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Case Report

Anaesthetic Considerations for Laminectomy and Spinal Decompression in a Patient with Cervical Myelopathy: A Case Report

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Abstract

The principal focus of the anaesthetist during surgical intervention in a patient with cervical myelopathy is to prevent further deterioration of the neurological system while delivering anaesthetic care. Successful surgical outcome of these patients requires a detailed preoperative review, careful and knowledge based peri-operative anaesthesia care plan and a robust collaboration between the anaesthetic and neuro-surgical teams. We report the case of a 76year old male medical doctor who presented with progressively worsening symptoms of cervical myelopathy and subsequently had laminectomy and decompression under general anaesthesia relaxant technique. We aim to highlight the place of detailed anaesthetic care plan in the successful management of this patient who was assessed as high risk for both a difficult airway and peri-operative anaesthetic complications associated with anaesthesia for cervical laminectomy and decompression.

Keywords: Cervical myelopathy, Manual in-line stabilization, direct laryngoscopy, Hemodynamic stability, prone position.

INTRODUCTION

Cervical spondylosis myelopathy (CSM) is a pathological change in the spinal cord secondary to degenerative changes in the cervical spine. These changes can be associated with compression of the cord or its vascular supply via stenotic processes, causing ischemia and demyelination. CSM is most common in the elderly with a male prevalence of about 75% and it's a common indication for spinal decompression surgery [1]. Surgical intervention can relieve spinal cord compression, prevent further deterioration of neurological function and improve existing neurological symptoms thereby improving the quality of life in these patients [1]. Airway maneuvers during facemask ventilation and intubation, peri-operative hypoxia, hypoperfusion and hemodynamic instability have all been implicated in the peri-operative deterioration of cervical spine myelopathy. The challenge to the anaesthesiologist is further heightened by the age group usually affected by cervical myelopathy because of the presence of co-morbidites in these patients who are usually above the age of 40years [2]. A successful surgical intervention in patients with symptomatic cervical myelopathy requires a careful, detailed and knowledge based anaesthesia care plan and a robust collaboration between the anaesthetic and neuro surgical teams [2]. This case report highlights the place of a detailed anaesthetic care plan in the successful surgical management of a potential difficult airway patient with cervical myelopathy.

CASE REPORT

We report the case of a 76year old male medical doctor who presented with 6 months history of reduced neck mobility, neck pain and stiffness with associated upper limb pain and paraesthesia. He also had progressive loss of fine motor skill and loss of power and movement in the lower limbs. All symptoms had progressively worsened and peaked about 3 months prior to presentation. He was scheduled for C4, C5 laminectomy with canal decompression. Patient is a known hypertensive diagnosed about 20 years prior to index presentation with good drug compliance (on Tab nifedipine 20mg daily). No other co-morbidities were identified. He had scrotal surgery and corneal implant about 10 and 40 years respectively prior to present surgery. Both were performed under general anaesthesia with no anaesthetic complications. Examination revealed an elderly man with a neck collar and a Thrombo-Embolic Deterrent (TED) stocking in

place. He could barely achieve lateral neck movements. He had fine tremors in both upper limbs and reduced power in both lower limbs (power in both lower limbs was 2/5). Power remained intact in the upper limbs. His blood pressure the night preceding surgery was 150/80mmhg. He was pre-medicated with oral diazepam 10mg the night before surgery and had his antihypertensive, oral nifedipine, 20mg on the morning of surgery. Blood pressure by the morning of surgery was 120/80mmhg. Findings in other systems were essentially normal.

Blood investigations including full blood count, electrolyte urea and creatinine, liver function test and clotting profile were within normal limits. The chest x-ray, electrocardiograph and echocardiography were all essentially normal.

He was assessed as American Society of Anaesthesiology III, mouth opening was about 5cm and his airway was assessed as Mallampati IV. Patient was taken to the theatre with 2 wide bore cannulas with the cervical collar and TED stockings in place.

Standard monitoring was ensured peri-operatively which included pulse oximetry, end tidal carbon dioxide, electrocardiograph, non invasive blood pressure, pulse rate and temperature probes. A trained assistant standing behind the performing anaesthetist applied the fingers and palm of both hands to stabilize the patient's occiput and mastoid processes to counteract the forces of airway maneuvers, (Manual in-line stabilization) to minimize mechanical movements of the neck during intubation. The anterior aspect of the cervical collar was removed to facilitate laryngoscope maneuver. Lignocaine was administered intravenously at a dose of 1.5mg/kg (total dose of 120mg (6ml) of 2% lignocaine) to attenuate hemodynamic response to laryngoscopy. Anaesthesia was induced with a combination of intravenous propofol at 1mg/kg (total dose of 80mg), ketamine at 0.5mg/kg(total dose of 40mg) and fentanyl at a loading dose of I mcg/kg and a maintenance dose of 0.5mcg/kg (a total loading dose of 80mcg and a maintenance dose of 40mcg hourly respectively). Intubation was facilitated with a non depolarizing muscle relaxant, vecuronium given at a loading dose of 0.1mg/kg and a maintenance dose of 0.01mg/kg with a total loading dose of 8mg and maintenance dose of 0.8mg. He was intubated with a size 7.5 ID reinforced endo tracheal tube rail-roaded over a gum elastic bougie. Tube placement was confirmed and the tube was secured. Patient was carefully log rolled to the prone position on the operating table. Supports were placed beneath the upper chest, shoulders and iliac crests and a free abdomen was ascertained. The head was placed in a headrest in the neutral position. Padded gauze protected the eyes and ears. Various body pressure points were protected. The neck and limbs were maintained in the neutral position. Anaesthesia was maintained with isoflurane at a concentration of 1.0% to 2.5% in 100% oxygen. Prophylactic Intravenous antibiotic, ceftriaxone 1g was given and anti inflammatory dexamethasone 8mg was administered prior to surgery. Peri-operatively, multimodal approach of analgesia was employed with intravenous administration of fentanyl as documented above, 20mg acupan and 900mg acetaminophen and wound infiltration with bupivacaine post operatively. Blood pressure was maintained to achieve a mean arterial pressure between 85-90mmhg. Intermittent administration of ephedrine in aliquotes was given to achieve this. Optimal theatre temperature was maintained. Surgery lasted about 120 minutes. Postoperatively, the effect of vecuronium was reversed with 1.2mg atropine given intravenously followed by 2.5mg neostigmine. Patient was extubated awake and neurological assessment was done. Blood lost at surgery was about 50mls. Standard monitoring was continued in the post anaesthesia care unit (PACU) for about 2 hours before being transferred to the high dependency unit for further care. He was transferred to the open ward about 12 hours after surgery. There was no surgical or anaesthetic complication. He was discharged home on the 6th day post surgery for follow up at the clinic.

DISCUSSION

The primary focus of the anaesthetist during cervical spine surgery is to prevent the exacerbation of pre existing spinal damage and neurological deficit. The optimal anaesthetic care involves a spectrum of thorough pre-operative assessment and a detailed, skill and knowledge-based peri-operative anaesthesia care plan [2]. The index case was particularly a challenge to the anaesthetic team. Apart from the patient's blood pressure status, he was a prospective difficult airway because of his inadequate mouth opening, limited neck mobility, neck stiffness and a Mallampati assessment score of IV. All this also made him a high risk for peri-operative anaesthetic complications that could further worsen cervical spine disease or anomaly. Presence of comorbidities like hypertension, airway maneuvers, excessive flexion or extension during intubation or surgical positioning such as the prone positioning could have a devastating effect on the pre existing cervical spine injury leading to further deterioration of the patient's presenting symptoms [3, 4]. Hypertension is one of the co-morbidities not unusual in patients with cervical myelopathy as they are usually above the age of 40years [2]. Patients with high blood pressure are more prone to the devastating effects of the haemodynamic response of laryngoscopy and intubation. Sudden increase in cerebral blood pressure can interrupt cerebral blood flow further compromising cervical spine perfusion leading to worsening of the cervical spine disease condition [2, 4]. Being a known hypertensive with a blood pressure of 150/80mmhg the night preceding surgery, our patient was optimized with 10mg oral diazepam as premedication which is an effective anxiolytic [2]. Lignocaine was administered

intravenously to attenuate the hemodynamic response to laryngoscopy and intubation.

To further reduce the risk of peri-operative anaesthetic complications during laryngoscopy and intubation in our patient, specific caution was exercised while applying the face mask and during laryngoscopy. Intubation was achieved using manual in-line stabilization applied by a trained assistant with the cervical collar in place. Mask ventilation and airway management during intubation have also been implicated in neurological deterioration in patients with cervical spine pathology. However, there have only been a few case reports of possible damage to the spinal cord from intubation and no direct causal effect has been proven [3, 4]. There have also been several reports of safety of laryngoscopy in patients with cervical spine injury [5]. Hence, it is difficult to implicate intubation alone as a main course of exacerbation of neurological function. The course of the pathology itself, intra-operative surgical complication, haemodynamic changes, hypoxia and hypoperfusion may all contribute to neurological deterioration [6]. To minimize the risk of deterioration during airway maneuvers, the manual inline stabilization technique along with the use of the cervical collar to further limit mechanical movement of the cervical spine was employed in our case [7]. MILS has been associated with increased risk of difficult intubation and failed intubation [8]. This risk was mitigated in our patient by allowing an experienced and skilled anaesthetist to perform intubation, removing the anterior portion of the cervical collar which allows for space to maneuver the laryngoscope [2] and making available airway adjuncts on our airway tray such as the gum elastic bougie, [GEB]. The GEB has been known to be effective in the management of difficult airways [9]. It limits the forces transmitted to the cervical spine and facilitates intubation by functioning as an endo tracheal tube introducer over which an endo tracheal tube is rail roaded as we used in intubating the index case [9, 10] Different laryngoscopes are comparable with regards their effectiveness during direct laryngoscopy in cervical spine anomaly [11-13]. We made use of the Macintosh laryngoscope. Either an awake fiber optic technique or video laryngoscopy would have been an alternative to our choice of direct laryngoscopy. However, both techniques have been said to be comparable with direct laryngoscopy [12, 13]. The emphasis is more on the anaesthetist choosing the more familiar technique rather than basing the judgment of choice on a supposedly more effective but unfamiliar technique [6].

Caution is necessary during the induction of anaesthesia in these peculiar patients as induction with agents like propofol, opioids and benzodiazepines may cause severe hypotension while at the other extreme the use of ketamine may precipitate increased neuroaxial pressure. Both of which may lead to hypoxia and hypoperfusion. The combination of these agents to achieve a balance along with a cardiostable non depolarizing muscle relaxant like atracurium and vecuronium has been advocated [2]. Hence our patient was induced with a combination of fentanyl, ketamine and propofol while vecuronium was the neuro muscular blocking agent of choice to facilitate intubation. This afforded us the advantage of induction without causing iatrogenic hypotension or hypertension with subsequent inadvertent hypo perfusion which can further exacerbate pre-existing cervical spine damage.

The aim of intra-operative management is to prevent spinal cord ischemia, compression, oedema, hypoperfusion, hypoxia, hypercapnoea, hypoglycemia and hypothermia [2]. Immediately after induction, prophylactic intravenous dexamethasone was given to inhibit lipid peroxidase which reduces the risk of ischemia and necrosis. The anti-inflammatory property of dexamethasone reduces the release of interleukins, prostaglandins and thromboxanes. These increases perfusion of the affected area of the spinal cord, reduces the risk of oedema and improves the generation of impulses [13, 14]. We further maintained spinal cord perfusion with the optimal control of blood pressure (BP) and mean arterial pressure at 85-90mmHg, to maintain perfusion while producing a bloodless surgical field. Strategies to maintain the aimed MAP included adequate hydration, use of the vasopressor, ephedrine in aliquots, optimal positioning after proning so that the abdomen hangs free. This reduces the risk of increasing intra abdominal pressure which in turn reduces epidural venous bleeding. Similarly, the patients head was placed in a headrest in the neutral position to also avoid venous congestion [2, 10]. Pain relief is essential post cervical laminectomy as pain can precipitate sympathetic dysfunction and hemodynamic instability with a deleterious effect on the spinal cord. Analgesia is usually given by multimodal approach using opioids such as fentanyl, remifentanil, morphine and local infilteration technique [2, 10]. Our patient had adequate analgesia with a combination of fentanyl, acupan, paracetamol and local infiltration with bupivacaine. Padded gauze protected the ear and eyes and body pressure points to avoid post operative debilitating ulcers which can increase morbidity. Optimal temperature was maintained to prevent arrhythmias, poor coagulation and reduce the risk of infection [2, 10].

Standard anaesthetic monitoring was continued from pre-operative period till post-surgery and recovery in the post anaesthetic care unit as hypoperfusion, hypoxia, hypercapnoea and hemodynamic instability increases the risk of deterioration to the nerve tissues at risk [1, 2].

The incidence of thrombo-embolism following spinal surgery is about 0.395 - 15.5%. The high risk for thrombo embolic disorders results from the presence of all the elements of Virchow's triad which includes

endothelial abnormality, stasis of blood flow and hypercoagulability. The risk is further heightened by the presence of comorbidities in the age group usually affected by cervical myelopathies such as hypertension, peripheral vascular diseases, diabetes and cancers [10, 14]. The routine use of Thrombo Embolus Deterrent stockings, sequential compression devices (SCD), early ambulation post operatively and early commencements of antithrombotics such as subcute clexane as soon as 12 hours after surgery are some of the protocols being advocated and recommended post surgery to reduce the risk of thromboembolism after cervical spine surgery [2, 14]. Our patient was hypertensive which is a predisposing factor to thromboembolic disorders after spinal laminectomy. He was thus placed on TED stockings from admission and early ambulation was encouraged post surgery to further reduce the risk of thromboembolism. Surgery lasted about 120 minutes after which patient were extubated awake. The duration of surgery was comparable to the typical 55-110 minutes duration previously recorded for cervical decompression and laminectomy [15].

The decision to extubate a patient after laminectomy and decompression surgery is based on several factors which includes but not limited to the patients pre morbid state, extent of surgery, duration of surgery, presence of surgical complication, blood loss and clinical assessment [8] Average blood loss in cervical laminectomies ranges between 32-75mls [15] which is comparable to the 50mls estimated in our patient. However bleeding could be severe in poorly prepared patients for example those with thrombocytopenia prior to surgery, patients with raised blood pressure /mean arterial pressure peri-operatively, abnormal positioning which could lead to engorgement of the neck veins, a raised intra-abdominal pressure with subsequent increase in intracranial volume or venous blood [15]. Post surgery, the patient was haemodynamically stable with a good recovery profile hence extubated awake and taken to the post anaesthesia care unit, PACU.

Post operative neurological assessment is usually carried out to assess the success of surgical intervention in the immediate post operative period. For this assessment, a post operative neurological assessment is done and compared with the pre-operative base line neurological examination documented. [2, 10] The neurological deficit observed during the preoperative review in our patient had been recorded. Power in both lower limbs was documented as 2 (demonstrating that patient could only move the legs horizontally) while in the neurological assessment done in the immediate post-operative period, patient was able to raise the two lower limbs against gravity (suggesting at least a power of 3 bilaterally). This allows for early assessment for a deterioration or improvement in neurological function. In the index case, the improvement observed was suggestive of a successful anaesthesia and surgical outcome.

Patients are usually discharged from the hospital 4-6 days after cervical spine decompression and laminectomy [15]. The index patient was similarly discharged on the 6th day post surgery.

CONCLUSION

This case report highlights the place of skilled anaesthesia in the successful outcome of surgical intervention for cervical laminectomy using the manual inline stabilization method, direct laryngoscopic technique and gum elastic bougie in a 76 year old male doctor who had presented with limited neck movement and stiffness, poor mouth opening and an airway assessment of mallampati IV.

REFERENCES

1. Rao, R. D., Currier, B. L., Albert, T. J., Bono, C. M., Marawar, S. V., Poelstra, K. A., & Eck, J. C. (2007). Degenerative cervical spondylosis: clinical syndromes, pathogenesis, and management. JBJS, 89(6), 1360-1378.
2. Bao, F. P., Zhang, H. G., & Zhu, S. M. (2017). Anesthetic considerations for patients with acute cervical spinal cord injury. Neural Regen Res. 12 (3), 499-504. doi:10.4103/1673-5374.202916
3. Yan, K., & Frances Diggan, M. (1997). A case of central cord syndrome caused by intubation: a case report. *The Journal of Spinal Cord Medicine*, *20*(2), 230-232.
4. Donaldson III, W. F., Heil, B. V., Donaldson, V. P., & Silvaggio, V. J. (1997). The effect of airway maneuvers on the unstable C1-C2 segment: a cadaver study. *Spine*, *22*(11), 1215-1218.
5. Patterson, H. (2004). Emergency department intubation of trauma patients with undiagnosed cervical spine injury. *Emergency medicine journal*, *21*(3), 302-305.
6. Durga, P., & Sahu, B. P. (2014). Neurological deterioration during intubation in cervical spine disorders. *Indian Journal of Anaesthesia*, *58*(6), 684-692. doi:10.4103/0019-5049.147132
7. Gerling, M. C., Davis, D. P., Hamilton, R. S., Morris, G. F., Vilke, G. M., Garfin, S. R., & Hayden, S. R. (2000). Effects of cervical spine immobilization technique and laryngoscope blade selection on an unstable cervical spine in a cadaver model of intubation. *Annals of emergency medicine*, *36*(4), 293-300.
8. Adesida, A., Desalu, I., Adeyemo, W. L., & Kushimo, O. (2014). Manual in-line stabilization of the cervical spine increases the rate of difficult oro-tracheal intubation in adults-a randomized controlled trial. *Annals of African Surgery*, *11*(2), 10-14.
9. Fagbohun, O., Dennar, I., Sope, O., & Theressa, O. (2021). Anaesthesia for Reconstruction Surgery

Post Mandibulectomy in a Patient with a Predicted Difficult Airway: A Case Report. *Integrative Journal of Medical Sciences*, *8*, 1-3. DOI: 10.15342/ijms.2021.426

10. Dooney, N., & Dagal, A. (2011). Anesthetic considerations in acute spinal cord trauma. *International Journal of Critical Illness and Injury Science*, *1*(1), 36-43. doi:10.4103/2229-5151.79280
11. Hastings, R. H., Vigil, A. C., Hanna, R., Yang, B. Y., & Sartoris, D. J. (1995). Cervical spine movement during laryngoscopy with the Bullard, Macintosh, and Miller laryngoscopes. *The Journal of the American Society of Anesthesiologists*, *82*(4), 859-869.
12. Bharti, N., Arora, S., & Panda, N. B. (2014). A comparison of McCoy, TruView, and Macintosh laryngoscopes for tracheal intubation in patients with immobilized cervical spine. *Saudi journal of anaesthesia*, *8*(2), 188-192. doi:10.4103/1658-354X.130705
13. Taylor, A. M., Peck, M., Launcelott, S., Hung, O. R., Law, J. A., MacQuarrie, K., ... & Ngan, J. (2013). The McGrath® Series 5 videolaryngoscope vs the Macintosh laryngoscope: a randomised, controlled trial in patients with a simulated difficult airway. *Anaesthesia*, *68*(2), 142-147.
14. Hulsebosch, C. E. (2002). Recent advances in pathophysiology and treatment of spinal cord injury. *Advances in physiology education*. 26. 238-255.
15. Siemionow, K., Smith, W., Gillespy, M., McCormack, B. M., Gundanna, M. I., & Block, J. E. (2018). Length of stay associated with posterior cervical fusion with intervertebral cages: experience from a device registry. *Journal of Spine Surgery*, *4*(2), 281. Doi: 10.21037/jss.2018.095.27.