

Anaesthetic Management in a Case of Penetrating Orbitocranial Trauma: A Case Report

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Abstract

We herein report a case of 19-year-old male with penetrating orbitocranial injury due to metallic rod. Patient presented with penetrating left orbital injury extending into the cranium. Though vision was intact patient was in severe distress and agony. CT scan was done which showed left orbital roof fracture with intracranial extension of the metallic rod. Left frontal craniotomy under general anaesthesia was planned. This case has been reported to highlight how the anticipated difficulty in mask ventilation, laryngoscopy and endotracheal intubation due to presence of metallic rod was overcome with the insertion of I-gel.

Keywords: I-gel, Penetrating eye injury, Metallic rod

Introduction

Transorbital intracranial injury is rare but leads to serious brain damage and is associated with a high morbidity and mortality rate [1]. It accounts for 4.5% of all orbital pathology, and represents 0.04% of all head trauma [2,3]. Complication rate in transorbital injuries is twice that for penetrating cranial injury not affecting the orbit, with a mortality rate of approximately 12% [4].

Penetrating orbital injuries can have serious neurological consequences if it occurs via orbital roof, superior orbital fissure and optical nerve [5]. Temporary or permanent neurologic deficits and vascular complications such as hemorrhage, thrombosis, or occlusion may occur [5, 6]. Orbital injuries like eyeball laceration, retrobulbar hematoma, proptosis and damage to the optic nerve with visual impairment are common.

A multidisciplinary, systemic approach and prompt treatment is necessary. Any impending cerebrovascular catastrophes and risks should be determined by clinical evaluation and computed tomography (CT) scan and/or magnetic resonance imaging and angiography [4]. Airway management is of paramount importance as these cases might present for emergency surgery and maybe associated with airway compromise. The management becomes more challenging where large foreign body is in situ and poses problems during transport and positioning.

We report a case of a patient who had sustained penetrating eye orbit and skull injury with iron rod due to road traffic accident and presented with the rod in situ to the emergency room. Patient had an intact vision in the affected eye and so early surgery was needed to preserve the eye. Patient was assessed by an ophthalmologist who instilled saline in the injured eye and checked for visual acuity after cleaning the outer surface. Surgery under general anaesthesia was

planned to remove the penetrating iron rod. Mask ventilation (due to presence of iron rod), laryngoscopy and endotracheal intubation were difficult, as it required turning head from lateral to midline position and extension at cervical spine. This was not possible as it could lead to movement of the iron rod and further damage to eye & brain. Decision was taken to insert an I-gel after induction to avoid any head and neck movement.

Case Report

A 19-year-old average-built male was brought to the emergency department after road traffic accident. Patient presented with penetrating left orbital injury with a metallic rod in situ. The rod was around 1.5 feet long and curved, the other end of the rod was touching the chest in such a way that head of the patient could not be straightened or turned (Fig. 1). Patient had no history of unconsciousness, vomiting, seizures and ear or nose bleed. On presentation patient was conscious, oriented but restless due to pain. His vitals were stable. Right side pupil was normal in size and normal reacting. Left side eye could not be accessed due to pain and presence of blood. CT scan was done which showed left orbital roof fracture with intracranial extension of the metallic rod. Left frontal craniotomy under general anaesthesia was planned to remove the metallic rod and fractured bone fragment from the left orbital roof. Pre-anesthetic checkup was normal except the anticipated difficulty in mask ventilation, laryngoscopy and endotracheal intubation due to presence of metallic rod penetrating through the orbit in the cranium and other end of the iron rod resting on the chest. Airway could not be assessed but due to anticipated difficulty an airway management plan was decided beforehand.

Plan A - Insertion of I-gel after induction of anaesthesia

Plan B - Insertion of fiberoptic bronchoscope via intubating LMA

Plan C - In case of failure of plan A and plan B, tracheostomy by ENT team was kept as standby

Patient had his last meal 4 hours back. He was informed about the aspiration risk and consent was obtained. Standard aspiration prophylaxis with injection Ranitidine 50 mg and injection Perinorm 10 mg iv was given. On shifting to operation room standard monitors

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Figure 1: Patient with foreign body in situ



Figure 2: Successful placement of I-gel to secure the airway



Figure 3: Iron rod after removal in toto

were applied and IV (intravenous) line was secured. Patient was given Inj. Glycopyrolate 0.2 mg, Inj. Midazolam 2 mg, Inj. Fentanyl 100 µg IV and preoxygenated with nasal cannula at 5 litres/min for 5 minutes. Induction was done with Inj. Propofol 100 mg I V. Patient had adequate jaw relaxation checked with jaw thrust was applied which showed adequate jaw relaxation. Without any movement of head and neck, insertion of I-gel was done in first attempt and took 25 seconds (time from holding the device till confirmation of placement) (Fig. 2). Proper placement was confirmed by good chest rise, auscultation of chest and capnography. A 14FG gastric tube was inserted through the gastric port of I-gel. For muscle relaxation Inj. Vecuronium bromide was given and maintenance was done with Oxygen-Air and Isoflurane 1-2%. Patient was kept on pressure control ventilation 12-14 cm of H₂O and rate was adjusted to keep the EtCO₂ 30-35 mm Hg. Procedure took four hours and patient was stable throughout. At the end of the surgery inhalational anesthetics were turned off and residual neuromuscular blockade was reversed with Inj. Neostigmine 2.5 mg and Inj. Glycopyrolate 0.5 mg. I V. Gastric port suction and oral suction was done and I-gel was removed. I-gel was inspected for presence of any blood or vomitus. Patient denied any sore throat after extubation or in the postoperative period. Patient was discharged after 7 days from ward.

Discussion

During intraocular trauma all vascular and neural structures are at risk but trauma that violates the orbital wall makes nearby intracranial structures vulnerable, with potentially catastrophic sequelae [7].

It becomes a surgical emergency given the risk to vision in addition to potential intracranial injuries such as vascular injury, dural laceration, and neurologic injury.

Airway management in such emergency situations always remains a challenge to anesthetist. Proper assessment of difficult airways and systematic preparation are the keys for achieving successful intubation [8].

In such cases decision should be taken after exploring all the feasible possibilities. Patient reassurance and comfort plays significant role as these patients genuinely need proper counseling and care

In this case there was an additional issue of movement of metallic rod which was in-situ in the left orbit. The movement of metal rod could further increase the injury to the eye or brain leading to grave consequences like blindness or severe neurological deficits.

Bag and mask ventilation was tricky because of presence of metallic rod over the face.

In such conditions awake fiber-optic intubation might be the

technique of choice but this technique requires lot of experience and patient cooperation. We did not attempt fiber-optic intubation as this patient was restless, uncooperative and also during regional airway anesthesia there might be movement of the head-neck or metal rod which might have worsened the injury. But we had kept it as plan B (fibreoptic bronchoscope through intubating LMA) in case our plan A of securing the airway with I-gel would have failed.

Supra-glottic devices are frequently used to secure airway without much movement of head and neck but only specific supra-glottic devices protect from gastric aspiration. Though Proseal LMA has a gastric channel but its insertion is generally difficult even in experienced hands and takes longer time to secure airway [9, 10]. I-gel is a supra-glottic device which can be rapidly inserted and it also has a gastric channel to insert gastric tube. I-gel is routinely been used in the management of difficult airway [11-14] during elective as well as emergency situations in anesthesia. In our case we were able to manage entire surgical procedure successfully with I-gel. Such cases are always considered to be full stomach, we have already given aspiration prophylaxis to our patient and use of I-gel has successfully been described in such cases in emergency [15, 16]. Another important aspect is to prevent sudden rise in intraocular pressure both during induction and reversal because it may aggravate the eye ball injury. With I-gel such events are decreased [17]. We kept our patient on pressure control ventilation and there is enough evidence available for the use of I-gel in positive pressure ventilation [18-20]. In this case I-gel helped to secure airway rapidly and safely without movement of head and neck, and we were able to maintain anesthesia throughout the procedure without any problem.

Conclusion

Penetrating orbitocranial wound is a life-threatening condition that demands interdisciplinary approach and treatment. I-gel may be a useful airway device for securing airway in difficult airway situations like penetrating face/eye injury with large foreign body in situ without movement of head and neck. Due to presence of large foreign body in orbit any movement of head and neck is not desirable as it may lead to exacerbation of orbitocranial injury or loss of vision.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the Journal. The patient understands that his name and initials will not be published, and due efforts will be made to conceal his identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None

References

- Lin HL, Lee HC, Cho DY. Management of transorbital brain injury. *J Chin Med Assoc.* 2007; 70:36–8.
- Turbin RE, Maxwell DN, Langer PD, Frohman LP, Hubbi B, Wolansky L, et al. Patterns of transorbital intracranial injury: A review and comparison of occult and non-occult cases. *Surv Ophthalmol.* 2006; 51:449–60.
- Seçer M, Ergüngör MF, Dalgıç A, Okay HÖ, Dağlıoğlu E, Acar OA. Transorbital brain injury by a metallic fragment: A case report. *Turk Neurosurg.* 2007; 17:163–5.
- Gazzaz M, Lmejjati M, Akhaddar A, Derraz S, Aghzadi, El Khamlichi A. Paediatric penetrating orbitocranial injury with a pencil - a report of two cases. *Pan Arab J Neurosurg* 2000; 4:2.
- Singh A, Kumar Bhasker S, Kumar Singh B. Transorbital penetrating brain injury with a large foreign body. *J Ophthalmic Vis Res.* 2013; 8:62–5.
- Miscusi M, Arangi P, De Martino L. An unusual case of orbito-frontal rod fence stab injury with good outcome. *Surgery.* 2013; 13:31–6. 10.1186/1471-2482-13-31.
- Yin YH, Dhanireddy S, Braley AE. Management of an Unusual Orbitocranial Penetrating Injury: Case Reports in Ophthalmological Medicine, Volume 2020, Article ID 9070595, 5 pages <https://doi.org/10.1155/2020/9070595>.
- Goto T et al Advancing emergency airway management practice and research; *Acute Medicine & Surgery* 2019; 6: 336–351.
- Singh I, Gupta M, Tandon M. Comparison of Clinical Performance of I-Gel™ with LMA—Proseal™ in Elective Surgeries. *Indian J Anaesth.* 2009 June; 53(3): 302–305.
- Trivedi V, Patil B. A Clinical Comparative Study of Evaluation of Proseal LMA V/S I-GEL For Ease Of Insertion And Hemodynamic Stability; A Study Of 60 Cases. *The Internet Journal of Anesthesiology* Volume 27 Number 2.
- Emmerich M, Dummler R. Use of the I-gel laryngeal mask for management of a difficult airway. *Anaesthesist.* 2008 Aug; 57(8):779–81.
- Asai T. Successful use of I-gel in three patients with difficult intubation and difficult ventilation. *Masui.* 2011 Jul; 60(7):850–2.
- Emmerich M, Tiesmeier J. The I-gel supraglottic airway: a useful tool in case of difficult fiberoptic intubation. *Minerva Anesthesiol.* 2012 Oct; 78(10):1169–70.
- Gupta L, Bhadoria P: The I-Gel™ airway for Difficult Intubation. *The Internet Journal of Anesthesiology.* 2008 Volume 18 Number 1.
- Gibbison B, Cook TM, Seller C. Case series: protection from aspiration and failure of protection from aspiration with the I-gel airway. *British Journal of Anaesthesia* 100 (3): 415–17 (2008).
- Kim YH. Pulmonary aspiration associated with supraglottic airways: Proseal laryngeal mask airway and I-Gel. *Korean J Anesthesiol* 2012 December 63(6): 489–490.
- Ismail SA, Bisher NA, Kandil HW, Mowafi HA, Atawia HA. Intraocular pressure and haemodynamic responses to insertion of the I-gel, laryngeal mask airway or endotracheal tube. *Eur J Anaesthesiol.* 2011 Jun; 28(6):443–8.
- V. Uppal, G. Fletcher and J. Kinsella. Comparison of the I-gel with the cuffed tracheal tube during pressure-controlled ventilation. *British Journal of Anaesthesia* 102 (2): 264–8 (2009).
- Maharjan SK. I-gel for Positive Pressure Ventilation. *JNMA J Nepal Med Assoc.* 2013 Jan-Mar; 52(189):255–9.
- Siddiqui AS, Raees US, Siddiqui SZ, Haider S, Raza SA. Comparison of performance and safety of I-gel with laryngeal mask airway (classic) for general anaesthesia with controlled ventilation. *Anaesth Pain & Intensive Care* 2010; 14(1):17–20.

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