Case Report

Penetrating knife injury to infratemporal region: case report & review of literature

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ABSTRACT

Infra Temporal Fossa (ITF) injuries with retained knife handle are quite uncommon. ITF has a complex anatomy and is divided into prestyloid and post styloid compartments. We reviewed the literature and found one reported case. We are presenting another such rare case. A 22-year-old male presented in emergency room with a retained knife injury to the left face in front of left tragus. Clinically the patient was stable haemodynamically. CT showed the knife lying in left extra cranial infratemporal region, and the tip dangerously close to carotid canal, foramen ovale, and foramen spinosum and lateral orbital wall. After careful assessment it was decided to take the patient for simple extraction of knife in OT and prepare neck for ligation of external carotid if required. The knife was successfully removed and the patient has been followed up for 1 year with no residual problems. ITF injuries are uncommon and dangerous particularly ones which go into retrostyloid region and penetrate cranial cavity. If patient is stable clinically and imaging suggests pre styloid ITF injury, then after consulting a multidisciplinary team these may be treated by simple knife extraction in operation theatre with good outcome.

Keywords: Infratemporal fossa, Knife handle injury, Maxillofacial injuries, Penetrating injuries, Neurovascular injuries, Cerebral penetration, External carotid injuries

INTRODUCTION

Infra Temporal Fossa (ITF) injuries with retained knife handle are quite uncommon. It is a strange site to see a walking patient with knife handle struck in his face (ITF) with no deficits! We reviewed the literature and found one reported case only.¹

CASE REPORT

A 22-year-old male presented in emergency room with a retained knife injury to the left face in front of left tragus. The wound was not bleeding and the patient came walking to the emergency. On clinical examination the patient was conscious and oriented. Motor and sensory

examination was normal. Cranial nerve examination was normal. Patient was stable haemodynamically with BP 130/80 and a pulse rate of 80 per minute. He had severe pain and soreness in left face.

On further questioning the mode of injury, the attendants informed that he was fighting with a friend and in a fit of rage he struck the kitchen knife at his face with full force. He had no history of unconsciousness or seizures; there was no sign of any other injury on his body.

An immediate computed tomography was ordered after securing venous lines in the arm. Instructions were given to arrange for Blood transfusion immediately and more if required. CT showed the knife lying in left extra cranial

infratemporal region, and the tip dangerously close to carotid canal, foramen ovale, and foramen spinosum and lateral orbital wall. There was no sign of any damage to brain parenchyma.

Complete infratemporal exposure was deemed unnecessary due to the stable condition of the patient and no major neurovascular injury. After careful assessment and discussion with otolaryngologist and anesthetist it was decided to take the patient for simple extraction of knife in OT and prepare neck for ligation of external carotid if required. Necessary Blood transfusion was readied and patient explained risks involved in surgery.

General anesthesia was administered to the patient and face and neck cleaned and draped. Wound was extended and the knife was gradually loosened. After dissecting the muscles and achieving hemostasis it was observed that the knife was free in the upper part but the tip was stuck firmly in bone. Gradual dissection was done and the last portion of the knife was extracted with some force. A gush of venous blood followed, which was quickly stopped with pressure and the knife, was out! The oozing from wound was controlled with bone wax and surgicel.

The wound was stitched in layers and a drain was left in deep part of wound, which was removed after 48 hours. The patient did well post operatively and had no neurological complication and was discharged after 5 days. Patient has been followed up for 1 year with no residual problems.

Figure 1: CT Brain plain suggestive of knife penetrating the muscles in infratemporal region and lying dangerously close to optic canal and foramen ovale and lacerum. The brain parenchyma has no contusion, or hematoma.

Figure 2: CT Brain (bone window) shows the knife more clearly with some artifacts. Its difficult to say whether the tip of knife has violated the lateral orbital wall but seems just short of apex where optic nerve and vessels exit.

Figure 3: A skull model showing the path traversed by the knife. The knife is the original one taken out from the patient's infratemporal fossa.

DISCUSSION

Maxillofacial injuries around the orbit are infrequent and serious due to cranial extension.¹ Injuries to the infratemporal fossa are rare and challenging to treat due to the complex anatomy. A multi-disciplinary team of neurosurgeon, otolaryngologist, interventional radiologist and intensivist are required for successful management.

The infratemporal fossa (ITF) is a continuation of the temporal fossa between the internal surface of the zygoma and the external surface of the temporal bone and greater wing of the sphenoid bone. It is sitting deep to the ramus of the mandible.² The styloid diaphragm divides the ITF into prestyloid and retrostyloid regions and covers the high cervical ICA. The prestyloid region contains the parotid gland and associated structures, including the facial nerve and external carotid artery. The retrostyloid region contains major vascular structures (ICA, internal jugular vein) and the initial exocranial portion of the lower cranial nerves IX through XII.^{3,4} In our patient the knife injury was prestyloid, however no injury to facial nerve or external carotid artery or parotid was noted.

The bony dimensions of ITF include; the roof is the greater wing of the sphenoid bone, the medial wall is the lateral pterygoid plate, the lateral wall is the ramus of the mandible, the posterior wall is the articular tubercle of the temporal bone and the spine of the sphenoid bone.² The knife in our case was however stuck inside firmly, likely into the lateral pterygoid plate. As there was no neurological deficit and haemodynamically the patient was stable, hence the decision was taken to disimpacting the knife was taken. Wider exposure of the infratemporal region is fraught with dangers of manipulating lower cranial nerves and ICA. The literature also supports the simple extraction method if no deficits are there.⁵⁻⁷

Taylor has reported high incidence of mortality for patients with retained blades. Possible reasons for these findings are that retained blades tend to be deeply penetrating with a potential for more cerebral and vascular injury, and there is a higher incidence of petrous

bone penetration that results in carotid artery injury.⁸ Such patients can be identified preoperatively with the extent of knife tip and cerebral damage.

Injuries to external carotid and its branches like maxillary artery or middle meningeal artery at foramen spinosum or facial nerve branches can also occur in prestyloid ITF penetrating injuries.⁹ In our case there was local bleeding from vessels and bony venous oozing from disimpacting knife. CT Angiography of neck vessels is desirable in such patients but was not done in our case. Postoperative Angiography is also valuable as it can show any aneurysmal or dissection or obliteration of vessels.^{9,11} There are cases reported of external carotid artery obliteration post injury to ITT region.¹

CONCLUSION

ITF injuries are uncommon and dangerous particularly ones which go into retrostyloid region and penetrate cranial cavity. If patient is stable clinically and imaging suggests pre styloid ITF injury, then after consulting a multidisciplinary team these may be treated by simple knife extraction in operation theatre with good outcome.

Abbreviations

ITF - Infratemporal fossa
CT - Computed tomography
ICA - Internal carotid injury
OT - Operation theatre

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REFERENCES

1. Cosan TE, Arslantas A, Guner AI, Vural M, Kaya T, Tel E. Injury caused by deeply penetrating knife blade lodged in infratemporal fossa. Eur J Emerg Med. 2001 Mar;8(1):51-4.
2. Gustavo Rassier Isolan, Richard Rowe, Ossama Al-Mefty. Microanatomy and surgical approaches to the infratemporal fossa: an anaglyphic three-dimensional stereoscopic printing study. Skull Base. 2007 Sep;17(5):285-302.
3. Bejjani GK, Sullivan B, Salas-Lopez E, Abello J, Wright DC, Jurjus A, et al. Surgical anatomy of the infratemporal fossa: the styloid diaphragm revisited. Neurosurgery. 1998;43:842-52.
4. Vishteh AG, Coscarella E, Theodore N, Spetzler RF, Zabramski JM. The infratemporal fossa: an anatomic review. BNI Quart. 1999;15(4):4-11.
5. Grobbelaar A, Knottenbelt JD. Retained knife blades in stab wounds of the face: is simple withdrawal safe? Injury. 1991;22:29-31.
6. Hudson DA. Impacted knife injuries of the face. Br J Plast Surg. 1992;45:222-4.
7. Orbay AS, Uysal OA, Iyigun O, Erkan D, Guldugus F. Unusual penetrating faciocranial injury caused by knife: a case report. J Craniomaxillofac Surg. 1997;25:279-81.
8. Taylor AG, Peter JC. Patients with retained transcranial knife blades: a high-risk group. J Neurosurg. 1997;87:512-5.
9. Harris JP, Anterasian G, Hoi SU, Shackford S, Brahme FJ. Management of carotid artery transection resulting from stab wound to the ear. Laryngoscope. 1985;95:782-5.
10. Berlot G, Nicollazzi G, Viviani M, Silvestri L, Tomasini A, Gullo A, et al. Traumatic blunt carotid injury: clinical experience and review of the literature. Eur J Emerg Med. 1996;3:36-42.
11. Mittal VK, Paulson TJ, Colaiuta E, Habib FA, Penney DG, Daly B, et al. Carotid artery injuries and their management. J Cardiovasc Surg (Torino). 2000 Jun;41(3):423-31.

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