Utility of Clinical Examination and CT Scan in Assessment of Penetrating Neck Trauma

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ABSTRACT
Managing penetrating injuries adequately and effectively depends a great deal on proper assessment of the injury. This study carried out was done at The Aga Khan University Hospital to assess the role of clinical examination and CT scan imaging in evaluation of penetrating neck injuries. A total of 68 students were included, with ages ranging from 3 to 74 years. The involved zones and the injured structures were noted. Results showed a high sensitivity of clinical examination in assessing vascular (81%) and airway trauma (77%), with a low sensitivity for esophageal trauma (34%). For CT scan the sensitivity was 90% for vascular trauma, 83% for airway trauma and 53% for esophageal injuries. Clinical findings and CT scan imaging are important assessment tools for evaluation of penetrating neck traumas, with a high sensitivity for vascular and airway injuries.


Injuries leading to neck trauma constitute 5 – 10% of all the injuries with a mortality rate of 11%. However, in case of fatal neck injury to vascular structures, it can lead to a quick and rapid death in 88% cases.¹ In 1522, Sir Ambrose Pare tried his hand at managing grave neck injuries by ligating all the major vessels in the neck.¹ The American Civil War had a mortality rate of 15% secondary to penetrating neck injuries which fell to 11% in World War-I and subsequently to 7% by the time of World War-II.²

Clinical findings remain the most crucial and vital step in assessing a penetrating neck injury. Computed tomography (CT) scan outshines all other imaging techniques for assessment of penetrating neck injuries. It plays an important role in deciding for a conservative versus surgical management. Neck exploration for zone-II injuries was considered mandatory due to its easily accessibility, irrespective of absence of clinical findings, but it led to a lot of negative non-therapeutic neck explorations.

The morbidity of a neck exploration can be avoided by prompt examination and imaging. A retrospective study was carried out for a period of 10 years, from 1999 to 2009. Sixty eight patients who came with penetrating neck injuries were included. The objective was to assess the sensitivity and specificity of clinical findings and CT scan imaging in accurately identifying the penetrating neck injuries. All the patients were observed for signs of vascular, airway and esophageal trauma and also underwent high resolution thin-cuts CT scan head and neck with intravenous contrast. The findings were confirmed by the mandatory neck exploration which was taken as gold standard.

The age ranged from 3 years to 74 years with the mean age being 28 years. Sixty two patients were males and 6 females. Thirty three patients had isolated zone-II injuries, 15 patients suffered from zone-I and II from zone-III injuries. Around 9 patients had injuries involving more than one zone. Clinical examination was able to correctly interpret 25 of vascular injuries, 19 of airway and only 4 esophageal injuries. It had a high sensitivity of 81% for vascular trauma, with 77% sensitivity for airway trauma with a low sensitivity in interpreting esophageal injuries (34%). CT scan correctly interpreted 32 of vascular injuries, 15 of airway and only 7 of esophageal trauma, with sensitivity as high as 88% for vascular trauma, 78% for airway trauma, but only 53% for esophageal injury (Table I).

Studies state that zone-II is the most common region to be injured (68%),³ an observation noted in this study as well. Being the largest and the most easily accessible zone, its management has an edge over the other zones and can be promptly dealt with.

Clinical findings are sometimes sufficient to correctly interpret injuries. In penetrating neck injuries triage examination is important for prompt management. Vascular injuries can be the easiest and quickest to be detected by a proper clinical examination. Airway trauma can have presenting symptoms of aphasis, voice

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change, dyspnea, hoarseness or obvious stridor whereas an esophageal trauma usually presents with dysphagia, drooling of saliva, hematemesis or even mediastinitis. But even then, esophageal injuries are notorious for being quiet injuries and most of the time are symptomless till the vital time for intervention has been lost. Understandably as all these injuries are inter-related, the symptoms can present in all three types of penetrating trauma.

Approach for a conservative neck management began to emerge in the early 1970s. Ayuyao et al. reported that around 134 patients who underwent a mandatory neck exploration, of which around 68% were negative. Later on 109 patients were managed selectively based on clinical assessment, 69 of these patients were successfully managed without surgery. Studies have confirmed the accuracy of clinical findings in correctly assessing the neck injuries. Phillip et al. concluded in a retrospective review that physical examination to have a sensitivity of 93% and a positive predictive value of 83% in assessing the penetrating neck injuries. Where clinical examination lacks, investigations like CT scan prove helpful. Accurately diagnosing, it can obviate further investigations as well as operative intervention, allowing a prompt observation and an early discharge.

Mazolewski et al. identified CT scan as a very important diagnostic modality for penetrating neck injuries. CT angiography was not brought into use in this study; the conventional CT scan was performed in most of the patients to assess whether the injury was vascular, laryngeal or esophageal. Recently, CT angiography has been used in the neck trauma patients for assessing the nature of vascular injury.

This study indicated an approach towards use of clinical findings and CT imaging for assessment of penetrating neck injury. It, however, reflects a lower sensitivity and specificity for detection of esophageal injuries. CT imaging reported by Gonzalez et al. also missed 50% of esophageal injuries. The results of this study were based on a retrospective design with a limited number of patients. To improve the accuracy, a prospective and a multidisciplinary team approach is suggested. Prompt clinical assessment and swift CT scan imaging helps to avoid unnecessary neck explorations. This being cost effective, also reduces the morbidities associated with the surgery.

REFERENCES


Table I: Sensitivity and specificity.

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<th>Clinical examination</th>
<th>CT scan imaging</th>
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<tr>
<td></td>
<td>Sensitivity</td>
<td>Specificity</td>
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<tr>
<td>Airway</td>
<td>77%</td>
<td>80%</td>
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<tr>
<td>Vascular</td>
<td>81%</td>
<td>70%</td>
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<td>Esophageal</td>
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