

Problems Faced During Anesthesia In Morbidly Obese Patient With Cervical Injury Presented For Fixation In Prone Position

M Said Maani Takrouri, F Shubbak, K Al-Musrea, N Ghanem

Citation

M Said Maani Takrouri, F Shubbak, K Al-Musrea, N Ghanem. *Problems Faced During Anesthesia In Morbidly Obese Patient With Cervical Injury Presented For Fixation In Prone Position*. The Internet Journal of Anesthesiology. 2008 Volume 19 Number 2.

Abstract

A morbidly obese 24 years old male patient has. BMI=35, presented for cervical surgery after sport injury rendering him quadriplegic. In such patient there is high susceptibility for deep veins thrombosis and pulmonary embolism, and pulmonary hypoventilation. This paper reports the unusual presentation of both risk factors namely femoral thrombosis and restricted ventilation after positioning in prone position (on Jackson neurosurgical spine table). It presents how anesthesia team, surgeons and interventional radiologist dealt with this life threatening conditions and conducted the treatment procedures safely.

INTRODUCTION

This report describes a rare case suffered in perioperative period of deep venous thrombosis and respiratory difficulties due to positioning in prone position for posterior approach of cervical spine surgery. Also describes the management line adopted for safe outcome

Surgery in prone position was adapted in neurosurgery to prevent problems and complications of sitting position. Prone position is favorable for gas exchange and it has been used extensively in Acute Respiratory Distress Syndrome (ARDS) ventilation in intensive care units. Morbid obesity has its own hazards of deep vein thrombosis and pulmonary embolus. Anesthesia and surgical positioning of morbidly obese patient carries three branched hazards namely: Morbid obesity, Prone position and Airway preservation problems.

CASE REPORT

A morbidly obese 24 years old male quadriplegic athletic patient, [weight 150 kg, Height = 170 cm BMI=35], presented for emergency fixation of injured cervical spine.

MRI REPORT :- The CT scan showed fractures of the vertebral body of C5 and posterior arch of C5 as well as fracture of the left transverse process of C6 with C5-C6 dislocation and it showed small posterior displaced fragment into the cervical canal detached from the vertebral body of C5. - The MRI shows swelling of the spinal cord mainly

opposite C6 vertebra with high signal intensity within the spinal cord indicating significant cord contusion. No MRI evidence of tear or discontinuity of the spinal cord. Cord edema is extending superiorly until the level of C2. There is obliteration of the pre and retro-spinal CSF spaces due to cord edema. There is a straightening of the cervical spine. There is injury and displacement mainly posterior of the inter-vertebral disc at the level of C5-C6. There is associated para-vertebral posttraumatic soft tissue edema (Fig 1).

Figure 1

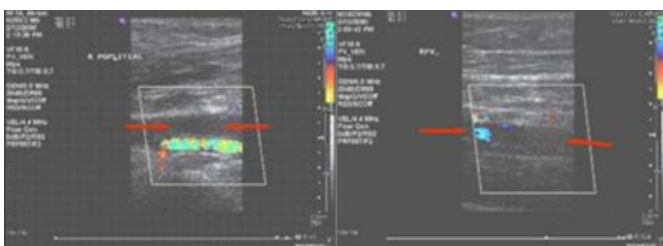
Figure 1: MRI Conclusion: Severe medullary contusion opposite C5 and C6 vertebrae with cord edema extending upwards until the level of C2 with visibility of small area of medullary hemorrhage opposite the vertebral body of C6 and the spinal cord is swollen at the level of the injury. However, no evidence of cord rupture. Severe injury to the C5-C6 intervertebral disc which is torn with posterior displacement of the posterior portion and inferior displacement of the anterior portion along the anterior aspect of C6 vertebra.



After induction of anesthesia, an ultrasound report on the day of surgery indicated the presence of deep vein thrombosis (DVT) of lower limb. Vascular ultrasound of both lower limbs veins on 12-2-2008; examined bilateral common femoral and left femoral, left popliteal veins showed phasic flow, augmentation and compressibility. Right femoral and popliteal veins are dilated, filled with hypochoic materials and not compressible. Impression: Acute DVT in right femoral and popliteal veins (Fig 2).

Figure 2

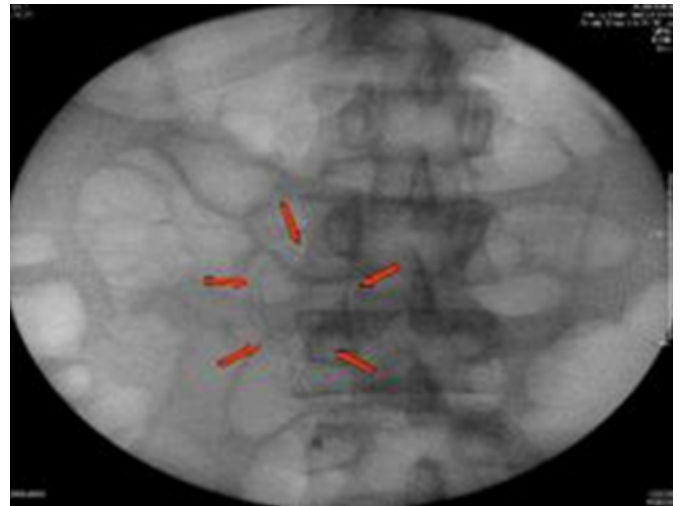
Figure 2: Vascular ultrasound of both lower limbs veins on 02-Feb.-2008: Bilateral common femoral and left femoral, left popliteal veins showed phasic flow, augmentation and compressibility. Right femoral and popliteal veins are dilated, filled with hypochoic materials and not compressible. Impression: Acute DVT in right femoral and popliteal veins.



The team faced the following dilemma: Going forwards with the surgery will expose the patient to pulmonary embolism risk under anesthesia, while postponed the surgery to treat the DVT will expose the patient to bleeding problems and neurological compromise. The decision was taken to insert IVC filter (Fig 3) and to proceed for surgery.

Figure 3

Figure 3: IVC filters at L2/L3 level below renal veins drainage.

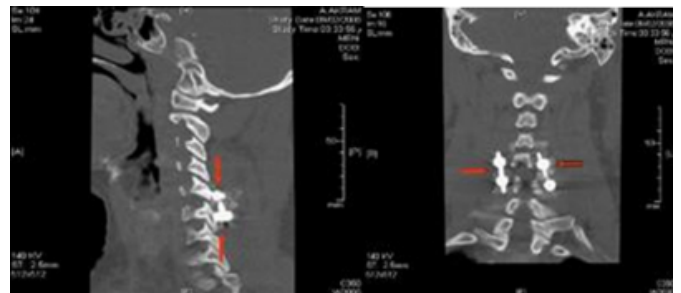


Despite of smooth intubation with preservation of neck stability, air leak was detected during prone position on Jackson spine table®, in addition of increase of airway pressure due to a severe limitation of chest cage. It was impossible to proceed with the planned long surgery, instead repositioning the patient on ordinary surgery after re-laying the patient in supine position and fiberoptic confirmation of correct endotracheal tube integrity (no obstruction , no disruption) and placement was done, for clinical and medico legal view points. The tube was fixed at a lip level of 27 cm.

Surgery was done safely (Fig 4).

Figure 4

Figure 4: The fixation rodes are demonstrated in these Lateral and Anteroposterior imaging of the neck bones.



The post operative course of the patient was smooth. He was admitted to the surgical intensive care unit.; starting immediately a therapeutic anticoagulant low molecular weight heparin. He respiratory physiotherapy and Incentive spirometry. The patient was extubated two days later. He continued doing well, i.e. no post operative pulmonary or hemorrhagic complications.

DISCUSSION

Morbidly obese patient carries more problems when exposed to bed confinement. The most important to anesthesiologist are chest infection and deep vein thrombosis then immobilization. The patient's sport injury severity was due to heavy weight, since he got paraplegic after falling on his head and fractured his neck on jumping exercise. The hospital admission with loss of body movement added the risk of respiratory infection deep venous thrombosis; The anesthesia was shadowed with the risk of difficult intubation due to obesity and reducing the risk of more nerve injuries to the cord, the potential for serious complications after venous air embolism and successful malpractice liability claims are the principle reasons to use prone position in neurosurgical and spine surgery in Western World [1] and then the rest of surgical world to follow. Early review of prone position practice in children soon showed its special type of complications; in 107 patients undergoing 119 surgical procedures in the prone position for posterior fossa or upper cervical lesions showed that the intraoperative complications encountered include cardiac arrhythmia, respiratory complications, cardiac arrest, hypothermia, air embolus and technical difficulties. In all but three children the problems were minor and easily remedied. It was seen that the use of controlled ventilation appears to reduce blood loss, permits excellent relaxation of the exposed tissues and had some anesthetic advantages [2]. Sedated-paralyzed morbidly obese patients, compared with normal subjects, are characterized by marked derangements in lung and chest wall mechanics and reduced lung volume after abdominal surgery. These alterations may account for impaired arterial oxygenation in the postoperative period. [3] Many report examined the special risks in obese surgical patient as difficult venous access, difficult to position on surgical table and other factors which are patient related like co-morbidity and post operative respiratory hazards including sleep apnea and lung collapses [4,5,6]

Prone position has a key role in posterior approach in spinal surgery; Soon ophthalmic complication of edema and acute

vision loss temporally and permanent appeared in literature [7]. It still debatable if reduction of intraocular perfusion pressure is due to raised intraocular pressure (IOP) or due to all reasons of reduction of systemic mean arterial pressure (MAP)

For surgeon and anesthesiologist the inherited problems of airway in fixed and poorly accessible airway in such reported patient would add extra burden. Reports indicated the occurrence of airway obstruction for various reasons like mucous plug, blood clot and defective endotracheal tube [9,10,11,12,13,14,15,16,17,18], accidental extubation of a patient while placed in the prone position during spine surgery then successfully managed this emergent problem by inserting a Laryngeal Mask Airway (LMA) while maintaining the patient in the same position.[19,20]. Cardiac arrest and fibrillation has been successfully as well reported [21]. Risk factors, as mentioned in the reported case and review, for intra-operative cardiac arrest in patients in the prone position include: cardiac abnormalities in patients undergoing major spinal surgery, hypovolaemia, air embolism, wound irrigation with hydrogen peroxide, poor positioning and occluded venous return. In this report; The prone position added the risk of airway loss, the effects position on rigid longitudinal side support bars of Jackson spine table was an added risk.

The prone position on longitudinal metal supportive bars trapped the chest and upper abdomen to almost restrictive respiratory stop The solution was changing the position using the transverse supportive high rubber bars positioned under the chest and pelvis, made better control of respiration. Checking the position of the tube, by fiberoptic bronchoscope, was important for (1)- clinical to assure that there were no dislodgement or interruption of the integrity of the tube, or obstruction and (2) medico legal purpose. This report indicate the importance of preoperative preparation and optimization of the patient to surgery on one hand and watch for unusual events and potential hazards surrounding the thin or obese patients of this position.

ACKNOWLEDGMENT

The authors would mention with gratitude the help rendered by Dr Osama Nofel consultant Anesthesiologist and Assaf Al Malki head anesthesia technologists for their help in this case report.

Also we would like to mention that this report is founded on poster presentation at FINAS (The First International

Neuroanesthesia Symposium in Riyadh KFMC 2008 April 14th. Jackson spine table is state of art for surgery and radiographic imaging developed to highest specification. Mizuho OSI is a Delaware Corporation. Manufactured in the USA.

The local dealer representative indicated that this table is not intended for morbidly obese patients. This report does not describe a faulty design rather unsuitability for morbidly obese patient.

References

1. Porter JM, Pidgeon C, Cunningham AJ. The sitting position in neurosurgery: a critical appraisal. *Br J Anaesth* 1999; 82: 117–28.
2. Humphreys RP, Creighton RE, Hendrick EB, Hoffman HJ. Advantages of the Prone Position for Neurosurgical Procedures on the Upper Cervical Spine and Posterior Cranial Fossa in Children. *Pediatric Neurosurgery Childs Brain* 1975;1:325-336
3. Pelosi, P., M. Croci, I. Ravagnan, M. Cerisara, P. Vicardi, A. Lissoni, and L. Gattinoni. Respiratory system mechanics in sedated, paralyzed, morbidly obese patients. *J. Appl. Physiol.* 82(3): 811-818, 1997
4. Buckley FP. Anaesthesia for morbidly obese patient. *Can J of Anaesthesia* 1994;4,51: 94-100
5. Lemmens HJ, Brodsky JB. The dose of succinylcholine in morbid obesity. *Anesth Analg.* 2006; 102 (2):438-42
6. Shenkman Z. Preoperative management of the obese patient. *Br J of Anaesthesia* 1993; 70:349-359
7. Hanrem CW. The implications of Morbid Obesity for anaesthesia. *Anaesthesiology Review.* 1979; 6:29-35.
8. Lee LA, Lam AM, Roth S. Causes of elevated intraocular pressure during prone spine surgery. *Anesthesiology.* 200.
9. Cheng MA, Todorov A, Tempelhoff R, McHugh T, Crowder CM, Laurysen C: The effect of prone positioning on intraocular pressure in anesthetized patients. *Anesthesiology* 2001; 95: 1351-5
10. Mohamad Said Maani Takrouri, Mohammad Ismail Saqer, Ayman Al-Banyan: Respiratory Difficulties Encountered During Posterior Fossa Exploration . *The Internet Journal of Anesthesiology.* 2008. Volume 16 Number 1.
11. Lin JA, Wong CS, Cherng CH. Unexpected blood clot-induced acute airway obstruction in a patient with inactive pulmonary tuberculosis during lumbar spine surgery in the prone position--a case report. *Acta Anaesthesiol Taiwan.* 2005; 43(2):93-7 Lin JA,
12. Wong CS, Cherng CH. Unexpected blood clot-induced acute airway obstruction in a patient with inactive pulmonary tuberculosis during lumbar spine surgery in the prone position--a case report. *Acta Anaesthesiol Taiwan.* 2005; 43(2):93-7
13. Santos IA, Oliveira CA, Ferreira L. Life-threatening ventilatory obstruction due to a defective tracheal tube during spinal surgery in the prone position. *Anesthesiology.* 2005 ;103(1):214-5; discussion 215
14. Populaire C, Robard S, Souron R. An armored endotracheal tube obstruction in a child. *Can J Anaesth* 1989;36(3, Pt 1):331, 332.
15. Kopp KH, Wehmer H. Nitrous oxide induced intraluminal tube obstruction during endotracheal intubation with armored tubes. *Anaesthesist* 1981;30:577-9.
16. Tose R, Kubota T, Hirota K, et al. Obstruction of a reinforced endotracheal tube due to dissection of internal tube wall during total intravenous anesthesia. *Masui* 2003; 52:1218-20.
17. Umamaheswara Rao G.S., Ali Z., Ramkiran S., Chandrasekhar H.S. The Dissection of a Reinforced Endotracheal Tube Causing Near-Fatal Intraoperative Airway Obstruction. *Anesth Analg* 2006;103:1624-1625.
18. Raphael J, Rosenthal-Ganon T, Gozal Y. Emergency airway management with a laryngeal mask airway in a patient placed in the prone position. *J Clin Anesth.* 2004 Nov;16(7):560-1.
19. Dingeman RS, Goumnerova LC, Goobie SM. The use of a laryngeal mask airway for emergent airway management in a prone child. *Anesth Analg.* 2005;100(3):670-1.
20. Brown J, Rogers J, Soar J. Cardiac arrest during surgery and ventilation in the prone position: a case report and systematic review . *Resuscitation* 2000; 50 , 12:233 - 238

Author Information

Mohamad Said Maani Takrouri, MB, ChB, FRCA

Conduant in Charge of Neuroanesthesia, Department of Anesthesia, King Fahad Medical City

Firas A. Shubbak, MD, CJBA

Assistant Consultant Anesthesiologist, Department of Anesthesia, King Fahad Medical City

Khaled Al-Musrea, B.Med.SC, MD, FRCSC

Acting Chairman, Spine Department; Consultant, Neurological & Spine Surgeon, Neurosciences Center, King Fahad Medical City

Najeeb Ghanem

Medical Administration Imaging, King Fahad Medical City