

## PENETRATING NECK INJURY EVALUATION AND MANAGEMENT

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Received: 04 June 2023, Revised and Accepted: 15 July 2023

## ABSTRACT

**Objective:** To study the prevalence of penetrating neck injuries in north-west Rajasthan.

**Methods:** This was a cross-sectional study on 50 patients with penetrating injury to the neck and of either sex fulfilling inclusion and exclusion criteria who visited our Trauma Center and ENT out-patient department at PBM Hospital Bikaner during January 01, 2022–January 01, 2023. Patients were evaluated and resuscitated as per Advanced Trauma Life Support Protocols. If the patient is stable, a multi-detector computed tomography angiography will be done, and treatment will be done accordingly. All patients were observed for at least 48 h prior to discharge. Follow-up of all patients was done at 4 weeks and 3 months post-discharge.

**Results:** The mean age of the study population was 31.53±9.24 years; with an age range of 18–70 years. Maximum 90% of cases were male; 54% of cases were urban. 48% of cases were in the II zone, followed by 24% in the III<sup>rd</sup> zone and 16% in the IV<sup>th</sup> Zone, whereas a minimum of 12% had injuries in multiple zones. Conservative treatment was done in 34% of cases; 33 cases were treated by surgery, out of which 57.57% were treated by surgical debridement and primary wound closure; 88% of cases were cured; and 1 (2%) case died.

**Conclusion:** A proper evaluation, rapid airway intervention, and proper surgical repair are essential for a successful outcome. Early management of laryngeal injury within the first 24 h seems to bear the best results for airway and voice.

**Keywords:** Penetrating neck injury, Evaluation, Management.

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## INTRODUCTION

Any neck injury that causes a breach in the platysma muscle is referred to as a penetrating neck injury. The neck region is one of the body's most susceptible places to injuries of all kinds because it has a high concentration of essential organ structures in a relatively limited and unprotected anatomic region. In recent years, the incidence has increased significantly [1,2]. 5–10% of all cases of trauma involve a neck injury. The mortality rate after neck injuries can reach 11% [3].

About 25% of penetrating neck injuries result in arterial damage [4]. Spinal cord injuries are rare (<1%), whereas aerodigestive injuries happen between 23 and 30% of the time [5,6]. A single penetrating wound has the power to do a lot of damage. Vital neck structures are seriously at risk from penetrating neck trauma [7]. The development of a thoughtful interdisciplinary plan and knowledge of the varied neck injury presentations are essential for improving patient outcomes and lowering morbidity and mortality [8].

## Aim

The aim is to study the prevalence of penetrating neck injuries in north-west Rajasthan.

## METHODS

This was a cross-sectional study on 50 patients with penetrating injury to the neck and of either sex fulfilling inclusion and exclusion criteria who visited our Trauma Center and ENT out-patient department at PBM Hospital Bikaner during January 01, 2022–January 01, 2023. Patients with penetrating neck injuries that have breached the platysma muscle and who provide valid, informed written consent were included. Patients unfit for anesthesia due to comorbidities, below 18 years of age, with superficial neck injury, and who refused consent for study were ruled out.

A detailed evaluation of the patient was done. Patients were evaluated and resuscitated as per Advanced Trauma Life Support Protocols. If the patient is stable, a multi-detector computed tomography (MDCT) angiography will be done and treatment will be done accordingly. The unstable patient was shifted to the operating theater for immediate surgical exploration.

A stable patient was classified according to a comprehensive clinical examination as either symptomatic or asymptomatic. The symptomatic group was further divided according to the presence of hard or soft signs of vascular injury. In the presence of hard signs; patients were shifted for surgical intervention, but MDCT-A was performed before intervention in patients with zones I and III injuries to determine the feasibility of endovascular treatment. Supplementary contrast swallow test and bronchoscope will be done if aerodigestive injuries are suspected. Investigations for all patients include CBC, PT/INR, RFT and LFT, Chest X-ray, and lateral cervical spine X-ray. Additional investigation for patients with signs of vascular injury includes MDCT-A. All patients were observed for at least 48 h before discharge. Follow-up of all patients was done at 4 weeks and 3 months post-discharge.

Required approval taken from the Ethics Committee and Research Committee. Written informed consent was taken from all the patients who were enrolled in the study.

## RESULTS

Maximum of 48% of cases were in the 18–30 year age group, whereas a minimum of 2% were in the 61–70 year age group, with the mean age of the study population being 31.53±9.24 years with an age range of 18–70 years. Maximum of 90% of cases were male, 54% were urban, whereas a minimum 46% were rural (Table 1).

Maximum 80% of cases had a road traffic accident, followed by 10% others, 8% stab injuries, and a minimum of 2% bullet or shotgun injuries. Maximum 48% of cases were in the II zone, followed by 24%

in the III<sup>rd</sup> zone and 16% in the IV<sup>th</sup> zone, whereas minimum 12% had injuries in multiple zones.

Maximum 40% of cases had head trauma, followed by 30% thoracic, 24% limb injuries, and 20% abdominal injuries, whereas minimum 4% had injuries to the cervical spine and 10% had facial injuries. The mean time of presentation was 6.2±3.5 h after injury (Table 2).

In our study, a hard sign was present in 25 cases, of which maximum 96% had active bleeding, 64% had large hematoma, 56% had hemoptysis/hematemesis, whereas minimum 20% had respiratory distress, and 24% developed shock or reduced GCS. Maximum 44% had minor bleeding, 22% had dysphasia, 20% had subcutaneous air and small hematoma, whereas minimum 10% had dysphonia (Table 3).

In our study, hard signs were present in 25 cases, which were further investigated, out of which 72% had NCCT head and neck, 20% had CECT, and 8% had CT angio. Conservative treatment was done in 34% of cases, whereas operative treatment was done in 66% of cases (Fig. 1).

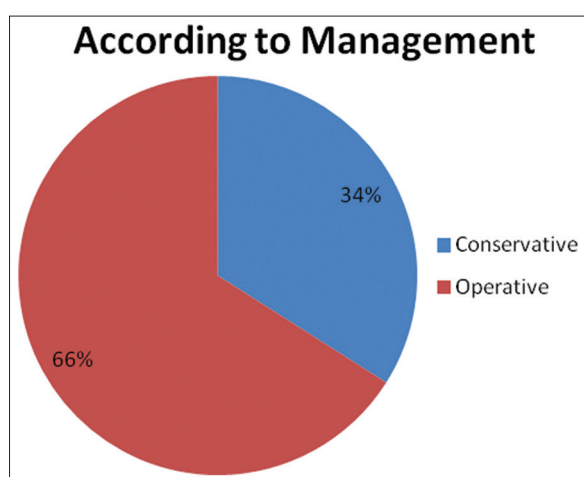


Fig. 1: Mode of management of study participants

Table 1: Sociodemography of study participants

	Frequency (%)
Age (years)	
18–30	24 (48)
31–40	15 (30)
41–50	8 (16)
51–60	2 (4)
61–70	1 (2)
Gender	
Male	45 (90)
Female	5 (10)
Residence	
Urban	27 (54)
Rural	23 (46)

Table 2: Mode and zone of trauma among study participants

	Frequency (%)
Mode of trauma	
Road traffic accident	40 (80)
Bullet/shotgun injury	1 (2)
Stab injury	4 (8)
Others	5 (10)
Zone	
I	8 (16)
II	24 (48)
III	12 (24)
Multiple	6 (12)

In our study, 33 cases were treated by surgery, of which 57.57% were treated by surgical debridement and primary wound closure, whereas a minimum of 42.43% were treated by tracheostomy (Table 4).

In our study, 44 (88%) cases were cured, 5 (10%) cases were referred to a higher center, and 1 (2%) case died. Out of 44 survivors, 2 (4.55%) cases developed post-operative hematomas and 1 (2.27%) had an esophageal tracheal fistula and an SSI. In 90.91% of cases, there was no complication recorded (Table 5).

DISCUSSION

In our study, 80% of cases had a road traffic accident, followed by 10% of others, 8% of stab injuries, and a minimum of 2% of bullet or shotgun injuries. Similarly, Thoma et al. (2008) [9] found 159 cases with stab wounds and 42 with gunshot wounds.

Maximum 48% of cases were in the II zone, followed by 24% in the III<sup>rd</sup> zone and 16% in the IV<sup>th</sup> zone, whereas minimum 12% had injuries in multiple zones. Penetrating neck injuries are usually described in terms of their location in one of three anatomic zones, as described by Monson [10].

Maximum 40% of cases had head trauma, followed by 30% thoracic, 24% limb injuries, and 20% abdominal injuries, whereas minimum 4% had injuries to the cervical spine and 10% had facial injuries. Similarly, Madsen et al. (2016) [11] found that associated injuries included three penetrating cardiac injuries and 146 patients with hemopneumothoraces.

In our study, hard signs were present in 25 cases, out of which maximum 96% had active bleeding, 64% had large hematomas, 56% had hemoptysis or hematemesis, whereas minimum 24% developed shock or reduced GCS, and 20% had respiratory distress. Maximum 44% had minor bleeding, 22% had dysphasia, 20% had subcutaneous air and small hematoma, whereas minimum of 10% had dysphonia. Similarly, Ibraheem et al. (2018) [12] out of 337 cases One hundred and fifty-six patients had soft signs, and 82 had hard signs.

Table 3: Hard and soft sign among study participants

	Frequency (%)
Hard sign	
Respiratory distress	5 (20)
Active bleeding	24 (96)
Large haematoma	16 (64)
Shock/reduced GCS	6 (24)
Haemoptysis/haematemesis	14 (56)
Soft sign	
Dysphonia	5 (10)
Dysphagia	11 (22)
Minor bleeding	22 (44)
Subcutaneous air	10 (20)
Small haematoma	10 (20)

GCS: Glasgow coma scale

Table 4: Operative modalities used among study participants

Operative	Frequency (%)
Tracheostomy	14 (42.43)
Surgical debridement and primary wound closure	19 (57.57)

Table 5: Distribution of study population according to outcome

Outcome	Frequency (%)
Cured	44 (88)
Death	1 (2)
Referral	5 (10)

In our study, 25 cases with a hard sign were further investigated, of which a maximum of 72% had NCCT head and neck, 20% had CECT, and 8% had CT angio, as reported by Madsen *et al.* [11].

In our study, conservative treatment was done in 34% of cases, whereas operative treatment was done in 66% of cases, as similarly reported by Thoma *et al.* (2008) [9] and Madsen *et al.* [11].

In our study, 33 cases were treated by surgery, out of which 57.57% were treated by surgical debridement and primary wound closure, whereas a minimum of 42.43% were treated by tracheostomy, as also reported by Ibraheem *et al.* (2018) [12]. In our study, 44 (88%) cases were cured, 5 (10%) cases were referred to a higher center and 1 (2%) case died. Also, Madsen *et al.* [11]. The in-hospital mortality rate was 2%.

#### CONCLUSION

We draw the conclusion that penetrating neck injuries, a condition that can be fatal, primarily affect men. Road traffic accidents were the most frequent cause, and the majority occurred in Zone II. An extensive clinical evaluation can cut down on pointless exploration. In order to decrease complications and prevent mortality, a defined management regimen should be followed. For a successful outcome, a thorough diagnosis, quick airway management, and precise surgical repair are necessary. The best outcomes for the airway and voice tend to come from early care of laryngeal damage within the first 24 h.

#### ACKNOWLEDGMENT

We owe an obligation of appreciation to the SP Medical College for help throughout the research exploration.

#### AUTHORS' CONTRIBUTION

All the authors have contributed equally.

#### CONFLICT OF INTEREST

The authors declare no conflicts of interest.

#### AUTHOR'S FUNDING

The writers thusly express that they received no monetary help for their examination, composition, or distribution of this paper.

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