

Radiology for the General Surgeon and Trauma

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Introduction

Patients who have been injured must be evaluated using radiographic imaging. In the majority of contemporary facilities, conventional radiography (plain film), ultrasonography, and computed tomography (CT) are almost always present and easily accessible. Particularly in trauma and general surgery, the use of CT and ultrasonography is growing. Other modalities are crucial supplementary modalities. Examples include conventional angiography, fluoroscopy, MRI, and nuclear medicine. The three modalities utilized most frequently in the preliminary stages of evaluation—plain film, ultrasonography, and CT—are the subject of this article. There is no ideal imaging modality [1]. Each method has restrictions, dangers, and expenses. The ideal application of diagnostic radiology takes into account the physiology of the patient, the mechanism of the damage, the physical examination, and knowledge of the advantages and disadvantages of various modalities.

Description

The initial modality for radiographic examination is conventional radiography (plain film), which is well-established. Advanced Trauma Life Support still advises routine pelvis radiographs (PXR) and chest radiographs (CXR) for the evaluation of blunt trauma. CXR is well-known, accessible, and quick. Anteroposterior, single-view, for trauma victims A life-threatening injury shown by a CXR may need to be treated right once, such as a pneumothorax or hemothorax that may call for a tube thoracostomy. Aortic injury may also be indicated by anomalous mediastinal breadth or shape, abnormal diaphragm contour, rib fractures, retained items like bullets, and extrathoracic injuries, among other symptoms. Pneumothorax is detected by CXR with good specificity but low sensitivity, missing up to 50% of pneumothoraces.

When evaluating patients who have suffered blunt trauma and have hip or pelvic complaints, aberrant hemodynamics, or unreliable examination, the PXR is an appropriate initial modality. PXR can detect major pelvic fractures, pelvic diastasis, hip fractures, and dislocations, all of which may call for prompt medical attention (such as a pelvic binder for an open-book pelvic fracture or hip reduction) [2,3]. If a CT abdomen or pelvis is scheduled in examineable patients without hemodynamic problems, signs, or symptoms, PXR is poor yield.

A popular method in the initial assessment of trauma is ultrasound. In the early evaluation of patients with acute abdominal trauma or penetrating precordial/trans thoracic injuries, focused assessment for sonography in trauma (FAST) is well validated and established. FAST includes the right upper quadrant, left upper quadrant, subxiphoid pericardial and pelvic views as initially described. FAST's main goal is to determine whether hemoperitoneum

is present or not. FAST has the advantages of being easily accessible (typically carried out by the surgeon or another physician at the patient's bedside), noninvasive, repeatable, and radiation-free. FAST may detect intra-abdominal fluid amounts as low as 225 to 400 mL, however it is very operator-dependent.

FAST is not as useful in detecting retroperitoneal injuries, hollow visceral injuries, or solid organ injuries since these conditions may or may not be related to hemoperitoneum. The quality of the picture may also be lowered by body habits and subcutaneous or intraluminal air. If a CT abdomen and pelvis is recommended in patients who have suffered blunt trauma and are hemodynamically stable, the value of FAST is minimal [4]. Negative FAST, especially if repeated after a period of time, is a useful evaluation component if a CT abdomen and pelvis is not necessary.

The selection of the initial imaging modality should be guided by physiology. Cavity triage is the idea of performing rapid CXR, PXR, and FAST (or E-FAST) tests during or after primary and secondary survey to quickly screen for causes of life-threatening haemorrhage in patients who have suffered severe trauma and are hemodynamically unstable. The initial emergent therapy should be determined by this quick scan of the thorax, which should identify the most likely sites of haemorrhage (thoracic, abdominal, or pelvic/retroperitoneal). Abdominal radiographs should be taken into account in penetrating torso trauma in addition to CXR and PXR to fully screen the torso and perhaps rule out intra-abdominal trajectory [5].

The examination of stable patients with blunt and penetrating injuries now routinely includes a CT scan. It is quick, widely accessible, and generally accurate. CT requires enough patient stability for transfer and enough time to perform the study, in contrast to portable plain film and ultrasonography, both point-of-care modalities. The conventional wisdom was to never subject a patient who was unstable to a CT scan. This regulation was developed in response to the lengthy travel times many hospitals had between the trauma resuscitation area and the CT scanner, as well as the slow rate at which older CT scanner generations could acquire CT images. Due to greater knowledge of the shocking morbidity and mortality of BCVI and advancements in CT technology that enhance imaging of the carotid and vertebral arteries [6], the diagnosis of blunt cerebrovascular injury (BCVI) is becoming more crucial in patients who have suffered blunt trauma. The standard screening method for BCVI is currently a CT angiography of the neck (16 slices in 2009, but substantially higher today). When CT angiography (CTA) is not appropriate, magnetic resonance angiography is an option. Trauma professional organisations have advised screening standards for asymptomatic individuals [7].

About 80% of patients with BCVI are detected using these screening criteria. The opposite of this is also true: utilising standard screening criteria fails to detect 20% of people with BCVI. Some facilities screen extensively and include CTA neck vasculature as a part of pan scanning due to the serious possible consequences of delay in diagnosis (stroke).

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Conclusion

Diagnostic radiology is essential to the evaluation of almost all trauma patients. The initial evaluation can quickly obtain plain film and ultrasonography. As travel time and distance reduce, the value of CT in decision-making keeps increasing. In order to reduce pointless procedures and radiation exposure, radiologists and surgeons should work together. Radiographic imaging should be performed on patients who are deemed at risk during pregnancy.

Acknowledgement

Not applicable.

Conflict of Interest

There is no conflict of interest by the author.

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