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RESEARCH ARTICLE

ANAESTHETIC MANAGEMENT OF EMERGENECY TRAUMATIC UNSTABLE CERVICAL SPINE FIXATION: A CASE REPORT

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ABSTRACT

Cervical spine injury can pose great challenge to the medical team due to involvement of neurologic, cardiovascular and respiratory systems. Airway management in an unstable cervical spine injury can be the most challenging part for an anaesthesiologist as it can have serious implications if not well managed. In our patient with unstable cervical spine, airway management had to be altered from the ideal method of using fiberoptic bronchoscope. Overall idea is to prevent deterioration of previous injury without inciting any new injury besides maintaining other vital parameters. With anterior fixation of cervical spine, extubation was equally critical. Here we present the anaesthetic management of an unstable cervical spine injury posted for emergency anterior discectomy and fixation.

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INTRODUCTION

Anaesthesiologists face a significant challenge when managing a patient with cervical spinal cord injury (SCI). Acute cervical SCI is accompanied by various physiological disturbances, including the neurologic, cardiovascular, and respiratory systems (Petsas, 2015), which may make the patient more vulnerable to general anaesthesia complications. Motor and sensory deficits should be identified preoperatively in cases of cervical spine injury so that they can be accurately monitored intraoperatively and postoperatively. Furthermore, any unstable neurologic deficits should be identified so that extra precautions can be taken to prevent further damage during intubation or positioning.

Patients with low cervical or high thoracic spinal injuries may have decreased forced vital capacity due to decreased intercostal and abdominal muscle strength, despite the preservation of diaphragm innervation. This may result in an insufficient cough for secretion clearance. As a result of the risk of further pulmonary complications, these patients require post-operative ICU care and close monitoring. We present the perioperative management of a 45-year-old female case of traumatic cervical spine C6-7 subluxation with facet fracture, and C7 spinous process and transverse process fracture, posted for emergency anterior cervical discectomy and fixation surgery.

CASE REPORT

A 45 years old female (152cm, 61kg) patient came in the emergency department with history of road traffic accident about 7-8 hours back with injury to neck and left hand. She had no comorbidities. Her computed tomography showed C6-7 subluxation with facet fracture, C7 spinous process and transverse process fracture.The findings were confirmed on MRI showing post traumatic cervical spine instability with anterior subluxation of the C6 over C7 vertebra associated with fracture of the right superior articular facet of the C7, right transverse process of the C6, C7, D1 vertebra, spinous process of C6, C7 vertebra. There was dislocation of the right C6-C7 facet joint and perched left C6-C7 facet joint. There was also annular tear with posterior and right posterolateral C6-C7 disc extrusion with cranial migration, large extruded disc lying behind the subluxed C6 vertebral body. Severe right foraminal stenosis was noted at C6/C7 level, compressing the right C7 exiting nerve root with nerve root edema. There was no cord compression or cord parenchymal edema or contusion. On examination, her power for right shoulder abduction was grade 4/5, rest was normal. Cervical immobilisation was done with a rigid cervical collar.She was posted for anterior cervical discectomy and fixation surgery. Her complete blood count, serum creatinine, electrolytes, coagulation profile, liver function tests were all within normal limits. CT chest and CT brain ruled out any chest and head injuries.

On airway examination, her mallampatti grade was 3, adequate mouth opening, with cervical collar insitu to avoid neck movements. Thoughfibre optic bronchoscope guided intubation was explained to the patient, patient was very anxious. So after discussing with orthopaedic surgeon, it was decided to first induce and then intubate with video laryngoscope with manual inline stabilization and cervical collar insitu. With 2 wide bore intravenous lines and after attaching all routine ASA monitors, patient was preoxygenated for 3 minutes. Her baseline parameters showed heart rate of 110/minute, blood pressure 130/70 mm hg, and saturation 99% on room air. She was then induced with intravenous 0.5mg inj midazolam, 50 micrograms inj fentanyl and 120 mg of inj propofol. After confirming ability to mask ventilate, inj succinylcholine 100mg was given IV. Intubation was done with CMAC video laryngoscope with 7 number flexometallic endotracheal tube railroaded over bougie with manual inline stabilisation and cervical collar insitu. After confirming endotracheal placement of tube with ETCO2 tracing and bilateral equal air entry, inj. atracurium 50mg was given. Intraoperatively, anaesthesia was maintained with O2: Air (50% each) and desflurane mixture to keep MAC around 1, atracurium infusion, fentanyl intermittent bolus and dexmedetomidine infusion 0.2 to 0.5mcg/kg/hr. C6-7 discectomy with removal of part of C6 inferior body was done. After adequate decompression, cage was filled with iliac crest autograft and placed in C6-7 space. Total 2000ml crystalloids was given, with blood loss 100ml and urine output 300ml. surgical team wanted to do neurological examination in immediate post-operative period to rule out any new neurological deficit surgery went well and patient was hemodynamically stable throughout the intraoperative period hence decision was taken to give extubation trial, so after, post-surgical closure once patient wasConscious and had good spontaneous breathing efforts and met all extubation criteria, leak test was performed which showed significant leak excluding significant laryngeal edema causing postoperative breathing difficulty. After adequate reversal of neuromuscular blockade with Inj.Glycopyrrolate 0.5mg and Inj. Neostigmine 2.5mg and after thoroughoropharyngeal suction and extubation was done overa ventilating bougie so that in case of a postoperative airway emergency, it can be used as an access to railroad the endotracheal tube during laryngoscopy. We observed the patient post extubation in OT for next 30mins. Patient was breathing normally and was maintaining100% on 6 litres per minute flow of oxygen with Hudsons mask. Patient was then shifted to ICU for over nigh to bservation, patient was moving all four limbs without any neurological deficit in immediate post-operative period. Rest of the postoperative course wasuneventful and patient shifted to ward on postoperative day 4 and discharged on postoperative day8.

DISCUSSION

Following cervical SCI, a variety of pathophysiological changes can occur. Acute cervical SCI is commonly associated with cardiovascular complications such as neurogenic shock, autonomic dysreflexia and other arrhythmias, in addition to neurologic injury (Lehmann, 1987). Although the degree of respiratory dysfunction depends on the severity and extent of the injury, cervical SCI causes respiratory dysfunction, which can include impaired respiratory muscles, diaphragmatic paralysis, decreased lung and chest wall compliance, impaired cough and secretion clearance, and increased work of breathing (Winslow, 2003). Respiratory dysfunction is a major cause of death and morbidity following SCI (Winslow *et al*., 2002). As a result, it is critical to reduce these risks in SCI patients. Patients with acute cervical spine instability or compression face the same difficulties as patients with chronic cervical spine disease. Furthermore, these patients will almost always have some form of neck immobilisation, which increases the difficulty of successfully intubating the patient. It is critical to remember the ABCs when developing a plan to safely intubate the patient while protecting the cervical spine as much as possible. Protecting the cervical spine comes second to ensuring that the patient is adequately ventilated.

Unfortunately, patients with severe cervical trauma are both the most vulnerable to intubation and the most likely to develop respiratory failure as a result of the injury. It is critical to consider the extent of the neurologic injury, the patient's mental status, the airway exam, the adequacy of ventilation and the urgency of the surgery when developing an intubation plan. There are several techniques for intubating the patient, but no single technique is ideal for every situation. When developing the plan, it is critical to consider the benefits and drawbacks of each technique, as well as how each technique leads to cervical spine movement. Awake fiberoptic intubation is regarded by some as the gold standard for securing airway in acute spine injury. The ability to perform a post-intubation neurologic exam is one of the benefits, also one more advantage of the fiberoptic scope is minimal pressure placed on the cervical spine. The challenges in performing an awake fiberoptic intubation include the time necessary for airway topicalization and to perform an intubation. Usually it takes around 20-30 minutes to do an awake fiberoptic intubation. A second issue is that, despite adequate topicalization of the airway, it is observed that patient tends to cough or move during airway intubation. This movement can be quite violent at times, putting the spinal cord in jeopardy.

In addition, a patient who is awake and willing to cooperate with the intubation is also required while doing fiberoptic guided intubation. An alternative to performing the fiberoptic intubation while the patient is awake is to perform the fiberoptic intubation while the patient is under general anaesthesia. If this is done, the patient can be given a short-acting paralytic medication to ensure that no movement or coughing occurs during the intubation. The anaesthesiologist must be confident that the patient can be mask ventilated to ensure adequate ventilation prior to intubation for this to happen safely. The advantage of performing the intubation under general anaesthesia is that it is usually much faster and does not require a cooperative patient.The main disadvantage of this technique is the inability to perform a neuro exam after intubation. While the fiberoptic scope causes only minor spinal cord movement, the act of mask ventilating the patient causes significant spinal movement. In a cadaver study, performing a jaw thrust to allow mask ventilation resulted in 5mm of cervical spine movement at the site of injury (Aprahamian, 1984). Also direct laryngoscopy can be used instead of a fiberoptic intubation As an alternative technique.

It is common practise to maintain "manual in-line immobilisation" (MILI) during intubation to minimise cervical spine movement. While this prevents gross cervical spine extension, subluxation still occurs (Lennarson, 2001). In 45 percent of patients, keeping the cervical spine in a neutral position rather than the classic "sniffing position" worsens the view of the vocal cords. Furthermore, the vocal cords were not visible in 22% of patients whose spine was kept in a neutral position. While in "sniffing position" it was observed that only in 1% of patients vocal cord were not visible (Nolan, 1993). In view of the anticipated difficulty in intubating a patient with MILI, it has become standard practise to use a video laryngoscope instead of direct laryngoscopy which has shown to significantly improve the ease of intubation (Turkstra, 2005) also during the intubation movement at cervical spine is comparable with around 3-4 mm widening of the disc space (Robitaille, 2008). Direct laryngoscopy or video laryngoscopy is significantly faster than fiberoptic intubation as the patient is under general anaesthesia, patient is not required to be awake or cooperative. Direct laryngoscopy or video laryngoscopy is also technically less challenging than fiberoptic intubation, particularly in patients with blood in the pharynx due to trauma. When MILI is combined with cricoid pressure, however, successful LMA placement becomes much more difficult. Furthermore, when they attempted a fiberoptic intubation with the LMA in place, they found vocal cords in significantly fewer patients who were kept in MILI vs the sniffing position (38 percent vs 83 percent) (Gabbott, 1995).

There are currently no recommendations for the best method to manage the airway in patients with cervical spine disease. There are no outcome studies that shows superiority of one technique over another (Crosby, 2006). The ultimate decision will be based on the provider's expertise in managing the airway, how quickly the airway needs to be secured, and the patient's willingness to cooperate with the intubation. Furthermore, it is critical to comprehend the extent of the cervical injury as well as how the various airway management techniques will affect the cervical spine. As already discussed our patient was very anxious due to road traffic accident and nature of injury and would not have cooperated for awake fiberoptic intubation, hence considering unstable cervical spine we decided to go ahead with videolaryngpscopic and bougie guided intubation after confirming bag and mask ventilation. Fiberoptic scope was kept standby in case of any difficulty to do fiberoptic intubation under general anaesthesia as a plan B. we successfully intubated with videolaryngoscope and bougie in single attempt. Cervical spine surgery areusually performed in the same anatomical region as the larynx, also for most of the spine surgeries patients are placed in prone position and manipulation around the larynx during surgery can lead to airway edema, which can result in airway compromise postoperatively. Access to the vertebral column is frequently achieved during an anterior approach for cervical spine surgery by medial retraction of the upper airway structures and oesophagus (Palumbo, 2013). Potential complications of this approach are as follows airway edema,sore throatandhoarseness of voice other serious complications includerecurrent laryngeal nerve palsy, dysphonia, dysphagia andoesophageal perforation (Stefanutto, 2012). As demonstrated in these cases, edema can impair patients' respiratory track and distort airway anatomy, making establishing a secure airway exponentially more difficult. If a patient develops respiratory compromise, the initial method of intubation may no longer be effective due to difficulty visualising anatomical landmarks or inability to pass the endotracheal tube into the trachea.Considering all these risk factors it is necessary that anaesthesiologist and surgical team must be extremely vigilant while expediting extubation after the cervical spine surgery.

Prior to extubation, it is necessary to do an endotracheal tube cuff leak test to identify patients with significant airway edema. A cuff test compares expiratory tidal volumes with the cuff inflated to those with the cuff deflated, looking for a 15% reduction in tidal volume to indicate an appropriate leak when the cuff is deflated (De Bast, 2002). It is of paramount importance that medical team should have a rescue plan for airway management in these cases in the event of airway compromise requiring reintubation. This plan should include having advanced airway devices on hand right away, staff who are trained to identify at-risk patients, and standby surgeon who can secure a surgical airway. In our case, we first performed a leak test, which revealed a significant leak, and once all extubation criteria were met, we extubated our patient over ventilating bougie so that it could be used as an access to railroad the endotracheal tube during laryngoscopy in the event of a postoperative airway emergency.

CONCLUSION

In the care of patients with spinal cord disease, these patients can have a wide array of pathology. The patient's concurrent medical comorbidities, the severity of the neurologic deficits, and the complexity of the surgery are all taken into account when developing the anaesthetic plan. The preoperative workup, airway management, positioning challenges, and anaesthesia maintenance are the primary goals of the anaesthetic plan. Both anaesthesiologists and surgeons can benefit from a thorough understanding of these issues when caring for these patients.

REFERENCES

Aprahamian C, Thompson BM, Finger WA, Darin JC. Experimental cervicalspine injury model: evaluation of

airway management and splintingtechniques. Ann Emerg Med 1984;13:584-7.

Crosby ET. Airway management in adults after cervical spine trauma. Anesthesiology 2006;104:1293-318.

De Bast Y, De Backer D, Moraine J-J, Lemaire M, Vandenborght C, Vincent J-L. The cuff leak test to predict failure of trachealextubation for laryngeal edema. Intensive Care Med 2002;28(09):1267–1272

Gabbott DA, Sasada MP. Laryngeal mask airway insertion using cricoids pressure and manual in-line neck stabilisation. Anaesthesia 1995;50:674-6.

Lehmann KG, Lane JG, Piepmeier JM, et al. Cardiovascular abnormalities accompanying acute spinal cord injury in humans: incidence, timecourse and severity. J Am Coll Cardiol 1987;10:46–52.

Lennarson PJ, Smith DW, Sawin PD, Todd MM, Sato Y, Traynelis VC. Cervical spinal motion during intubation: efficacy of stabilization maneuvers in the setting of complete segmental instability. J Neurosurg 2001;94:265-70.

Nolan JP, Wilson ME. Orotracheal intubation in patients with potential cervical spine injuries. An indication for the gum elastic bougie. Anaesthesia 1993;48:630-3.

Palumbo MA, Aidlen JP, Daniels AH, Bianco A, Caiati JM. Airway compromise due to laryngopharyngeal edema after anteriorcervical spine surgery. J Clin Anesth 2013;25(01):66–72

Petsas A, Drake J. Perioperative management for patients with a chronic spinal cord injury. BJA Educ 2015;15:123–302.

Robitaille A, Williams SR, Tremblay MH, Guilbert F, Thériault M, Drolet P.Cervical spine motion during tracheal intubation with manual in-linestabilization: direct laryngoscopy versus GlideScope videolaryngoscopy.Anesth Analg 2008;106:935-41, table of contents.

Stefanutto TB, Gatt S. Cervical decompression and unexpected soft tissue oedema: case report. Anesth Pain Med 2012;2(02):97–100

Turkstra TP, Craen RA, Pelz DM, Gelb AW. Cervical spine motion: afluoroscopic comparison during intubation with lighted stylet, GlideScope,and Macintosh laryngoscope. Anesth Analg 2005;101:910-5, table ofcontents.

Winslow C, Bode RK, Felton D, et al. Impact of respiratorycomplications on length of stay and hospital costs in acute cervical spine injury. Chest 2002;121:1548–54.

Winslow C, Rozovsky J. Effect of spinal cord injury on the respiratorysystem. Am J Phys Med Rehabil 2003;82:803–14.

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