



**ORIGINAL RESEARCH PAPER**

**ENT**

**OUT OF THE WAY BULLET TRAJECTORY IN A CASE OF CIVILIAN GUNSHOT INJURY IN THE HEAD AND NECK REGION**

**KEY WORDS:** Trajectory, Civilian, Gunshot

**Dr. Anjankumar Sahoo\***

MBBS, MS ENT, ASSISTANT PROFESSOR, DEPT. OF ENT AND HEAD & NECK SURGERY, MAMC & LNJP HOSPITAL, DELHI \*Corresponding Author

**Dr. Sunita Dhakal**

MBBS, MS ENT, JUNIOR RESIDENT, DEPT. OF ENT AND HEAD & NECK SURGERY, MAMC & LNJP HOSPITAL, DELHI

**ABSTRACT**

**Introduction:** Gunshot injuries have become a very common medico-legal issue to be dealt with in emergency department. Because of easy access to the fire arms, the civilian firearm injuries are on rise both in developed and developing countries. The injuries may be homicidal, suicidal or accidental.

**Case report:** Here we present a 28 years male who sustained a bullet injury to his left cheek with abnormal trajectory passes to the right paravertebral region without damaging any vital structures.

**Conclusion:** For gunshot wounds in the head and neck region, basic resuscitation followed by early identification and repair of injuries is required.

**INTRODUCTION**

Gunshot injuries in the head and neck region cause severe morbidity and significant mortality. In long run it has a physical, mental, psychological and economical disability of individuals, families, communities. These injuries may be homicidal, suicidal or accidental & occurs in both military and civilian settings. Most of the time the trajectory of the bullet is well defined but in rare cases, atypical tract lines resulting from such injuries may lead to difficulties in diagnosis and treatment. In this case report there is a gun shut injury to the head and neck with an unusual bullet trajectory is presented.

**CASE REPORT**

A 28-year-old male reported to the ENT emergency, 24 hours after sustaining a single gunshot wound to the left cheek. The victim was a referred MLC from a private hospital in Delhi. He gave the history of being shot by a man at his home address, due to some family dispute. His chief complaint was neck pain. He was conscious, oriented to time, place and person and the vital signs were within normal limits. On examination, there was an entrance wound around 2\*2 cm over the left body of the mandible approximately 5 cm from the symphysis (Fig1). The exit wound for the bullet could not be identified. No active hemorrhage or neurological deficit was noted. Initial X-Ray (Fig. 2) and CT scan (Fig. 3) showed a bullet fragment, which had travelled through the body of left sided mandible, shattering it, and finally rested in the right side of the neck at C2, C3 para-vertebral region.

The patient was then prepared for surgical intervention under general anesthesia. Surgical exploration of the right anterior cervical region was performed (Fig. 4). On exploring the neck, the bullet was identified in the right para-vertebral space at the level of greater cornu of hyoid bone, lying just anterior to right common carotid artery and below and behind to right hypoglossal nerve (Fig 5). The bullet was safely retrieved. None of the vital structures in the neck were breached by the bullet. However, on direct laryngoscopic examination, a rent of around 2\*2 cm was identified in the right lateral pharyngeal wall, indicating the course of the bullet. The patient was kept on nasogastric feed for 10 days during which the breach on the mucosa healed on its own.

**DISCUSSION**

Knowing the anatomy of the head and neck region is very important in evaluating penetrating neck injuries. The overall mortality from penetrating neck trauma is as high as 11%<sup>1</sup>. Roon and Christensen in 1979 suggested that the neck can be divided into three zones viz:

**Zone 1** extends superiorly from the sternal notch & clavicle to the cricoid cartilage. **Zone 2** extends from the cricoid cartilage to the angle of the mandible. Penetration in this area is the most frequent (60 to 70%)<sup>2</sup>.

**Zone 3** is a small but critical area extending from the angle of the mandible to the skull base.

Ballistic injuries can be classified as low velocity or high velocity. Projectiles travelling less than 1200 ft/s are categorized as low velocity injuries and that travelling greater than 1200 ft/s as high velocity injuries. The amount of damage to the surrounding tissue from a gunshot injury is given by the formula,  $KE = \frac{1}{2} MV^2$ , where KE = kinetic energy, M = mass and V = velocity of the trajectory<sup>3</sup>. Low velocity injuries cause little bone and soft tissue loss whereas high velocity injuries inflict considerably more damage. High velocity bullet due to its high kinetic energy tends to follow a direct and predictable pathway, piercing all the structures coming along its path. Low velocity bullets, on the other hand, due to its low kinetic energy, it moves around important structures such as nerves and muscles and terminates at some point in the body distant or unsuspected from the entrance wound<sup>4</sup>.

**Management**

Initial management of gunshot wounds in the head and neck region begins with basic resuscitation. High velocity injuries as well as mandibular injuries have a high rate of airway compromise requiring immediate intervention<sup>5</sup>. Endotracheal intubation or tracheostomy should be considered early. Radiographic evaluation by X-Ray and CT scan is helpful in determining the path of the projectile, its location inside the body if there is no exit wound seen on examination, fracture pattern, soft tissue loss and presence of major vascular injury<sup>6</sup>. Facial gunshot wounds carry 10-50% incidence of vascular injury<sup>7</sup>. Color flow doppler ultrasound helps in the evaluation of vascular injury in neck trauma. Conservative treatment in the form of debridement of devitalized tissue, thorough wound cleaning, removal of all foreign matter present in the wound and primary replacement of soft tissue defects will often result in a better functional and aesthetic restoration in a shorter period of time<sup>8</sup>. For extensive soft tissue loss, free osseocutaneous and musculocutaneous flaps are now the mainstays of reconstruction. Tetanus prophylaxis is mandatory. Appropriate antibiotic coverage is also necessary due to contamination by non-sterile primary and secondary missiles.

**Conclusion**

For gunshot wounds in the head and neck region, basic resuscitation followed by identification and repair of injuries is required. While there is no single protocol for the management of maxillofacial gunshot wounds, having a tailored approach to individual cases allows the surgeon to optimize form and function.

Clin Plast Surg 2001;28(2):323-337.  
 7. Futran ND, Farwell DG, Smith RB, Johnson PE, Funk GF. Definitive management of severe facial trauma utilizing free tissue transfer. *Otolaryngol Head Neck Surg* 2005; 132(1):75-85.  
 8. Goodstein WA, Stryker A, Weiner LJ. Primary treatment of shotgun injuries to the face. *J Trauma* 1979; 19(12):961-964.



Fig 1. Pre-operative view showing the entry wound.



Fig 2. X-ray lateral view of cervical spine shows a bullet fragment at the level of C2 and C3.



Fig 3. CECT Neck showing bullet at the level of C2 and C3.



Fig 4. Pre-operative view showing the incision line.

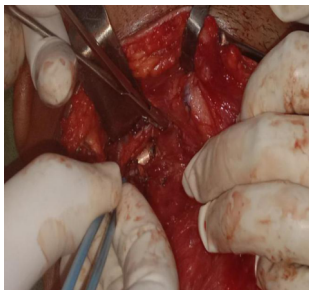


Fig 5. Surgical Exposure of the bullet in paravertebral space.

**References**

1. Pippal SK, Soni S, Asif SK, Bhadoria S. An extraordinary case of ricochet gunshot injury in the head & neck region with an atypical bullet trajectory—a case report. *World articles in ear, nose and throat* 2009; 2(1): 1-6.  
 2. Roon AJ, Christensen N. Evaluation and treatment of penetrating cervical injuries. *J Trauma* 1979; 19(6):391-397.  
 3. DeMuth WE. The mechanism of shot gun wounds. *J Trauma* 1971; 11(3): 219-229.  
 4. Holt GR, Kostohryz G. Wound Ballistics of Gunshot Injuries to the Head and Neck. *Arch Otolaryngol* 1983; 109(5):313-318.  
 5. Kummoona R, Muna AM. Evaluation of immediate phase of management of missile injuries affecting maxillofacial region in Iraq. *J Craniofac Surg* 2006; 17(2):217-223.  
 6. Suominen E, Tukiainen E. Close- range shotgun and rifle injury to the face.