Unusual Penetrating Metallic Foreign Bodies Injured Maxillofacial and Orbital Region with Minimal Damage

SUMMARY

Penetrating injuries during work accidents represent a rare but complex variety of craniofacial trauma. Generally, the penetrating material is stiff enough to cross through different anatomic structures and can cause an impressive problem for the patient. On the arrival at the emergency department, clinical situation of the patient must be evaluated to decide the type of examination. Functional and cosmetic problems must be taken under consideration and an immediate decision must be taken by the specialists for a rapid surgical treatment. The surgical approach depends on the position of a foreign body.

2 penetrating head injuries during work accident are presented, the pre- and intra-operative approach described and the particularities of these cases are pointed out.

Keywords: Penetrating Trauma; Metallic Foreign Body

Introduction

According to Agrillo et al1, a good cosmetic and functional outcome of penetrating injuries depend on 4 main factors: (1) the extent of the traumatic injury; (2) clinical condition and age of the patient; (3) diagnostic accuracy; and (4) the amount of time that has passed between trauma and operation. First aid for trauma patients requires their transportation to an emergency department by qualified personnel. After this, a multidisciplinary approach is recommended, taking into account all the anatomic structures involved and planning the most suitable surgical strategy1.

In order to assess the exact extent of the maxillofacial injuries, it is necessary to perform some examinations, such as standard skull radiographs in 4 projections, 2-dimensional computed tomography (CT) scans in axial and coronal projections, or 3-dimensional CT scans of the maxillofacial area2. Preoperative knowledge of the shape of the foreign body and its relationship to the surrounding structures using appropriate imaging modalities is imperative3.

Report of Cases

Case A

A 52-year-old farmer sustained an injury of his left eye during outdoor activity. After the injury, he was examined in the nearby hospital of his town and then referred to Papanikolaou Hospital of Thessaloniki nearly 48 hours after being injured, under broad-spectrum antibiotic coverage and anti-tetanus prophylaxis.

At the time of examination, he had hypophagia, slight oedema around the left orbit, blepharoptosis and a dorsal injury of the left upper eyelid. On further examination by ophthalmologists, the left eye had peri-bulbar oedema, hyphema, intravitreous haemorrhage and reduction of visual acuity to counting fingers at 1 m. The IOP was 15 mmHg. A slit lamps examination disclosed iridoschesis at 6 o’clock. ENT examination revealed no abnormality of the nasal cavity. There was no systemic involvement.

X-rays at the time of the injury and the requested posttraumatic computer tomography revealed a metal body with intra- and extra-conal extension, in immediate contact to the left frontal, ethmoidal and nasal bones.
distal part of the foreign body ended in the left superior concha. The optic nerve appeared normal. There were no signs of any injuries of the globe or any fractures or intracranial involvement (Figs. 1-3).

It was decided to explore the wound under general anaesthesia. Through the entry wound the metallic body was found to be embedded in the medial wall of the orbit. On manipulation, the body showed slight movement and appeared to be fixed to deeper structures. In order to avoid further injuries of the orbital contents, with mild manoeuvres and under direct visual contact, the entry wound was extending and the foreign body removed (Fig. 4).

The patient recovered uneventfully. 3 months later the ptosis improved. New ophthalmologic examination revealed visual acuity of 3/10 and IOP of 9 mmHg. Fundus examination showed small hemorrhage near the optic disc.

Case B
A 57-old man was brought to the emergency department after a work accident. He was slightly confused, but able to answer to some questions. He had a metal foreign body of irregular shape embedded in his left mid-face, in the area of the left sinus. He presented soft tissue injuries of the lips and the chin, dermal loss at the tip of the nose, 3 broken teeth in the front of the mandible and burning injuries on the neck, the cheek and the forehead (Figs. 5 and 6). After the evaluation by specialists of other disciplines and since there were no signs of any injury of vital anatomic structures,
radiographs (Figs. 7-9) and no computer tomography, were taken to estimate the exact position of the metal body, because time was more critical in view of the patient distress.

The patient was transferred directly to surgery in the operating room for careful removal under general anaesthesia, with all facilities available in the event of any complication. A metal body of irregular shape and size 8 cm x 5 cm was removed from the left side of the patient’s face (Fig. 10), along with a high number of small pieces of plastic which were also embedded in the trauma area and seemed to have caused the burning injuries of the face. There was no intra-operative haemorrhage or other complications.

The front wall of the left sinus, along with the zygomaticomaxillary buttress was completely destroyed and there was no possibility of reconstruction. An antro-rhinostoma was performed at the meatus inferior. A primary plastic closure of the face injuries was achieved.

Antibiotic cover with cephalosporine second generation, intra- and post-operatively, for 14 days was recommended. Our patient recovered uneventfully and had no recurrent maxillary sinusitis or nasal obstruction.
Discussion

Foreign bodies can cause injuries of the orbit and extensive damage to the surrounding structures. They may give rise to severe orbital complications and usually inorganic foreign bodies cause visual loss or orbital complications from direct trauma. A retained metallic orbital foreign body may cause a variety of signs, symptoms, and clinical findings, based on its size, location and composition. There have been described cases with pyogenic infection, periostitis and fistula formation. There may also be a risk of gas gangrene formation, development of tetanus, chronic sinusitis, when a sinus is involved, meningeal infection or cerebral abscess formation if cranial cavity is involved. Even sight-threatening complications have been described. Complications can appear long time after the injury. In the case A, the 24-month follow-up period was uneventful.

CT scan is the standard diagnostic test, because it demonstrates most foreign bodies and it is safe in the presence of metallic bodies. Recent reports have shown helical CT scans to be as accurate as conventional CT scans, while reducing the radiation exposure for the patient.

The surgical approach used, depend on the position of the foreign body. Most commonly, this is through the entry wound. Posteriorly located foreign bodies have an increased risk of motility disturbances or optic neuropathy after surgical removal, whereas anteriorly placed foreign bodies are more easily removed.

In the case B, the examination was performed with simple radiographs, because of the metallic nature of the foreign body and the possible artefacts in other imaging procedures, the urgency of the situation and because it was thought that any other method, like CT, would not add anything important for the planned surgical intervention.

The proposed algorithms for the approach of penetrating injuries of the face, after the exclusion of any life threatening situation for the patient and with no complication from the orbital area, had no importance in the case A, because of the unique shape and size of the embedded foreign body. In the second case, the foreign body lost kinetic energy during the impact with the maxillary region, saving, in this way, the orbital structures and the brain. Since there was no possibility of osteosynthesis in the maxilla because of the extensive destruction of the bone structures of the area, we decided a double approach from intraoral and through the face trauma that left behind the metal body. A Caldwell- Luc operation was unnecessary. The metallic object was carefully removed because of the danger of a major haemorrhage and to avoid secondary iatrogenic injury during removal.

Injury to the paranasal sinuses should be appropriately treated to decrease the risk of recurrent sinusitis and mucocele formation. Wound tracts should be thoroughly irrigated and devitalized tissue debrided. Intraoral wounds should be closed early when possible. Prophylactic antibiotic coverage and tetanus toxoid booster should be given. Long term follow-up is recommended. Sometimes further imaging studies are necessary to evaluate delayed traumatic injuries to cranial nerves and paranasal sinuses.

Although seldom fatal, the treatment of penetrating craniofacial injuries requires a methodical approach because of the possible immediate complications that may follow the removal of the foreign body. The therapeutic record should be based on a multidisciplinary approach to obtain the best aesthetic and functional results. It must be emphasised that the prognosis of every injury by a foreign body is strongly influenced by the nature and the location of the injury and the extent of initial damage.

References


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