THE USE OF FLUOROSCOPY IN THE REMOVAL OF FOREIGN BODIES FROM MAXILLOFACIAL REGION

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INRODUCTION

Foreign bodies are now more frequently found in maxillofacial tissues due to firearm injuries associated with emerging terrorism and evolving explosive devices in South Asia and especially in tribal areas of Pakistan.

Oral and maxillofacial surgeons are frequently facing such situations in which advanced imaging technologies like computerized tomogram (CT), magnetic resonance imaging (MRI) are not available. Despite of the preoperative localization of foreign bodies through radiographs. Intraoperative guidance, when navigating through the delicate tissues is very important to avoid damage to these delicate structures, decrease operating time in terms of intraoperative localization and retrieval of foreign bodies [1]. Fluoroscopy is ubiquitous and is used frequently for removal of foreign bodies from upper aerodigestive tract [2, 3]. Fluoroscopy is more reliable, offers real time imaging, with precise intraoperative localization of foreign body and easily available [4]. Without prior localization of the foreign body surgery may do harm rather than giving benefit to the patient.

CASE REPORTS

CASE 1: A 23 year old male soldier was brought to the emergency room with a recent history of gunshot wound face. The history revealed that the patient was shot from a distant place in the right cheek. The entry wound could be seen over the right cheek, there was no exit wound. The patient was conscious oriented. His vital parameters were normal. He was breathing normally through mouth and airway was clear. He was assessed following the advance trauma life support (ATLS) protocol and managed accordingly. Neurological assessment was unremarkable. Tetanus prophylaxis was given to the patient He was referred to the ophthalmologist but globe injury was excluded and eye was normal.

After initial emergency management of the patient was over, radiological examination was performed to assess for any bony injury and to locate the foreign body. Posteroanterior and lateral cephalogram (Fig.1&2) revealed bullet in right infratemporal fossa with its secondary fragment in perisphenoidal area, dentoalveolar fracture of the right upper molar region. The bullet was pointing in a posteriomedial direction.

As bullet penetrated the tissues deeply and was physically encroaching on the adjacent hard and soft tissues, removal was necessary to avoid postoperative acute and chronic sequelae i.e. trismus etc.

It was decided to explore the area using image intensifier. Image intensifier showed the bullet in infratemporal fossa.The next step was to locate, fix and remove it under general anesthesia, a 21 gauge needle was inserted lateral to right pterygomandibular raphe intraoraly at the level of occlusal plane directing upward and backward. Under the guidance of the image intensifier, this needle was first inserted on the lateral side of the foreign body and moved medially. It moved the foreign body medially and the position was confirmed. This locating needle, inserted medially was used to fix the foreign body to the lateral side. Anterior ramal incision was made intraoraly with blade no.15 and medial tissues were retracted, widened with blunt dissection while the foreign body was fixed by the locating needle. This revealed the foreign body which was then grasped by an artery forceps and pulled out from its bed (Fig.3). The secondary fragment was left as

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such due to its location to adjacent vital structures and its removal could have done more harm than good to the patient. The wound was closed with 3-0 vicryl. Postoperative healing was uneventful.

CASE 2: A 65 year old male attended the emergency room complaining of foreign body in the floor of his mouth. According to the patient, it was a needle that had pierced his mouth while eating rice .It was painful every time he swallowed .He gave no recent history of dental treatment.

His general examination revealed an anxious person in irritable mood. He had history of myocardial infarction.

He was admitted for the following investigations to locate the foreign body: Orthopantomograph, lateral oblique skull view (fig.4) and a periapical x- ray view of the mandible confirmed the presence of a metallic needle. An attempt by the radiologist to locate the needle was unsuccessful. It was then decided to explore the area using fluoroscopy. An emergency appointment with the cardiac catheterization department was scheduled for fluoroscopic examination.

Fluoroscopy showed the needle in the floor of the mouth moving as the patient swallowed. The next step was to locate and remove it. A 21 gauge needle was inserted in floor of mouth after anesthesia was achieved. Under fluoroscopy, this needle was first inserted on the lateral side of the foreign body and moved medially .It was then inserted on medial aspect, under fluoroscopic guidance to move the foreign body to the lateral side. The foreign body moved laterally and the position was confirmed. This locating needle while still inside was used to fix the foreign body on the lateral side while the floor of the mouth was raised by the assistant from outside. A superficial incision with blade 15 was made and widened by blunt dissection while the foreign body was being fixed by the locating needle. This revealed the foreign body which was then grasped by an artery forceps and pulled out. The protruding end was grasped with another artery forceps and the foreign body (needle) was retrieved. The wound was sutured with 3.0 vicryl, healing was uneventful.

DISCUSSION

Firearm wounds are now a days very common due to prevalence of terrorism and can result in devastating immediate and longstanding sequelae.The resulting tissue damage depends upon projectile type (jacketed or nonjacketed), shape, victim proximity to muzzle and tissues penetrated(tissue with great resistance will suffer more communition like cortical bone) [5]. These injuries can be classified as penetrating, perforating and avulsive wounds. High velocity close range wounds result in significant avulsion and communition of soft and hard tissues [5].

A large variety of objects can be found in maxillofacial region which present as foreign bodies, most of these are usually long and sharp objects to allow for penetration to occur, such as nails, metal fragments, wood

Figure-1 & 2: Preoperative radiographs showing bullet in infratemporal fossa

Figure-3: Postoperative radiographs with bullet removed and arch bars secured to upper & lower jaws.

Figure-4: Lateral oblique skull radiograph showing needle in floor of the mouth

splinters and bullets, Most of these are accidental, some may be iatrogenic and rarely deliberate [6]. The routes of penetrating foreign bodies can be transfacial, transnasal, transorbital and transoral [6, 7].

There are many methods for the removal of foreign bodies ,some of the methods are conventional radiographs ,fluoroscopy, computed tomography, cone beam computed radiographic techniques, MRI, ultrasonography, electromagnetic metal detectors, xeroradiography, sinography, grid systems, every modality is associated with limitations[10, 11]. Most important step in removal of foreign bodies is localization. Conventional radiographs are noninvasive, inexpensive, easily accessible and can provide positional information, although not in real time, to aid in the removal of the foreign body [1]. Fluoroscopic systems consist of an x-ray image intensifier connected to video cameras. Fluoroscopic technology allows for real-time radiographic visualization of the foreign body and affords the clinician the opportunity to precisely locate and fix the foreign body using markers. In our cases hypodermic needle was used to locate and fix foreign body in its location. It is more convenient and adequate compared to other imaging modalities while radiation exposure is 10 to 12 times more than conventional techniques[1]. A clinician described a technique in which, two small needles were placed and advanced into the skin at perpendicular angles under fluoroscopy until they were both touching the foreign body. An incision was then made to connect the two needles, and blunt dissection effected foreign body removal [12].

Ultrasonography is now ubiquitously used and emerging technology for foreign body removal. Ultrasonography affords the clinician real-time localization and orientation information and can also help in characterizing whether soft tissue swelling or abscess is present. Relationship with respect to muscles and tendons can be appreciated as well [1]. Since such findings are critical in both decision-making and in planning the removal of the foreign body. Recent reports have rated sensitivity of 90% for ultrasound in the detection of foreign bodies while for CT scan since it has been considered gold standard it was 70%. Reports suggest that ultrasound is a superior and better imaging modality than CT scan and MRI for foreign bodies detection in soft tissues It has better detection capabilities for wooden foreign bodies which may give appearance of air bubble in CT scan but not for foreign bodies inside bone.There is no risk of radiation but it is dependent upon the competency of examiner [12, 14].

Cone beam computed tomography is a new rising imaging modality used in navigational surgery and is also used in foreign body removal. There are cases reported, in which foreign body was removed via an endoscopic channel made into tissues harboring foreign body [15].

The necessary radiographic equipment for fluoroscopy is available in most of the hospitals and, hence using a less successful technology can result in patient and surgeon's discomfort as well as medicolegal issues.

However we recommend that hypodermic needle of suitable gauge under fluoroscopic guidance can be used to locate and fix the foreign body prior to its retrieval.

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