

Awake Fiberoptic Intubation for Cesarean Section in a Parturient with Odontoid Fracture and Atlantoaxial Subluxation

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We report on the anesthetic experience of a 38-week pregnant patient in labor with an upper cervical spinal cord injury after an unusual trauma. She was transferred from a district hospital to our medical center with acute quadriplegia and sensory loss. Plain cervical spine x-ray and computed tomographic scan showed a C2 odontoid (dens of axis) process type II fracture and atlantoaxial (C1-C2) subluxation. Due to having regular uterine contractions and labor pain, she was scheduled for an urgent cesarean section. The instability of her cervical spine precluded the use of regional anesthesia; so awake nasal fiberoptic endotracheal intubation followed by general anesthesia was performed. The anesthetic course was uneventful, and the outcome of the parturient and newborn was good. We discuss our anesthetic considerations, intubation techniques and a review of the literature. (*Chang Gung Med J* 2003;26:352-6)

Key words: atlantoaxial subluxation, awake fiberoptic intubation.

To reduce anesthetic risk by avoiding the problems of failed intubation and aspiration, regional anesthesia is the most common method currently used for patients undergoing a cesarean section (CS). Eventually, it has led to a decrease in the use of general anesthesia.^(1,2) But general anesthesia is required in the following conditions: maternal shock, sepsis, coagulopathy, acute severe fetal distress, deformity of the spine, infection or certain neurological diseases and injuries, psychiatric disorders, and unsuccessful or patient refusal of regional anesthesia. Failed tracheal intubation and ventilation are important causes of anesthetic-related maternal morbidity and mortality. Many techniques can be used to manage a difficult airway in obstetric patients.^(2,3) Planned fiberoptic intubation is a valuable and reliable approach in some cases with predicted or suspected difficult airway problems for obstetric anes-

thesia before a CS.⁽³⁾ In this report, we describe the experience of successful awake fiberoptic nasotracheal intubation with supplemental topical anesthesia in a parturient with an acute cervical injury who required a semi-urgent CS.

CASE REPORT

A 23-year-old healthy primigravida at 38 weeks of gestation had a pleasant vacation with her husband. On their way back home, she suddenly bumped her head against the ceiling of the car while driving on an uneven rocky rural road. Because she was not wearing a seat belt in the front seat, she was seriously hurt, resulting in severe neck pain followed by some degree of numbness, tingling, and weakness in her 4 limbs. She was transferred to our medical center with the suspected diagnosis of a spinal cord

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injury (SCI).

Upon admission, the patient was fully alert with stable vital signs and no respiratory problem, and there was a normal fetal heartbeat (FHB: 120-150 beats/min). Obstetrical ultrasound showed oligohydramnios. She had normal electrolytes and other laboratory data, but was slightly anemic (Hb, 9.1 g/dL; Hct, 28.2%). Muscle power below C5 was diminished to 3-4 out of 5 bilaterally. The sensory level tested by pinprick, light touch, and temperature was intact at the level of the T5-dermatome. Cervical spine films showed an odontoid fracture, and magnetic resonance imaging revealed narrowing of the cervical spinal canal at the C1-2 level (Fig. 1). She began having regular uterine contractions, and we were consulted to perform epidural analgesia for her labor pain. To prevent further neurological damage during changing position for the lumbar epidural block and the expected stressful course of labor, a CS was suggested. The planning of nasal tracheal intubation with the aid of a fiberscope in her conscious state was clearly explained to the patient.

The patient arrived at the operating room with a cervical collar in place. Atropine at 0.5 mg was administered intravenously after setting up routine standard monitors (electrocardiogram, noninvasive

blood pressure, and pulse oximetry). Following preoxygenation, peripheral oxygen saturation was 99%-100%; blood pressure was 126/88 mmHg; heart rate was 82 beats/min; and percutaneous FHB was 145 beats/min. The tongue base and oropharynx of the patient were anesthetized with 4 puffs of 8% lidocaine spray. Both nostrils were gently lubricated with 2% lidocaine jelly. Another 60 mg of 2% lidocaine was injected through the cricothyroid membrane. The vocal cords were easily visualized and a 6.5-mm-sized cuffed nasotracheal tube was passed over the fiberscope into the trachea without difficulty. General anesthesia was then induced with 200 mg of 2.5% sodium thiopentone, followed immediately by 25 mg atracurium; anesthesia was maintained with 50% nitrous oxide in oxygen and 0.6% isoflurane under controlled ventilation. Five minutes after induction, a 2560-g female infant was delivered by cesarean section with Apgar scores of 9 at 1 and 10 at 5 min. The mother's cardiovascular status remained stable throughout the surgery. Synthetic oxytocin at 10 IU (followed with 10 IU by slow infusion drip), 150 µg fentanyl, and 5 mg diazepam were given intravenously after delivery of the baby. Intraoperative blood loss including amniotic fluid was 200 ml, and a total of 700 ml of warmed lactated



Fig. 1 Sagittal view of MRI demonstrating (arrow) spinal canal narrowing with cord compression at the atlantoaxial level.



Fig. 2 Lateral view of a cervical spine x-ray showing metallic Halifax fixation from the occiput through the C5 vertebra.

Ringer's solution was administered. The surgical procedure was completed uneventfully in 50 min. She awakened with sufficient alertness and was smoothly extubated while fully awake and with adequate ventilation.

The patient was constantly and closely monitored in the post-anesthesia care unit and was still protected by the cervical collar. Posterior cervical fusion with Halifax fixation (Fig. 2) was performed 4 days after she was stabilized with external cervical traction. The patient again received nasal fiberoptic intubation. After the neurosurgery for internal cervical fixation, she began a long period of rehabilitation. Another operation for cord decompression and wire fixation was performed due to malunion a half year later resulting in improvement in motor and sensory function but persistent residual neck pain.

DISCUSSION

To the best of our knowledge, this rare occurrence of odontoid fracture and atlantoaxial subluxation (AAS) in a parturient requiring CS has not been previously described in the literature. Mismanagement and inappropriate handling of unstable spinal column injuries may convert a simple bone injury into a more-serious spinal cord injury.⁽⁴⁾ The specific anatomical conditions render upper cervical spinal injuries more problematic than lower cervical spinal injuries. One must be aware that a type II odontoid fracture may sometimes increase the risk of airway obstruction due to the presence of acute retropharyngeal swelling after injury. Atlanto-occipital instability may be expected to produce difficult intubation.⁽³⁾ So, airway management in such a parturient with an odontoid fracture remains a challenge.

Spinal anesthesia can be used in SCI patients, and epidural blockade can provide effective treatment and prophylaxis for minimizing autonomic hyperreflexia in women with chronic SCI.⁽⁵⁾ Patients with a cord lesion above the T5-T6 spinal level are at risk for the life-threatening complication of autonomic hyperreflexia, which results from the loss of central regulation of the sympathetic nervous system below the level of the lesion.^(6,7) Labor pain appears to be a particularly noxious stimulus in these kinds of SCI women who are unable to reliably sense contractions and who produce only weak expulsive efforts.⁽⁷⁾ As to the anesthetic aspects of such a

patient's care, it would be difficult to perform epidural analgesia, and it would be dangerous to perform a vaginal delivery. Therefore, an urgent planned CS under general anesthesia was indicated. Regional anesthesia (epidural or spinal) was still precluded in our patient due to the acute odontoid fracture and cervical instability. If unexpected inadequate regional blockage had occurred during the CS, emergent airway management would have become complicated. Awake nasal fiberoptic intubation was chosen to guarantee airway control, which was another reason for the use of general anesthesia.

Awake oral or nasal fiberoptic intubation for a CS can be successfully used to secure a difficult airway.⁽⁸⁻¹¹⁾ Popat et al. suggested that if regional anesthesia was unsuccessful or contraindicated, one should be confident in performing fiberoptic intubation in an obstetric patient.⁽⁸⁾ It can be argued that awake fiberoptic intubation is the best choice for general anesthesia in SCI patients. Sometimes, if it is harmful to the conscious patient who cannot tolerate or fight the tube during awake intubation, one may consider intravenous sedation or topical anesthesia. We generally avoid all sedative drugs commonly used in awake fiberoptic intubation to minimize neonatal respiration depression and possible loss of maternal airway.⁽¹¹⁾ There are many methods for providing satisfactory airway anesthesia to allow awake intubation.^(11,12) Sufficient local anesthesia of the airway passage can help ensure that the patient is more cooperative and tolerant of the tracheal tube for fiberoptic intubation.⁽¹²⁾ But no single method of topical anesthesia is suitable for all situations, and modifications should be made by taking each patient's clinical condition into account. We use a well-lubricated nasotracheal tube (pre-softened in warm water) with different commercial lidocaine preparations of hypopharynx nebulized spray, transtracheal injection, and nostril lubrication. To prevent bleeding from the congested nasal mucosa during pregnancy, it is suggested to use vasoconstrictors for topicalization of the nose.

There are other intubation techniques for anesthetic considerations, although some of the larger studies showed no significant differences in neurologic outcomes when direct laryngoscopy was used for intubation. McLeod⁽¹³⁾ and Calder⁽¹⁴⁾ still emphasized the danger of SCI following direct laryngoscopy. During laryngoscopy, stabilization of the

cervical spine to prevent further neurological injury, even cord transection, is very important. Yaszemski reported a case of sudden death from cord compression associated with AAS instability after tracheal intubation.⁽¹⁵⁾ It is potentially dangerous, and the mouth opening can be significantly reduced when a patient is wearing a cervical collar; this was the main factor contributing to the increased difficulty with laryngoscopy.⁽¹⁵⁾ Therefore, although tracheal intubation is a rapid and safe means of achieving airway control,⁽¹⁶⁾ it may still pose some harmful problems in a patient with cervical spine injury (CSI). In addition, it is also important to consider the safe use of cricoid pressure in these patients to prevent compression of the cervical spinal cord.⁽¹⁷⁾

A laryngeal mask airway (LMA) is effective and probably safe for elective CS in healthy, selected patients when managed by experienced LMA users.⁽¹⁸⁾ Godley et al. found that the LMA has a place in facilitating potentially difficult awake tracheal intubation in pregnant patients.⁽¹⁹⁾ Nofiu and Elegbe reported that the LMA was a life-saving airway device in a "cannot intubate, cannot ventilate" obese parturient.⁽²⁰⁾ However, trauma to the atlanto-occipital region is an important factor which can complicate LMA placement. In other words, high substantial pressure exerted against the fragile cervical spine can worsen the injury during LMA insertion, especially the use of an intubating LMA. One must be careful to avoid excessive posterior pharyngeal force when using the LMA in a patient with an unstable cervical spine. It is not standard care to use the LMA for CS at this time.

Overall, there is still controversy as to the most appropriate intubation technique for patients with CSI. Fiberoptic intubation causes less cervical movement than does direct laryngoscopy. We concluded that awake fiberoptic nasotracheal intubation was an optional, safe, and reliable approach technique in this parturient, who had sustained an unusual odontoid fracture with AAS.

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產婦合併第一、第二頸椎骨折之剖腹產麻醉處理

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此病例為懷孕38週之孕婦，因不尋常受傷而引致高位頸椎損傷之麻醉經驗。該名產婦因四肢癱瘓及感覺消失而經由他院轉入本院。頸部 x-ray 及 CT 顯示第一、二頸椎不全脫位及第二頸椎齒突骨折，由於劇烈宮縮而再轉入產房待產。我們計劃替她施行剖腹產，因為高位頸椎受傷不方便施以區域半身麻醉，故利用光纖維儀器經鼻清醒插管後，給予全身麻醉。整個剖腹產及麻醉過程相當平順，母子均安。我們報告相關的麻醉處理、插管技巧及文獻回顧。(長庚醫誌 2003;26:352-6)

關鍵字：第一、第二頸椎不全脫位，清醒光纖管插管。

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