Bullet Penetration In The Face Caused By Accidental Gunshot: A Case Report

Aditya Herwandar Sastrasupena, Kristaninta Bangun
Jakarta, Indonesia

Background: Clinical and radiological examinations are used to predict the location of the bullet in bullet penetration injury. The maxillofacial region had a variety of structure which could make the bullet deviate from its normal trajectories.
Patient and Methods: A rare case of bullet penetration in the face caused by accidental gunshot is described. A 32 year-old male was hit by a bullet in the face with entrance wound on the left temporal region. Radiologic examination showed a bullet in the left inferior orbita. Treatment was exploration and extraction of the bullet. In this case we observe the difference between the clinical examination, radiological diagnosis and intraoperative findings
Result: The patient underwent an explorative operation based on the prediction of location of the bullet from the clinical and radiological examination. The bullet was found in the inferior rectus muscle which the location is out of the prediction of clinical examination and radiologic findings.
Summary: Clinical and radiological examination do not always give the accurate prediction regarding the location of bullet in penetrating bullet injury of the face because the face has a variety of bone, muscle and soft tissue structure.
Keywords: *Bullet penetration injury, Gunshot, maxillofacial*

Latar Belakang: Pemeriksaan secara klinis dan radiologis digunakan untuk memprediksi lokasi peluru pada cedera tembus peluru. Regio maksilofasial memiliki struktur yang bervariasi yang dapat menyebabkan peluru berbelok dari lintasan normalnya.
Pasien dan Metode: Dideskripsikan mengenai sebuah kasus yang jarang terjadi mengenai penetrasi peluru pada wajah disebabkan oleh tembakan yang tidak disengaja. Seorang laki- laki 32 tahun mendapat tembakan peluru pada wajah dengan luka masuk pada regio temporal. Pemeriksaan radiologis menunjukkan sebuah peluru terletak pada orbita inferior kiri. Penatalaksanaan mencakup eksplorasi dan ekstraksi peluru. Pada kasus ini kami melakukan observasi terhadap perbedaan yang ditemukan antara pemeriksaan klinis, pemeriksaan radiologis, dan penemuan intraoperatif.
Hasil: Pasien menjalani operasi eksploratif berdasarkan prediksi dari lokasi peluru dari pemeriksaan klinis dan radiologis. Peluru ditemukan di otot rectus inferior dimana lokasi tersebut tidak sesuai dengan prediksi sebelumnya dari pemeriksaan klinis dan radiologis.
Ringkasan: Pemeriksaan klinis dan radiologis tidak selalu memberikan prediksi yang akurat terhadap lokasi peluru dari cedera tembus peluru pada wajah. Hal ini disebabkan karena wajah memiliki struktur tulang, otot, dan jaringan lunak yang bervariasi.
Kata Kunci: *Bullet penetration injury, Gunshot, maxillofacial*

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Bullet injuries are different from other trauma-related injuries. Traumatic injuries are usually located only in the area of impact, whereas a bullet, as it enters the body, forms splinters that magnify the damage in the direction of the bullet. The damage and trajectory that a bullet creates is therefore unpredictable. Gunshot injuries cause profound morbidity and significant mortality, especially if they occur in the head. These injuries occur in both military and civilian settings. Causes of these injuries may be homicidal or suicidal, and in rare cases, it may be accidental. The high density of vital structures in the head makes injury to this region highly morbid and often fatal[1]. The maxillofacial region had a variety of

From the Division of Plastic Reconstructive and Aesthetic Surgery, Department of Surgery, Faculty of Medicine Universitas Indonesia Cipto Mangunkusumo Hospital, Jakarta, Indonesia.
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structure which could make the bullet deviate from its normal trajectories.

Knowledge of the path of the missile track is critical for assessment of the damage and management of the patient with a gunshot wound. The unpredictable nature of the bullet also emphasize the importance of projecting the missile trajectory.[2] Therefore surgeons need to gather informations from the clinical and radiological examination in order to predict the exact location of the bullet. The extent of tissue damage in gunshot wounds depends on the distance at which the gun is fired, the missile track and the bullet structure size and velocity.[3] It is indeed a rare finding that a bullet's trajectory passes through the temporal region and does not damage any vital structures. We present one such case of gunshot injury to the head.

PATIENT AND METHODS

A 32-year-old male was referred to our center from a hospital in west Kalimantan, 5 days after sustaining a single gunshot wound. His chief complaint was pain in the orbital region and there was a bullet entrance wound in the left temporal region. In the physical examination we found a little redness and slight dystopia in the left eye and slight swelling in the left orbital region. No other abnormalities was found in the physical examination. Eye examination showed no visual impairment. No possible exit wound for the bullet could be identified anywhere on the head and the neck region. This incident occurred while the patient was sleeping in his truck so neither the type of weapon used to fire the bullet, nor the distance between the weapon and the patient was known.

Initial radiographic examination of the head showed a bullet fragment in the left inferior orbital region. Needle marker could not be used on the radiographic examination because it could puncture the eye ball. CT scan was performed to approximate the location of the bullet but the result was not satisfactory because the metal bullet disrupts the magnetic reading on the CT scan. Based on the CT scan and the nature of the bullet, we predict the bullet to be found on the bony orbital floor or the medial orbital wall not in the soft tissue.

RESULT

Surgery was performed to explore and extract the bullet. Infraciliary incision was made. Based on the radiological examination, we elevated the periosteum and explored the left orbital floor and the medial orbital wall but there was no presence of bullet. We decided to explore the soft tissue surrounding the eyeball. Out of our prediction, we discovered the bullet in the inferior rectus orbital muscle.

DISCUSSION

Foreign bodies in the maxillofacial region may present a diagnostic challenge because of many factors such as the size of the object, the difficult access, and a close anatomic relationship of the foreign bodies to vital structures.[4] Not all gunshot wounds are the same. The wound and effect of Gunshot injuries will vary depending on the type of bullet used, the distance from which the bullet was fired, type of shot (size and weight of pellets), impact velocity and body tissue resistance.[2] With an increase in the incidence of gunshot injuries to the maxillofacial region, it is important for surgeons to be able to predict the trajectory of the bullet using physical and radiological examinations. Having knowledge of the weapon, distance and type of projectile that causes the wound, the potential problems of a wound caused by a projectile can be better anticipated. This case was an accidental gunshot which the victim was inside the truck with no knowledge of the type of gun and distance of the shooter. The police suspected that the bullet came from a Hunter's rifle from far distance since that area are often used as a hunting ground.

When a projectile enters the body, different layers of tissue behave differently according to their specific property. Injury to the dermis causes abrasion, impaction of particulate matter and contusion. At closer range, burning, implantation of powder or residue may occur and could result in a tattoo. It then enters the muscle. Muscle is elastic and may sustain deformation as much as four times the diameter of the projectile. The shape of deformation will be similar to that of the temporary cavity. On a cellular level the muscle

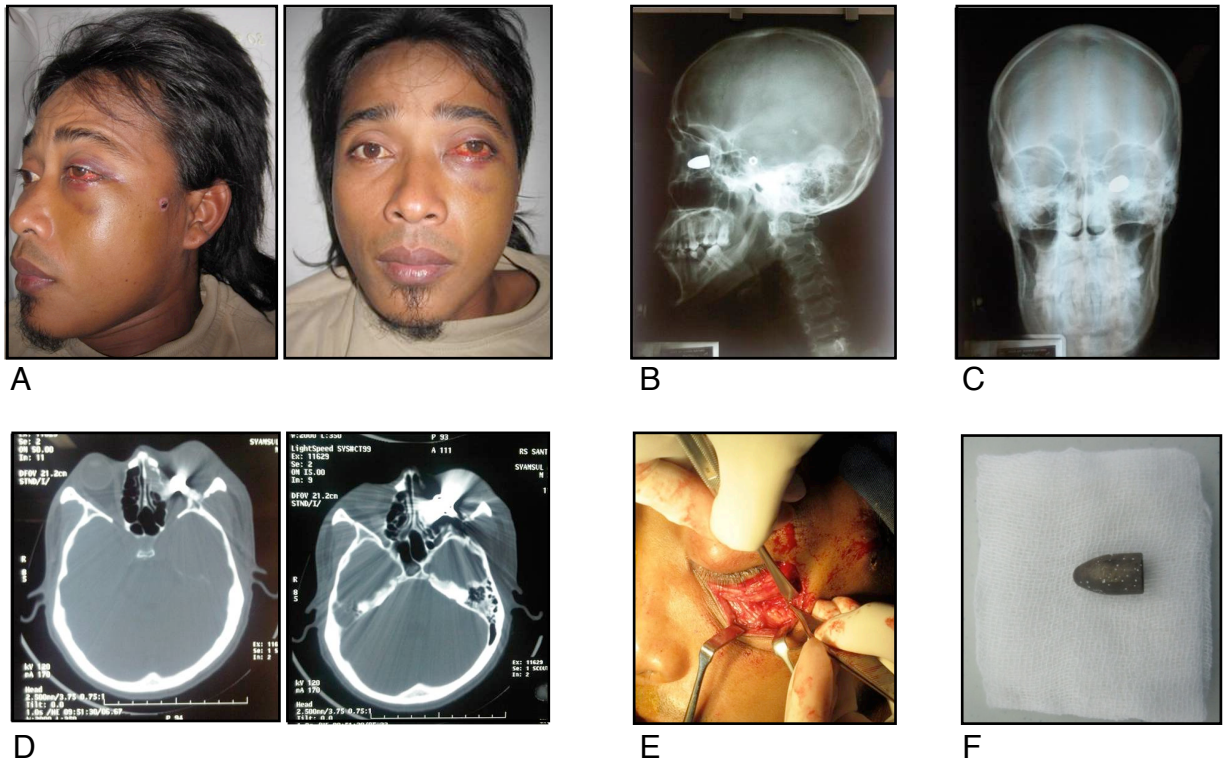

Figure 1. (a) Entrance wound on the left temporal region (A), Lateral view of the skull (B), AP view of the skull (C), Axial section of CT image showing the bullet (D), infraciliary insicion was made to expose infraorbital region (E), the bullet after being extracted from the inferior rectus orbital muscle (F).

becomes devitalized and necrotic. The projectile may then encounter vital structures such as nerves and vessels. Vessels may be ruptured, crushed or sheared and spasm may occur. Finally, the bullet will meet bone, which differs drastically from soft tissue in its architecture.[5,6] Because of this variety of structure, the bullet can deviate from it's normal trajectories or even lodged inside one of the structures or even an organ, so Physical examination often misleading. in order to predict the location of the bullet, we did an anterior-posterior and lateral radiographs. Unfortunately we could not use needle marker because the area of the wound is near the eyeball. Then we did the CT scan, but the result was not satisfactory. The metal nature of the bullet seems to disrupt the magnetic field of the CT scan and creating blurry white shadow surrounds the bullet which made it harder to confirm the position of the bullet.

We did the surgery by making an infraciliary incision and exploring the orbital floor and the medial wall based on the prediction from the radiological examination but we found the bullet in the inferior rectus muscle of the eyeball. Based on this experience we found that intraoperative radiography would be of great assistance in more precisely locating the bullet thus shortening the duration of surgery. Many authors described the use of a variety of equipment to assist the removal of foreign bodies such as endoscopic-assisted removal of foreign body,[7] the use of metallic detectors,[8] earth magnet,[9] and the use of navigating system.[4] Unfortunately these equipments are not available in our hospital. The simplest way is by using the C-arm. We could also use needle marker intraoperatively after securing the eyeball and use the C-arm to determine precise location of the bullet.[4]

SUMMARY

Maxillofacial region has variety of structure. Clinical and radiological examination do not always give the accurate prediction

regarding the location of bullet in penetrating bullet injury of the face because the face has a variety of bone, muscle and soft tissue structure. Each structures have different shape and density which could cause a bullet to deviate from it's normal trajectory in bullet penetrating injury. CT scan is considered the best tool to determine the location of foreign bodies,[4] but bullet can obscure the result of the CT scan images. Using Radiological examination intraoperatively using C-arm and needle marker is expected to be an effective way to locate and remove foreign bodies such as a bullet in the maxillofacial region.

Kristaninta Bangun, M.D.
Plastic Surgery Division
Cipto Mangunkusumo General National Hospital
Jalan Diponegoro No.71, Gedung A, Lantai 4.
kristaninta@yahoo.com

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