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Role of Conservative Management in Neck Trauma: A Case Series Study

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ABSTRACT

Introduction: Given the fact that neck is a vital component of one's anatomy, injuries of this organ may be accompanied by fatal complications. In this article, we aimed to evaluate the etiology of neck trauma, simultaneous injuries of other organs, therapeutic methods for neck trauma, associated complications, length of hospital stay, at Ghaem Hospital over 10 years.

Materials and Methods: In this retrospective study, we evaluated all cases of neck trauma at Ghaem hospital during 1994-2013. Patients were allocated into two groups of blunt and penetrating injuries. Trauma zone, therapeutic methods, coexisting injuries of other organs, associated complications, length of hospital stay, and mortality rate were evaluated in these two groups.

Results: In this study, 75 (75%) and 25 (25%) cases were penetrating and blunt, respectively. Overall, 45% of the subjects had other simultaneous injuries and central nervous system injury accounted for the majority of cases. Zone II of the neck was involved in 89% of penetrating neck injuries and 70% of these subjects underwent surgery; conservative management was applied for 30% of the cases. Mortality rate was estimated at 3% for penetrating neck injuries and mean length of hospital stay time was 6±2 days. Moreover, 68% of blunt neck injuries were explored. The most common cause of surgery was vascular exploration (68%) and the most common surgical intervention was vein ligation (64%). Mortality rate for blunt neck injuries was estimated at 5.2%, and mean mortality rate was 3.5% in both groups.

Conclusion: Considering the severity of complications associated with neck injuries, early neck exploration is suggested for unstable cases or individuals with injuries deeper than the platysma. In addition, the role of diagnostic techniques such as helical computed tomography and interventional angiography was emphasized in the current study.

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Introduction

Penetrating neck injuries, accounting for 5-10% of all trauma cases. Neck components are not always easy to examine for the purpose of surgical interventions or overall evaluation, However, the mortality rate associated with neck traumas is low (0-12%) (1).

In the evaluation of penetrating neck injuries, it is important to consider the location of the injury. Neck can be divided into three anatomic zones (2), as indicated in Figure 1.

The majority of neck injuries are penetrating and may lead to fatal conditions such as severe bleeding or tracheal/esophageal injuries. There are different approaches for the management of neck injuries. The aim of this study was to evaluate the etiology of neck trauma, therapeutic

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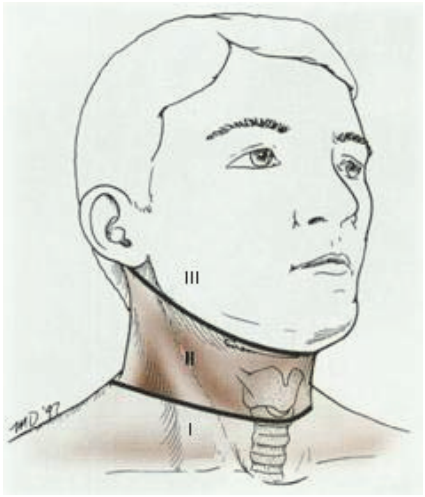

Figure 1. For the purpose of evaluating penetrating neck injuries, the neck is divided into three zones: Zone I is below the clavicles and is also known as the thoracic outlet; zone II is located between the clavicles and hyoid bone; and zone III is above the hyoid (2).

methods, coexisting injuries of other organs, associated complications, length of hospital stay, and mortality rate at Mashhad University of Medical Sciences during 1994-2013.

Materials and Methods

This retrospective (case series) study was conducted on 100 cases with neck trauma, referring to Ghaem teaching hospital, affiliated to Mashhad University of Medical Sciences during March 1994-April 2013. Patients were divided into two groups of blunt and penetrating traumas. The location of injury, therapeutic methods, other coexisting injuries, surgical interventions, associated complications, length of hospital stay, and mortality rate were evaluated in each group. After data collection, statistical analysis was performed using SPSS version 11.5.

Table 1. Etiology of penetrating traumas

Cause of injury	Absolute frequency	Related frequency
Knife	53	70%
Motor vehicle	5	6%
Gunshot	5	6%
Chains	4	5%
Others	8	10%
Total	75	100%

Table 2. Etiology of blunt traumas

Cause of injury	Absolute frequency	Related frequency
Motor vehicle	13	52%
Chains	5	20%
Fall	4	16%
Others	3	12%
Total	25	100%

Table 3. Coexisting injuries in other organs

Injury	Prevalence
CNS	25%
Thoracic	20%
Orthopedic	15%
Abdominal	12%

Results

Of 100 patients, 75 (75%) and 25 (25%) cases had penetrating and blunt traumas, respectively. Trauma cases are shown in Tables 1 and 2.

Overall, Forty percent (45%) presented with simultaneous injuries of other organs. In addition, central nervous system (CNS) injury was the most common coexisting injury (20%) (Table 3).

Type of organ injury and management vary based on the type of trauma. Therefore, we evaluated the patients in two groups of blunt and penetrating traumas.

Penetrating traumas

Overall, 67 (89 %), 5 (6%), and 3 (4%) patients had penetrating injuries in zone II, zone III, and zone I, respectively. Conservative management (therapy) was applied for 23 cases (30%) and surgery was performed in 52 cases (70%) with zone II injuries.

In total, 47 cases (63%) underwent emergent exploration; elective exploration was performed in 28 cases (37%). The most common reason for surgical exploration in these cases was vascular injury. In addition, respiratory complications including dyspnea, hoarseness, stridor, and hemoptysis were reported in 18 cases (25%), and alimentary tract symptoms (dysphagia and odynophagia) were observed in 11 cases (15%).

20 cases (20%), undergoing surgery, had more than one indication for surgery. Patient's instability and penetration of neck injury to the platysma were our criteria for surgical exploration. Among those with wounds penetrating the platysma, 64 cases (85%) had vital organ injuries in the neck, requiring surgical intervention, while 11 cases (15%) did not have any vital organ injuries.

Venous system injury (internal or external jugular veins) was reported in 53 cases (70%), managed by ligation. Arterial system injury (common carotid injury) was seen and repaired in 15 cases (20%); tracheal injury was also reported and repaired in 20% of the cases. Moreover, esophageal injury was seen in 7 cases (10%) and multiple injuries were reported and repaired in 20% of these patients.

Complications were reported in 64 cases (85%) and wound infection was the most common complication, reported in 7 cases (9%). Other complications included delayed bleeding in vascular repaired sites (1 case, 1.3%) and delayed tracheal stenosis (1 case, 1.3%). Overall, the mortality rate for penetrating neck trauma was estimated at 3%. Two patients had simultaneous injuries of carotid artery and jugular vein and died during surgical exploration due to delayed admission to the hospital; mean length of hospital stay time was 6±2 days.

Blunt traumas

Among 25 cases with blunt neck traumas, 7 cases (28%) received conservative treatment and 18 cases (72%) underwent surgical exploration; 13 cases (52%) of exploration were emergent and 12 cases (48%) were elective. Indication for surgical intervention was vascular injury in 17 cases (68%), respiratory system injury in 3 cases (12%), and gastrointestinal tract injury in 5 cases (5%).

Vital organ damage was reported in 23 cases of exploration (93%). Vein ligation, vascular repair, tracheal repair, and esophageal repair were performed in 16 (64%), 3 (12%) and 6 (24%) cases, respectively.

Associated complications were reported in 15.7% of cases and the most common complication was wound infection (0.5%). Other complications included delayed tracheal stenosis (5.2%) and delayed bleeding (5.2%). Overall, the mortality rate for blunt neck trauma was estimated at 5.2%; one patient died due to simultaneous CNS injury. Mean length of hospital stay was 8+1.5 days and the mortality rate was 3.5%.

Discussion

Saletta et al. studied the topographic distribution of neck injuries and showed that 85%, 11%, and 4% of injuries were in zone II, zone I, and zone III of the neck, respectively (5). Similarly, the most commonly involved neck zone in our study was zone II (82%); also, 5% and 3% of injuries were in zone III and zone I, respectively (2).

In 2014, Sethi RK and colleagues reported that the majority of neck injuries are not life-threatening and do not require hospital admission. These data had implications for neck injury surveillance and could be used to risk-stratify patients presenting with injuries in the acute care setting (3). Moreover, in a study by Schaefer SD et al, neck wounds penetrating the superior thoracic artery did not require endovascular therapy and were ultimately managed by thoracoscopic surgery (4).

Risk of other simultaneous injuries is variable in neck traumas. Rivkind reported multiple organ injuries in 52% of neck injuries; in addition, CNS injury, besides neck injury, was commonly reported (5). Similarly, in our study, 42% of patients had other simultaneous injuries and CNS was the most commonly involved organ.

Given the improvements in recent diagnostic methods, using angiography, intravenous (IV) contrast computed tomography (CT), and IV contrast MRI reduced the need for emergent neck exploration in neck trauma. Therefore, we can assess our patients or plan an elective exploration. As a previous study indicated, diagnostic evaluations can be used for stable cases, and 5-10% of neck injuries can be managed using a selective approach (6).

Trauma surgeons divide neck exploration indications into 3 groups of vascular, respiratory, and alimentary tract injuries. These cases need an emergent or elective operation, based on an algorithm. As Fogelman reported, the most common indication for surgery is vascular injury (80%) (7). Our results are consistent with his findings as 80% and 65% of explorations in penetrating and blunt injuries were due to vascular injuries, respectively.

A previous study indicated that unstable cases of neck injuries would not be stable without emergent operation, and all patients with neck injuries penetrating the platysma should be observed and evaluated. Management of these stable cases with injuries deeper than the platysma is controversial and surgical exploration is suggested for these cases (8). However, mortality and morbidity rates are almost similar in both conservative and surgical approaches, and surgeons must decide based on their personal experience (16, 9).

In 2010, Peter T. Masiakos and colleagues reported that neck injuries of either type remain diagnostic and therapeutic challenges, despite the progress in imaging technologies and surgical care; in fact, a mistake in indentifying an injury can result in significant morbidities and mortalities. Unless the patient is hemodynamically unstable or an emergent surgical airway is required (10). Lugman evaluated penetrating pharyngeal injuries in children and showed that these patients can be evaluated by lateral neck X-ray, laryngoscopy, and bronchoscopy; moreover, these cases could be managed by local drainage and broad-spectrum antibiotics (11).

Konobu studied penetrating laryngotracheal injuries and revealed the important role of maintaining the airway at the time of trauma. This can be accomplished by rigid bronchoscopy under direct observation to evaluate and repair the injured organ (12). Extubation can be performed for the patient after tracheal repair, although complex laryngeal injuries in blunt traumas may require a protective trachostomy, distal to the repaired site (12).

Vascular injuries in zone II do not require any specific imaging or diagnostic methods, since neck parts in zone II are accessible. However, stable cases with neck injuries in zone I and III need further evaluations and angiography plays a main role in these injuries. In this regard, Selafan assessed the role of angiography in the diagnosis and even treatment of stable cases with neck injuries in zone III by embolization (13).

Freguson also evaluated the diagnostic and therapeutic role of angiography in penetrating neck

injuries in zone III. In the mentioned study, stable patients with signs of vascular injury (hemorrhage, expanding hematoma, bruit, thrill, and neurologic deficit) underwent angiography, and 50% of patients were successfully treated by embolization (14); however, diagnostic and therapeutic angiography was not performed for our patients.

Recent studies have evaluated helical CT angiography, which indicated similar results to conventional angiography (without the probable complications associated with conventional angiography); however, therapeutic interventions are not applicable in helical CT angiography, unlike conventional angiography (15).

Ordog studied morbidity and mortality associated with neck injuries and reported 3-10% mortality rate for these cases. The highest mortality rate was related to gunshots and main vascular injuries, especially carotid injury in penetrating neck trauma (17). The most common involved zone II in study, recent diagnostic methods improvements, using angiography need to emergent neck exploration in neck trauma for stable cases.

Risk of retained foreign bodies and related complications can be prevented by using fluoroscopy during surgical exploration of the neck (18). The mortality rate in our study was estimated at 3-5% (mean=3.5%). However, no gunshots were reported in our study since these cases might have died before being admitted to our trauma center; therefore, the mortality rate in our study was a little lower, compared to that reported in other previous studies; the main cause of mortality in our study was vascular injury.

Conclusion

Considering the severity of complications associated with neck traumas, we should plan to decrease the mortality rate. Therefore, in this study, we explored all unstable cases even after primary management and resuscitation. Also, we explored all neck injuries penetrating the platysma. Considering the limitations in our country, we suggest that this approach be applied for cases with neck traumas. In future, by the improvement of diagnostic and imaging methods, we might be able to manage some of these patients, using helical CT or therapeutic angiography (embolization).

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Conflict of Interest

Authors declare no conflict of interest.

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