Journal of Anesthesia & Clinical Research

Shetty et al., J Anesth Clin Res 2019, 10:10

Case Report Open Access

Anesthesia for a Patient Undergoing Micro Endoscopic Lumbar Decompression in the Prone Position with a Deficient Sternum

Sangeeta Vivek Shetty*, **Vijay L Shetty and Vikas M Gupte**

Department of Anaesthesia, Fortis Hospital Mulund, Mumbai, India

***Corresponding author:** Dr Sangeeta Vivek Shetty, Department of Anaesthesia, Fortis Hospital Mulund, Mulund Goregaon Link Road, Mulund, West Mumbai, India, Tel: 9819391716; E-mail: s1v1shetty@gmail.com

Received date: September 23, 2019; **Accepted date:** October 07, 2019; **Published date:** October 14, 2019

Abstract

Micro endoscopic discectomy is a minimally invasive procedure. It has the advantages of minimal muscle splitting technique. However, it requires the patient to be in the prone position. Among the concerns in prone position are optimal support of the shoulders and pelvis. This avoids compression of the abdomen and hence prevents elevation of the intrathoracic pressure. We report a case where prone position was provided to a patient whose sternum had been partly removed post CABG. No such case has been reported earlier in literature.

Keywords: Prone position; Discectomy; Deficient sternum

Case Report

A 69-year-old male, had undergone coronary artery bypass grafting 17 months ago at another hospital. Post operatively, he developed infection at the surgical site and sternal osteomyelitis. Recurrent debridement and Vacuum Assisted Closure (VAC) procedures were carried out. It finally resulted in the removal of chest wires, part of the sternum. He complained of pain during breathing. He had been offered the option of sternal fixation which he refused, so the use of an adjustable chest brace was advised. The skin over the chest wall had healed, however a sternotomy site defect was seen. He presented to us with lower backache and pain radiating to the left leg following a recent fall, therefore was posted for 2 level micro endoscopic lumbar decompressions with unilateral approach. Blood investigations, ECG, 2DECHO were normal. 3D reconstructed CT of chest showed dehiscent manubrium with a gap between the two halves. Left half of the sternal body was deficient post-surgical removal with no support to the ribs medially. Right half of the sternum was fragmented. MRI lumbar spine showed left paracentral extruded disc prolapse at L2L3 and degenerative changes causing lumbar canal stenosis at L4L5 level. Heart rate was 78 per minute, Blood pressure 110/70 mm Hg. Respiratory rate was 14 per minute. He had pain during breathing. Current medications included telmisartan 40 mg, metasartan 50 mg, thyronorm 50 micrograms, prazopress 5 mg, aspirin 75 mg, atorvastatin 20 mg, clopidogrel 75 mg, gabapentin 75 mg.

Post removal of the sternum, the patient had not attempted to lie prone due to anxiety that pressure on the chest could create problems. In the presence of our OT team, a trial of prone position was carried out preoperatively. The patient tolerated the position and remained comfortable with no adverse hemodynamic effect. Informed, high risk consent explaining the possibility of cardio respiratory collapse was obtained. Clopidogrel was withheld for 5 days. Morning dose of telmisartan was omitted on the day of surgery. Other medications were continued. In the operating room the sternal defect was padded and the chest was strapped. Absence of any discomfort to the patient was ensured. 2 wide bore peripheral venous canulae were secured. Routine monitoring included ECG, SpO_2, $EtCO_2$, ST segment, pulse pressure variation. Invasive radial arterial pressure was measured (20 G Lederflex-Vygon). Following pre oxygenation, induction with midazolam 1 mg, fentanyl 100 mcg, propofol 150 mg, atracurium 50 mg was done. Patient was intubated with a size 8.0 flexometallic cuffed endotracheal tube (Portex). Gel bolsters were kept longitudinally parallel to the edge of the operating table. The patient was carefully made prone with the chest resting on the bolsters and the head supported with gel head rest. Anesthesia was maintained using Sevoflurane MAC 0.7-1.0 in air: oxygen 50:50 as carrier gas. Atracurium 5 mg boluses were administered every 30 minutes for muscle relaxation. 2 episodes of hypotension occurred with systolic pressures dropping to 70 mm Hg systolic. Pulse pressure variation was <14%. Hypotension temporarily responded to 3 mg bolus of ephedrine. A low dose norepinephrine (0.05-0.075 mcg/kg/min) infusion was started to maintain mean arterial pressure >70 mm Hg. Thereafter, the blood pressure stabilised. There was not much change in airway pressure (Paw) from the supine (Paw=15-16 cm H_2O) Ventilation was carried out using tidal volume 6 ml/kg with volume-controlled mode. The procedure lasted for 3 hours. At skin closure 1 g paracetamol was administered IV. Once the surgery was over, the patient was made supine carefully and extubated in operation theatre after reversal of muscle relaxant with 2.5 mg neostigmine and 0.2 mg glycopyrrolate IV. 100 mcg fentanyl IV was administered in total. Patient received 1000 ml Ringer Lactate peri-operatively. Total blood loss was less than 100 ml. There were no further episodes of hypotension in the supine position, so norepinephrine was discontinued. Post operatively, hemodynamic stability was maintained. In the recovery area, his pain was controlled adequately with 50 mg diclofenac IV and 50 mg tramadol IV with 4 mg ondansetron. The arterial line was removed. He was shifted to the ward after observation in post anaesthesia care unit. Remaining course was uneventful.

Discussion

Wound dehiscence post sternotomy following CABG is an unfortunate complication. Sternal osteomyelitis resulting in bone loss causes prolonged distress to the patient. Although a variety of treatment modalities are available, if sternal fragments are not fixed chronic chest pain, breathing difficulty is a possibility.

The normal rib cage can tolerate the pressure exerted on it in the prone position. This patient's rib cage had deficient anterior support. Our concern was to avoid direct compression of the mediastinal structures including the heart and major vessels. Also fracture of the ribs with ensuing pneumothorax was a possibility. A careful observation of airway pressures was maintained throughout the procedure to detect possible occurrence of pneumothorax. An intercostal drain set was kept ready and a surgeon was kept on standby if the need arose. The peak airway pressures remained close to the supine peak airway pressures when the position was changed to prone and no desaturation occurred perioperatively.

A post CABG patient with a deficient sternum can theoretically have herniation of the heart through the defect when made prone. Myocardial or coronary injury is a possibility, as the heart is pushed anteriorly towards the fragmented sternum. The pre-operative trial positioning was carried out with an aim to find the most optimal position, that would prevent compression of mediastinal structures and hence a fall in cardiac output. As the patient was awake, there was an opportunity to get a valuable feedback regarding discomfort. The hemodynamic parameters remained stable. The patient too was reassured about the safety of the position.

Prone position can result in increased pressure in the dependent areas, raised intra thoracic pressure, engorgement of epidural venous plexus which can impact the surgical field [1]. A variety of techniques have been reported to provide optimal prone position including Siemens, Andrews, Jackson's, Wilson's frame and the bolster system [2-4]. Although our patient did not have a compromised cardiac function, the deficient, unstable sternum had to be adjusted for; hence the bolster position placement was crucial. Height and length of the bolsters was selected to ensure adequate room for the abdomen to be accommodated and direct pressure on the sternum was avoided. For patients with significant chest deformity and scoliosis, transoesophageal echocardiography has been used to detect flow abnormalities in the prone position and find optimal supportive padding configuration to minimize the impact on cardiovascular function [3]. We decided to place the bolsters longitudinally based on observations by Dharmavaram et al. who used TEE and suggested, the use of properly positioned longitudinal bolsters produced the least effect on cardiac function, and may be superior to Siemens, Wilson, and Andrews frames for patients with reduced cardiac function undergoing spinal surgery [4]. The position given, resulted in a totally unobstructed abdomen and unimpeded venous return, as legs were supported at heart level [4]. However, the patient did have hypotension requiring the use of norepinephrine. This could be attributed to a combination of factors including, the residual effects of angiotensin receptor blockers, diastolic dysfunction, reduced stroke volume in prone position due to vascular compression in the pelvis, compression of the right ventricle [5]. An adequate volume status was indicated by pulse pressure variation <14%. As PPV was normal, inadequate pre load was excluded and norepinephrine was selected over fluid boluses. ST segment must be monitored. Ischemic changes could be suggestive of coronary or venous graft compression in post CABG patients. Facilities to make patient supine urgently must be available in case of sudden hemodynamic collapse. There is a paucity of information describing CPR in such patients. In event that CPR is required it must be guided by the upstroke of the arterial trace as in this case it could lead to myocardial laceration (Figure 1).

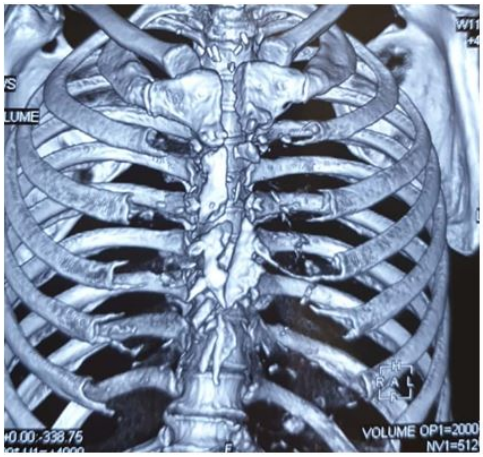

Figure 1: 3D reconstructed CT chest.

Apart from hypotension which responded to vasopressors, we did not encounter much difficulty in managing the case.

Conclusion

This is the first such case reported in literature. We emphasize that with careful positioning on longitudinally placed (parallel to the length of the table) gel padded bolsters, gentle surgical technique and pre-operative planning, the case was managed successfully.

Acknowledgment

Authors would like to thank Dr Hemalata Iyer and Dr Rajat Bhargava for their support.

References

1. Kwee MM, Ho YH, Rozen WM (2015) The prone position during surgery and its complications: A systematic review and evidence-based guidelines. Int Surg 100: 292-303.
2. Feix B, Chir B, Sturgess J (2014) Anaesthesia in the prone position. Cont Edu Anaesth Crit Care & Pain 14: 291-297.
3. Alexianu D, Skolnick ET, Pinto AC, Ohkawa S, Roye DP Jr, et al. (2004) Severe hypotension in the prone position in a child with neurofibromatosis, scoliosis and pectus excavatum presenting for posterior spinal fusion. Anesth Analg 98: 334-335.
4. Dharmavaram S, Jellish WS, Nockels RP, Shea J, Mehmood R, et al. (2006) Effect of prone positioning systems on hemodynamic and cardiac function during lumbar spine surgery: An echocardiographic study. Spine 31: 1388-1393.
5. Poon KS, Wu KC, Chen CC, Fung ST, Lau AW, et al. (2008) Hemodynamic changes during spinal surgery in the prone position. Acta Anaesthesiol Taiwan 46: 57-60.