, further diagnostics is pending, but it may happen that no follow-up is done! The frequency of missed injuries vary, and the references state that the percentage of such injuries and errors in managing patients is anywhere between 8% and 29.

“Labeling” patients based on a diagnosis narrows down the ability to perceive any possible injuries; for instance, “a penetrating wound to the right upper arm” is usually enough to satisfy the diagnostic curiosity, even though there may still be other injuries².

Common Mistakes in First Examine

Examine a severely injured patient without removing his clothes.

- Problem: Serious injuries may be missed!

Failure to perform the clinical examination according to a written protocol.

Problem: Important signs and symptoms may be missed! Always use written protocol³.

Common Mistakes in Approach to Airway

Insertion of an oropharyngeal airway in the presence of brisk gag reflexes.

- Problem: aspiration due to vomiting

Emergency tracheotomy.

Problem: It takes app. five minutes even in the hands of very experienced surgeons! Procedure of choice: Cricothyroidotomy.

Pharmacological paralysis for endotracheal intubation in a patient with a large neck hematoma, without a surgeon been present and ready to perform a cricothyroidotomy.

• Problem: Inability to visualize the cords and tracheal tube placement may be catastrophic because patient is paralyzed and cannot breath.

Underestimating the possibility of airway obstruction^{1,4}.

Problem: The patient may deteriorate very rapidly. Consider early intubation or surgical airway!

Severe gastric dilatation due to swallowing of air

Problem: respiratory difficulties or complicate the abdominal examination. Insert a nasogastric tube in the appropriate cases.

Errors in Admission Procedure

Obtain a detailed medical history from the patient or the family. Ask specifically for beta blockers, other cardiac or anti-hypertensive medication, anticoagulants, aspirin⁵.

Problem: These medications may complicate the clinical presentation and the risk of bleeding, especially intracranial one!

Never directly admit a patient with suspicious mechanism of injury (traffic injuries, falls from significant height) to an orthopedic or neurosurgical unit. It is a disaster waiting to happen!

Problem: Serious injuries may be missed. The trauma surgeon should be in charge for at least the first 24 hours.

Underestimate the risks in relatively moderate trauma. Intensive monitoring is critical. Liberal criteria for admission to ICU.

Failure to obtain a detailed medical history from the patient or the family. Ask specifically for beta blockers, other cardiac or anti-hypertensive medication, anticoagulants, aspirin. These medications may complicate the clinical presentation and the risk of bleeding, especially intracranially⁶!

Errors in Approach to Head injuries

Closed head injuries alone do NOT usually produce hypotension, except in terminal stages or infants. Look for blood loss or associated cervical spinal cord injury! Minor head injuries (GCS 13-15) may be associated with significant intra-cranial lesions. All patients with GCS <15, history of loss of consciousness or amnesia should be investigated by CT scan.

Scalp lacerations may bleed a lot! Suture before sending the patient to the radiology suite

Do not give seizure prophylaxis for longer than 7-10 days⁷.

Prolonged prophylaxis does not reduce the risk of epilepsy.

DIC, DI, and seizures are extremely common in severe trauma. Monitor closely and start treatment early! Routine seizure prophylaxis for 7-10 days.

Underestimate the significance of even “minor” head injuries. There is a high incidence of intracranial bleeding. Liberal use of CT scans evaluation.

Errors in Approach to Neck injuries

Cervical spine protection: Soft collars offer no protection. Hard collars offer some protection. Always apply total body immobilization with spinal board during transportation. C-spine clearance is not an emergency as long as spinal precautions are maintained^{1,7}.

Urgent priorities for penetrating injuries of the neck

1. Control any active bleeding (pressure, packing, Foley’s catheter).
2. If active bleeding: Trendelenburg position to prevent air embolism

3. Secure airway.
4. I.V. fluids (no I.V. line on the side of the injury).

Errors in Approach to Spine injuries

A widened upper mediastinum: Besides aortic rupture think of spinal injury as well!

All patients with significant spinal tenderness should have a CT scan, even with normal X-rays⁸!

Similarly, a complete C-spine CT scan (C1 -T1) should be performed in all unevaluable, multi-trauma patients with a suspicious mechanism of injury. If you forget this recommendation, it will be a matter of time before you have a disaster!

Quadriplegics may give a false picture of respiratory stability on admission. Rapid deterioration with acute respiratory failure may occur a few hours after admission! Consider early endotracheal intubation.

The spinal board used for spinal protection is very uncomfortable. It should be removed as soon as the patient completes the radiological investigations and is transported to the operating room or ICU^{4,7}.

When missed injuries are considered in terms of the anatomical regions and organ systems, it is alarming that the injuries to the cervical spine are missed 3 times more often than the injuries to the rest of the spine!

Errors in Approach to Vascular Injuries

Sitting up a patient with venous injuries⁹.

- Problem: Danger of air embolism! Keep the patient in flat position!

Insert an intravenous line on the same side of the neck injury.

- Problem: Extravasation of infused fluids from a proximal venous injury.

The presence of peripheral pulse does not exclude significant vascular injury. Always compare with the normal side (palpation and Doppler pressures).

A single exposure angiogram may miss arterial injuries.

Always suspect an arterial injury in posterior dislocation of the knee.

In the presence of severe extremity ischemia due to trauma do not delay the operation in order to get a formal angiogram. The patient may lose his limb as a result of the delay of the operation! If necessary, perform an "on-table" angio in the operating room.

Errors in Approach to Thorax injuries

External cardiac massage in traumatic cardiac arrest due to blood loss or cardiac tamponade. Procedure of choice is the resuscitative thoracotomy and internal cardiac massage^{1,4,7}.

Pack or suture open sucking/blowing wounds before thoracostomy tube insertion.

Problem: Tension pneumothorax! If a dressing is needed, apply a square gauze taped on to skin in only 3 sides!

Flail Chest: The initial blood gases may be normal. However, the patient may deteriorate very rapidly. Important to monitor with pulse oximetry and blood gases! Early intubation before CT scans in elderly patients.

Tension pneumothorax: The diagnosis should be clinical. Delays for radiological confirmation may prove catastrophic!

Widened upper mediastinum following a traffic accident or a fall: In addition to aortic rupture, think of thoracic spinal injury!

Many patients with rupture of the thoracic aorta may have a normal mediastinum! Perform routine CT scan evaluation in all patients with suspicious mechanism of injury (traffic accidents, falls from heights)¹⁰.

Sucking or blowing chest wound: Do not pack and do not suture before chest drain insertion! It may cause tension pneumothorax! Tape a square gauze over the wound on only 3 sides.

Many diaphragmatic injuries may be completely asymptomatic and the chest films may be normal or non-diagnostic. For left thoracoabdominal or anterior right thoracoabdominal injuries, routine laparoscopy should be performed irrespective of clinical or radiological findings^{7,10}.

Cardiac tamponade: The patient is often very restless and the inexperienced physician might mistaken it for alcohol or drug intoxication!

A moderate size hemothorax might be missed on a supine chest x-ray!

As far as the chest trauma is concerned, it is usually overlooked that the initial x-ray image “does not catch” 30% of the rib fractures presenting no dislocation, even when the image is adequate enough. The upper and/or lower ribs are usually “cut off” in the images, which could lead to missing more injuries (to the cervical spine, diaphragm, abdomen).

Sternal fissures are often missed because lateral imaging is not performed. Injuries to the sternum raise suspicion of other major trauma!

Myocardial contusion usually occurs when the body hits the steering wheel or when the seat belt tightens. There does not have to be an injury to the sternum! Therefore it is necessary to learn as much details about the mechanics of the injury as possible^{10,11}.

Errors in Approach to Abdominal and Pelvic Injuries

Omit rectal or vaginal examinations, especially in pelvic fractures. (Do not perform routine vaginal exam in children).

- Problem: Serious injuries may be missed!

A negative DPL does not exclude significant intra-abdominal injuries. In diaphragmatic,

Retroperitoneal or hollow viscus perforations it is often false negative¹².

Diaphragmatic injuries may be asymptomatic and the chest x-ray is usually non-diagnostic! Routine laparoscopy for all asymptomatic patients with penetrating injuries to the left or anterior right thoracoabdominal areas.

Blunt pancreaticoduodenal injuries often do not give early peritoneal signs. Serial serum amylase levels and white cell count, and repeat CT scan with oral and intravenous contrast should be considered in suspected cases.

Hollow viscus perforation in the blunt unevaluable trauma patient may be missed. Look for occult CT scan findings (unexplained free fluid, small amounts of free gas, bowel wall thickening, mesenteric stranding), unexplained leucocytosis, deteriorating base deficit, and failure to improve clinically. Always review the CT scan with an experienced radiologist.

Delay angiography and embolization¹⁰. Major blood loss and coagulation problems may occur.

Plain films often underestimate the severity of pelvic fractures! Liberal use of CT scan is recommended.

Infants, Elderly, Pregnant Women – Individuals with Special Needs in Trauma Treatment

Children

In young children and particularly in babies and children up to three years of age, some special anatomical and developmental features have to be taken into account. Thus, for instance, there may be no fracture due to the elasticity of the ribs, which in turn may lead to a wrong conclusion that there is no severe trauma to the chest¹³.

The possibilities of communication are minimal

The children are prone to quickly slipping into hypothermia.

Elderly Patients

In the elderly, there is a wide range of traps in diagnostics, which makes the risk of missing an injury even greater. For instance, if a patient takes beta blockers or has a pacemaker, the tachycardia as a response to hypovolemia is reduced. Taking this fact into consideration may help prevent a fatal interpretation of the patient's condition as hemodynamically stable due to what is perceived as a normal heart rate. It should also be kept in mind that most senior patients suffer from hypertension, and obtaining "normal" values of their arterial blood pressure would, in fact, represent hypotension in their case^{4,14}.

Pregnancy

Underestimate blood loss because of early "stable" vital signs. In advanced pregnancy blood loss up to 1500 ml may not manifest with hypotension.

Delay necessary x-rays or CT scans because of the pregnancy.

Underestimate the risk of fetal loss in fairly moderate maternal injury.

Trying to save the fetus at the expense of the mother! The best treatment for the fetus is resuscitation of the mother^{1,15}!

Conclusion

Examining a patient with potentially severe trauma on admission is usually combined with a lack of time and with constant pressure from other specialists, family, media... Such a situation requires not only medical knowledge, but a certain degree of experience, cool-headedness and the ability to fend off any influences coming from people from different spheres of life and to focus exclusively on the patient and the patient's overall state.

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