Difficult intubation in a parturient with syringomyelia and Arnold–Chiari malformation: Use of Airtraq™ laryngoscope

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ABSTRACT

Anesthetic technique in parturient with syringomyelia and Arnold–Chiari malformation is variable depending on the teams. Difficult intubation is one of the risks when general anesthesia is opted. Different devices have been used to manage the difficult intubation in pregnant women. We report the use of Airtraq™ laryngoscope after failed standard laryngoscopy in a parturient with syringomyelia and Arnold–Chiari type I malformation.

Key words: *Airtraq laryngoscope, cesarean section, intubation, pregnancy, syringomyelia*

INTRODUCTION

Syringomyelia is an uncommon progressive degenerative disease of the nervous system, characterized by the presence of cystic cavity within the spinal cord. The congenital origin is often associated with Arnold–Chiari malformation. Association of cervical spine diseases, such as syringomyelia, and pregnancy increases the risk of difficult intubation.

We report the successful use of Airtraq™ laryngoscope (AL; Prodol Meditec S. A., Vizcaya, Spain) after failed direct laryngoscopy in a patient with syringomyelia and Arnold–Chiari type I anomaly, undergoing elective cesarean section.

CASE REPORT

A 41-year-old woman, gravid 2, para 0, was admitted at 39 weeks estimated gestational age, with known syringomyelia and Arnold–Chiari type I malformation. Her previous obstetric history included sterility since 15 years and abortion 2 years ago. The onset of symptoms was in 1997, marked by neck pain and occipital headache that was controlled by analgesics. Five years later, the woman had the complaint of cervicobrachial neuralgia covering the territory of C6, especially in the right side. Clinical exam showed muscle weakness, decreased pain and temperature sensation and areflexia in the upper limbs. Clinical exam of the cranial nerves showed no damage. Magnetic Resonance Imaging (MRI) scan showed an Arnold–Chiari malformation type I and a syrinx extended from C1 to C7. The patient had foramen magnum decompression in 2002. There was retention of moderate weakness on the right side. Since then, she had no control.

At the time of admission in the Service of Obstetric, her gestational age was estimated as 39 weeks. Pelvic echography showed cephalic presentation with correct biometric measurements. Neurological exam revealed right hypoesthesia. There were no signs of autonomic nervous dysfunction or cranial nerve damage. During pregnancy, the parturient reported no significant changes in her symptoms. After discussion with the team (gynecologist, neurosurgeon and anaesthesiologist), a prophylactic cesarean section

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under general anesthesia was decided as the method of delivery least likely to aggravate the syrinx.

At the preoperative visit, the patient measured 170 cm and weighed 64 kg with a body mass index (BMI) of 22.14 kg/m^2. Her blood pressure was 132/67 mmHg, with a pulse rate of 82 beats/min. Airway exam revealed an interincisor distance of 35 mm, Mallampati class II, thyromental distance of 60 mm and moderate limitation of cervical spine mobilization. Her lumbar spine had mild scoliosis. Laboratory tests showed peripheral leukocyte count of 14,200 cells/mm^3, platelet count of 341 × 10^3/μL, hematocrit of 36%, activated partial thromboplastin time of 37 seconds, international normalized ration of 1.2 and fibrinogen of 2.7 g/L. Concentrations of urea, creatinine and blood glucose were normal. Preoperative electrocardiography (ECG) and chest X-ray were unremarkable. Pulmonary function was deemed unnecessary given the moderate scoliosis and clinical tolerance of the patient. A pediatric intensive care unit bed was prepared.

After fasting for 8 hours before surgery and premedication with ranitidine 150 mg orally the night before surgery and the dose repeated the next morning, the patient was admitted to the operating room. Monitoring included pulse oximetry, ECG, non-invasive automated arterial pressure and esophageal temperature probe. A nerve stimulator was placed over the left ulnar nerve. Acute volume expansion fluid was ensured by administering saline solution 0.9% (1500 mL) via a 16-gauge peripheral i.v. cannula. The patient was placed in mild left lateral decubitus position to avoid aortocaval compression and preoxygenation was started. Blood pressure was monitored continuously until the incision and then every 3 minutes. Anesthesia was induced with sodium thiopental 5 mg/kg and remifentanil 0.5 μg/kg. Cisatracurium 0.5 mg/kg was given to facilitate intubation. First view of the glottis with a Macintosh metal blade size 3/4 showed Cormack–Lehane grade 4. Tracheal intubation assisted by the gum elastic bougie had failed after two attempts. The airtraq laryngoscope (AL) showed a good glottis view after 14 seconds and intubation was successful after 7 seconds. Time to secure airway was 21 seconds. Capnography confirmed tracheal intubation. In order to maintain capnography to 32–35 mmHg, the patient was ventilated by 500 mL and 13 cycles per minute. Anesthesia was maintained with a mixture of oxygen/air (50%:50%) with 0.7% of isoflurane and remifentanil 0.25 μg/kg/min.

The patient gave birth to a male baby by cesarean section, weighing 3400 g with an Apgar score of 7 at the first minute and 10 in the fifth minute after a brief period of bag and mask ventilation without the need of naloxone. During surgery, there was no significant change in the hemodynamic status or body temperature of the patient. After she was awake, atropine 1 mg and prostigmine 3 mg were given i.v. The patient was extubated after reversal of the neuromuscular blockade confirmed by nerve stimulator, without any problem. The baby was admitted for monitoring in pediatric intensive care unit. During 4 hours, no complication was noted and the baby was returned to his mother. For analgesia, the patient received paracetamol 1 g/6 hours and ketoprophen 50 mg/6 hours. Postoperatively, no change of her neurological status was noted and she was discharged home on 6th postoperative day. Follow-up at 6 weeks and 3 months showed the development of baby to be normal and there were no maternal complications.

DISCUSSION

We report the successful use of the AL in a pregnant patient with syringomyelia and Arnold–Chiari type I malformation after failed direct laryngoscopy. Optimal anesthetic management and the mode of delivery (vaginal or cesarean) in parturient with syringomyelia and Arnold–Chiari malformation has not yet been established. Only a few reports on pregnancies complicated with this anomaly have been published.[1-3]

Anesthesia poses several risks to the patient. With general anesthesia, the risks are difficulty airway management and risk of hypoxia, damage to the spinal cord by increased intracranial pressure caused by laryngoscopy and intubation and sensitivity to neuromuscular blocking agents. With epidural anesthesia, the risks are subarachnoid space compression caused by sudden distension of the epidural space or decompression by accidental dural puncture. In both cases, neurological damage occurs. According to most authors, spinal anesthesia should be avoided. So, we had a choice between general and epidural anesthesia. Finally, we opted for general anesthesia, after discussion with neurosurgeon, neurologist, obstetrician and with the consent of the patient because: (1) difficulty of intubation was considered intermediate and could be managed by the new devices such as videolaryngoscope and AL, (2) increased intracranial pressure during laryngoscopy and intubation could be managed by a modified technique of anesthesia using opioids and (3) abnormal sensitivity to muscle relaxants could be controlled by use the monitoring and pharmacological reversal. Moreover, with general anesthesia are avoided medico-legal problems if neurological worsening occurs.

Pregnancy is known to be associated with an increase in difficulty for intubation. In a retrospective study of 3430

rapid sequence induction, 23 parturients had difficult intubation. This difficulty seems to be reduced by the experience of the team and the assistance of senior.[4] For this case scenario, different devices have been used. In a morbidly obese female with a history of difficult intubation for emergency cesarean section, the vocal cords were visualized and trachea was intubated easily by Bullard laryngoscope.[5] In two other cases, the GlideScope was the rescue device used after failed intubation by laryngoscopy in emergency cesarean section.[6]

The AL is a single-use device that has recently been developed. It is a new laryngoscope with an exaggerated blade curvature containing two channels, one open in which slides the endotracheal tube and the other containing a lens optical system for visualizing pharyngolaryngeal structures. Compared to the standard laryngoscopy, the AL offers several advantages: Better glottis views; no need for alignment of the pharyngeal, laryngeal and oral axes; less force on the tongue and mandible; less trauma; less hemodynamic response during intubation and reduction of duration of intubation.[7,8] These characteristics have contributed to the greater efficiency compared to the standard laryngoscopy and enabled it to be validated for difficult tracheal intubation for non obstetric patients.[7,8,9]

First use of AL in obstetrics has been reported by Dhonneur *et al*. in two cases of difficult intubation in morbidly obese parturients. The trachea was intubated after a short period in two patients after failed direct laryngoscopy. In Anesthesia and Intensive Care Department Jean Verdier Public University Hospital of Paris AL was incorporated in local algorithms for management of difficult intubation in obstetrics.[10] We used a modified technique in our patient, and the preparation involved fasting for 8 hours, antagonizing gastric acidity and use of remifentanil. In pregnant women, rapid sequence induction and intubation is recommended for general anesthesia.[11] This conventional technique can be modified in the presence of a particular disease, such as syringomyelia, by use of opioids to limit the hypertensive responses and increased intracranial pressure following laryngoscopy, tracheal intubation and incision. After failure of intubation with the standard laryngoscopy, our patient was successfully intubated by AL without complications. Time of non-secure airway was short (21 seconds) and no signs of inhalation were noted. The lowest arterial oxygen saturation was 91%. The use of opioids in general anesthesia in obstetrics patients seems logical in the presence of particular diseases.[12,13] The choice must be remifentanil, given its short duration of action. The optimal dose is not yet validated.[14] Neonatal respiratory depression is the main side effect requiring monitoring and treatment. In our case, the baby required short-term mask ventilation. Postoperative period was without problems.

Patients with syringomyelia have an increased sensitivity to neuromuscular blocking agents, to hypothermia and to hypovolemia.[3] In our patient, the use of suxamethonium was avoided because of the presence of hemiparesis. We administered cisatracurium accompanied by monitoring of the neuromuscular function. No prolonged effect was noted. Prostigmine and atropine were administered after reversal of the neuromuscular blockade, which was confirmed by nerve stimulator. Body temperature and the hemodynamic status remained stable during surgery.

Airway management in obstetrics should follow the guidelines of learned society.[15] Even though various devices have been used outside these guidelines, they have proved their effectiveness. Their incorporation in the algorithms seems justified. AL is a part of these devices. It should be considered as the second-line option in the scenario of difficult intubation. In pregnant patients with cervical spine diseases, AL represents the rescue device of choice after failed direct laryngoscopy.

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