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Case report

Tracheal intubation with size 1 Airtraq in a 3 month old child with occipital meningocele: A novel experience☆

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Abstract Meningocele is a neural tube defect where meninges protrude through a skeletal defect. Occipital meningocele compounded with the problems of paediatric airway itself pose challenges to anaesthesiologist in securing and maintaining airway. We present a case report of a 3 month-old-child with occipital meningocele posted for ventriculo-peritoneal shunt for hydrocephalus, who was successfully intubated using a size 1 Airtraq optical laryngoscope.

1. Introduction

Meningomyelocele is a broad term representing herniation of extracranial contents through a congenital defect in the vertebral column. If only cerebrospinal fluid (CSF) and meninges herniate, it is termed as a meningocele [1]. Securing the airway with intubation becomes challenging in occipital meningocele due to difficulty in positioning the patient for conventional laryngoscopy. Even though many devices are available in managing difficult airway in children, Airtraq demands special consideration because of its easy manoeuvring, the low cost and the more rapid learning curve [2]. The paediatric Airtraq became available in the UK in 2008 and is available in two sizes: infant (tracheal tube size 2.5–3.5 mm ID) and child (tracheal tube size 4.0–5.5 mm ID) [3]. We report a case of a occipital meningocele in a child posted for (ventriculo-peritoneal shunt) where a difficult airway was successfully managed using a size 1 Airtraq.

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2. Case report

A 3 month-old male baby weighing 6.3 kg presented with a large occipital meningocele and was posted for ventriculoperitoneal shunt for hydrocephalus. Physical examination revealed a swelling of $6 \times 8\ cm^2$ with full thickness skin in the occipital region (Fig. 1). The infant was active with no neurologic deficits and there was no other associated congenital anomalies found. (Liver function tests and coagulation profile of the patient were within normal limits). CT scan of head revealed hydrocephalus but no Arnold Chiari malformation. MRI of brain revealed defects in occipital region with dorsal protrusion of meninges with CSF suggestive of occipital meningocele.

On examination, cardiovascular and respiratory systems were normal and all investigations including Hb%, complete blood count, renal function tests and chest X-ray were within normal limits. The infant was premedicated with i.v. atropine ($0.01\ mg\ kg^{-1}$). After attaching (standard monitors including peripheral nerve stimulator), the infant was induced with i.v. Ketamine ($2\ mg\ kg^{-1}$) in supine position with a doughnut shaped support kept under the head. The thickness of that support was kept such that the entire meningocele was accommodated in hollow of the doughnut. After confirming adequate mask ventilation, muscle relaxation was achieved with succinylcholine $2\ mg\ kg^{-1}$. The decision was taken to use the Airtraq device for intubating this infant (by an anaesthesiologist who had experience of 20 paediatric Airtraq insertions). A 3.5 mm ID uncuffed endotracheal tube was adequately lubricated and inserted in the guide channel of an infant model Airtraq (size 1) (Fig. 2). Once introduced in the oral cavity, the Airtraq was maintained in central position and slid down to reach the epiglottis. With some twist manoeuvres at wrist, a full view of the entire glottic opening was visualized (Cormack-Lehane grade 1 (percentage of glottic opening) (POGO) score 100%) and an atraumatic intubation was proceeded. Correct placement was further confirmed by bilateral chest auscultation and square wave capnograph tracings. Total procedure duration from introduction of Airtraq between two lips to the appearance of first end tidal CO_2 wave was 35 s. (The intubation time was recorded by another anaesthesiologist not involved in the procedure.) There was no episode of hypoxia, laryngospasm or bronchospasm during the entire procedure. After proper fixation of ET tube, the baby was placed in semi prone position with extreme care taken to prevent the accidental extubation of the tube. (Anaesthesia was maintained with oxygen, nitrous oxide, sevoflurane and atracurium. The surgery lasted for 1 h).

Figure 1 Patient with occipital meningocele.

Figure 2 Size 1 Airtraq.

After completion of the surgery, the neuromuscular blockade was reversed and the baby was extubated when fully awake. There was no trauma detected post-operatively as (evidenced by the absence of blood staining on Airtraq blade, tongue, lip, teeth, oral cavity and on endotracheal tube).

3. Discussion

Meningomyelocele is hernial protrusion of part of meninges and neural elements in a sac [1]. Reported incidence is 1 in 5000 live births [4]. Most commonly occur in the lumbosacral region, but they can occur at any level in the neuraxis. Children with meningomyelocele are likely to have varying degrees of sensory and motor deficits [5]. Associated congenital defects include club foot, hydrocephalus, exostrophy of bladder, prolapsed uterus, Klippel-Feil syndrome and congenital cardiac defects. Major anaesthetic challenges in the management of lateral occipital meningomyelocele is securing and maintaining the airway [6].

The Airtraq optical laryngoscope (Prodol, Vizcaya, Spain), similar in optical design to a submarine periscope, reflects an image of the glottic opening transferred from the distal tip of the blade through a series of lenses, prisms, and mirrors to a proximal viewfinder. The exaggerated curvature of the blade provides a glottic view without requiring alignment of the oral, pharyngeal, and laryngeal axes. One channel of the Airtraq contains the optical components and a parallel second channel acts as a conduit for the endotracheal tube. The infant size version of the Airtraq accommodates endotracheal tubes from 2.5 to 3.5 mm ID. For intubation, the Airtraq is inserted into the mouth in midline over the centre of the tongue, and the tip is positioned in the vallecula. Once the view of the glottis has been centred in the viewfinder, the tracheal tube is guided by the conduit through the vocal cords. The tracheal tube is then separated from the Airtraq by moving it laterally and the device is removed.

The Airtraq has been shown to provide superior intubating conditions when compared with direct laryngoscopy in normal and difficult manikin airways [7]. In normal human adults, the Airtraq also provides similar or superior intubating conditions when compared with direct laryngoscopy [8]. Two cases describing successful use of the Airtraq in morbidly obese patients undergoing emergency caesarean delivery have been described [9]. Vlatten et al. reported a similar case where they successfully intubated a 5-month-old infant with Pierre-Robin sequence using Airtraq [10]. Similarly, a 3-month-old child with difficult airway due to Apert syndrome was intubated

with Airtraq [11]. Pean et al. demonstrated a case of difficult airway because of Treacher Collins syndrome. In this case, the authors intubated the 10 year old child with a 5.5 ID armoured tracheal tube using a size 2 Airtraq [12]. Till date, no paediatric airway case reports describing the use of the Airtraq in occipital meningocele have been published. By demonstrating its utility in an infant with occipital meningocele, the current report demonstrates the potential of this device for management of the difficult paediatric airway.

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