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Gunshot injury in neck region without major injury: A rare outcome

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Abstract

We present an interesting case of gunshot injury with entry wound over the left maxillary area without exist wound and injury to major vessels. Bullet was located with X ray of Neck and was removed without difficulty from the right posterior- inferior i.e. zone II region of neck. Patient was discharged home after 24 hours of hospital admission and the post-operative course was uneventful.

Keywords

Gunshot injury; Penetrating injury; Head and neck.

Introduction

Gunshot injuries are the major problems worldwide from the medical and economic perspectives and are associated with profound morbidity and significant mortality. It is estimated that total deaths from firearm in 2016 ranges from 195,000 to 276,000 and major portion in Brazil, USA, Mexico, Colombia, Venezuela and Guatemala [1]. Every year in USA alone around 30,000 to 50,000 people die from gunshot wound [2]. Non-fatal firearm injuries are twice more common than death in USA. Accidental injuries and assaults are the common nonfatal injuries and overall firearm injuries [3].

A lot of vital structure lies in the neck which means understanding the anatomy of neck and exact path of the bullet in neck very important in order to treat the patient. The major cause of death in patient with neck injury is due to vascular injuries [4]. Thus, treating physician should have a basic understanding of the mechanisms involved in such injuries. We present an interesting case of gunshot injury in neck region without any damage to neck vital structure.

Case History

A 17-year-old male patient presented in the emergency room about 45 minutes after sustaining a single gunshot wound to the left maxillary region. He accidentally shot himself while playing with real pistol with his friend. The bullet entered through his left maxillary bony region without an exit wound. There were apparently no other injuries. The patient had transient loss of consciousness at the time of the incident though he gained consciousness in few minutes. He received first aid treatment (hemostasis) by his colleague. There was no soot deposited around the entry wound. The underlying bone was not exposed. The movement of neck was painful on the left side. On palpation, the right sternocleidomastoid muscle was taut and tender. The bullet was not palpable anywhere in the head and neck. No exit wound was found in the head & neck region or elsewhere in the body. The rest of the ENT examination was within normal limits. Neurological examinations were normal and vitals were stable with normal cardiovascular and respiratory system.

On doing X ray of head and neck, a defect in the maxillary bony sinus wall with soft tissue density area within left maxillary sinus was noted with entrapped air in right para-pharyngeal space probably created by bullet tract. A bullet- shaped radio opaque shadow was found posterior and inferior to the angle of mandible on the right side in the neck.

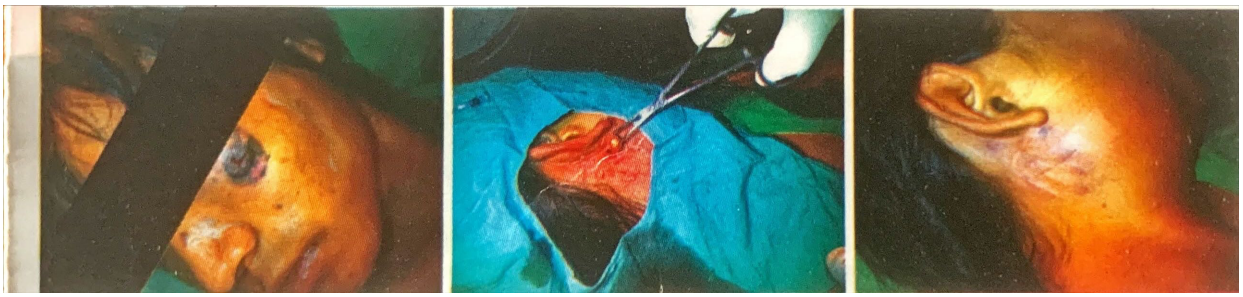

Figure 1: **(A)** Entry wound in the left maxillary region. **(B)** Bullet removed from the posterior-inferior region of neck. **(C)** Erythema in the region of lodge bullet.

With the diagnosis of lodge bullet in neck, neck exploration was done. A 3 cm linear horizontal incision was made from the mastoid tip extending anteriorly along the lower border of the mandible. Soft tissue dissection was performed and the bullet was localized and approached with the help of a C-arm and was found lateral to the sternocleidomastoid muscle lateral to the internal jugular vein and internal carotid artery. The bullet was dissected and removed. No nerve and major vessels were damaged. The wound was closed in two layers and hemostasis was achieved. The postoperative period was uneventful.

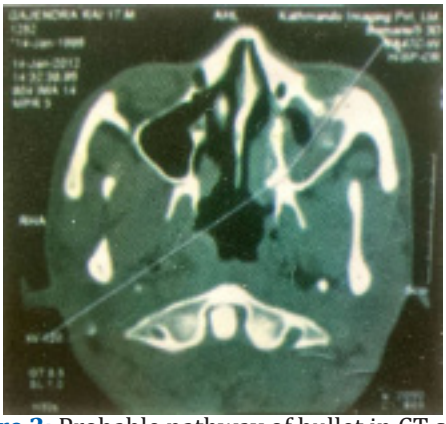

Figure 2: Probable pathway of bullet in CT scan.

Discussion

Penetrating injuries to neck can rupture major vessels running between chest and head and can cause severe hemorrhage. It needs immediate surgical exploration in case of pulsatile hematoma, active bleeding, airway compromise, large subcutaneous hematoma and shock [5]. Two third cases are fatal in case of injury to vital structure. Mortality rate of neck injuries is as high as 11% [6].

Neck is small but are densely occupied with major blood vessels, trachea, esophagus and spinal cord. Penetrating bullets even with minimal motion can cause severe damage to the major arteries, veins and trachea. Neck is divided into 3 major zone for evaluating and treatment of penetrating injuries [7]. Zone 1 is region between clavicle and cricoid cartilage which contains esophagus, trachea, thyroid, subclavian artery and vein, jugular vein and common carotid artery. Zone 2 lies between cricoid cartilage and angle of mandible, consist of common carotid artery, internal and external carotid artery, jugular vein, larynx, hypopharynx, cranial nerve X, XI, and XII. Zone 3 ranges from base of skull to angle of the mandible consisting of internal carotid arteries, jugular vein, lateral pharynx and cranial nerve VII, IX, X, XI and XII.

Face penetrating trauma is classified by Gussack and Jurkowich into 3 zone [8]. Zone 1 lies above superior orbital rim, Zone 2 is between superior orbital rim and oral commissure and zone 3 is below orbital commissure. Sherman and parish [9] classified the shotgun injuries based on the range. Long range injuries are characterized by subcutaneous or deep fascia injury only and distance between the weapon and the victim is more than 7 yards. Medium range injuries cause injuries to deeper structure to fascia and distance is 3-7 yards. Short range injuries cause massive tissue destruction and bullets is fired from under 3 yards. In our case, the entry wound was in Zone 2 of face and the bullet was lodged in the zone 2 region of Neck.

Direct tissue injuries, temporary cavitation and transmission of shock waves are the major three mechanism by which gunshot cause wound [11]. Weapon design, projectile target immediately after between muzzle and the body, sequence of the encountered tissue determines the severity of gunshot wound. Hitting hard structure like long bone, buckle of belt or hard object, yawing early in the tissue, large fragments and high speed of missile causes more severe injuries. Also, Low velocity bullet has erratic path, while high velocity has direct pathway [11]. Civilian bullets fired from the handgun, shotguns are more damaging to tissue than military combat wound as civilian bullets do not have the full metal jacket thus are likely to deform or fragment into tissue [10]. The characteristics of missiles and tissue both influence the nature of the wound. Tissue characteristics like elasticity, density, anatomical relationship with other tissue and missiles characteristics like mass, shape, construction and rotation of bullets (longitudinal or rotatory) also affect the nature of wound [10]. Rotational characteristics of bullets increase the probability of unusual or unpredictable course after it come in contact with tissue [11].

Initially, investigation depends on the vascular damage at clinical examination. However, routine X ray is next step in evaluating the patient. Computed tomography (CT) is performed based on the vascular injury. The patient with vascular injury needs immediate surgery after CT. Hemodynamically stable patient with no vessel injury on examination need to obtain CT scan with contrast and then should be transferred

to the Operation theater. After 24 hours of observation, patient with stable course can be discharged [12]. CT help in identifying hemorrhage, air, bullet, bone fragments, hemothorax, nerve lesion, musculoskeletal lesions, and vessels injuries and is useful for assessing medicolegal aspects as trajectory and the anatomical structures at risk [12].

According to Motamedi, three stage surgery is required which includes (1) debridement, fracture stabilization, and primary closure; (2) reconstruction of hard tissues, provided soft tissue coverage is adequate; and (3) rehabilitation of the oral vestibule, alveolar ridge, and secondary correction of residual deformities [13]. Lead toxicity when lead fragments remain in joint space, bursal space or disc space, is another potential complication of gunshot. Also, bullets and shotgun pellets deposit bacteria, and can contaminate deep tissues in the body [14]. In this case, the bullet removal was uncomplicated and performed at the request of the patient and his family.

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