



Steep trendelenberg position in laparoscopic prostatectomy : A harbinger of delayed recovery from anaesthesia

Sandeep Mutha, Shripad A. Mahadik, Munira A Dilawer, Deepak Phalgune

Poona Hospital & Research Centre, Pune, Maharashtra, India.

ARTICLE HISTORY

Received: 12.03.2020

Accepted: 22.06.2020

Available online: 30.06.2020

Keywords:

Steep Trendelenburg position,
laparoscopic prostatectomy,
perioperative complications

*Corresponding author:

Phone : +91-9496742242

Fax : +91-20-24338477

Email : dphalgune@gmail.com

ABSTRACT

Robotic surgeries demand challenging positioning and anaesthetic management, but laparoscopic prostatectomy requiring steep Trendelenburg position for the prolonged duration is unusually documented. An elderly patient underwent radical prostatectomy in steep Trendelenburg position by laparoscopic approach with surgery lasting more than six hours duration. The postoperative recovery was complicated by the development of cerebral, ocular and airway oedema apart from hypothermia. The perioperative complications required intensive-care unit care with prompt management of the airway and cerebral oedema along with elective overnight ventilation. The patient went home without any neurological or respiratory sequelae on the fifth postoperative day.

INTRODUCTION

Trendelenburg position and pneumoperitoneum together with facial and upper respiratory tract oedema cause venous stasis in head and neck region producing mask phenomenon, characterised by lacerated dermal capillaries because of raised intra-thoracic and intra-abdominal pressures.[1] Facial oedema alongside cerebral and ocular oedema further complicate the patient's recovery from anaesthesia contributing to perioperative patient morbidity. The present case report highlights the effects of steep Trendelenburg position during laparoscopic prostatectomy.

CASE REPORT

A 69-year-old male patient presented with obstructive uropathy symptoms for two months. He was a known type 2 diabetes mellitus patient and hypertensive optimised on pre-existing medications. Prostatectomy for prostatic carcinoma was planned. Haemogram, blood urea, serum creatinine, serum electrolytes, liver function tests, ECG, chest x-ray, 2D ECHO, ultrasonography of the abdomen and pelvis and positron emission tomography scan for other organ involvement was normal. The baseline arterial blood gas was normal. The patient was premedicated with lorazepam 2 mg and lansoprazole 30 mg. In the operation theatre, heart rate, non-invasive blood pressure, respiratory rate, oxygen saturation and temperature monitoring

were attached. Two large-bore intravenous (IV) cannulas were secured. Premedication with intravenous (IV) ondansetron and IV fentanyl was done. Induction was done with IV propofol and IV rocuronium in appropriate doses. Intubation with No. 8.5 Portex endotracheal tube was done and confirmed by auscultation/ capnography. The patient was positioned in lithotomy for surgery.

A rectal temperature probe was inserted. Initial core temperature was 36.4 degrees Celsius. Sequential compression devices were attached to lower limbs for active venous pumping. Eyes were cushioned after applying antibiotic lubricant and pressure points were adequately padded. Foleys catheter was inserted and subsequently, pneumoperitoneum was created. Steep Trendelenburg position for laparoscopic prostatectomy with bilateral pelvic lymph node dissection was given. Intraabdominal pressure was kept around 15 mm of Hg for pneumoperitoneum, in the beginning, later increased to 20 mm of Hg for one hour. Maintenance was with oxygen + air + sevoflurane on low flows with rocuronium and dexmedetomidine infusion. Hemodynamics were steady throughout the procedure.

Multimodal analgesia was achieved with IV paracetamol and diclofenac. Antibiotics were administered pre-procedural and intra-operative after a five-hour interval. The duration of surgery exceeded above six hours of which Trendelenburg position was maintained for five hours. Fluids were administered judiciously

after considering fasting/maintenance, haemodynamics, blood loss and insensible losses along with one packed cell volume. Active warming was continued throughout and steep Trendelenburg position was reversed after removal of ports. Cushioning and padding were removed and the lithotomy position was converted to the supine position. Reversal of the neuromuscular blockade was planned after the return of adequate respiratory attempts. However, spontaneous attempts at respiration were absent and hypothermia with conjunctival oedema was present. Fundoscopy confirmed papilledema. Arterial blood gas sampling revealed adequate oxygenation but respiratory acidosis and normal anion gap metabolic acidosis was observed. PCO₂ levels were 70 mm of Hg. End-tidal CO₂ was 40 mm of Hg. Overnight mechanical ventilation and continuous active re-warming, with measures to reduce cerebral oedema helped improved patients neurological condition. Extubation was done subsequent day after performing Leak test to confirm the absence of laryngeal oedema. On 5th postoperative day, the patient was discharged with no neurological or cognitive deficit or complaints of neuropathy. Early ambulation with appropriate IV analgesics and a course of steroids with other measures to reduce airway inflammation were administered.

DISCUSSION

Anaesthetic management in laparoscopic radical prostatectomy surgeries is related to the pneumoperitoneum in steep Trendelenburg position. This combination affects cerebrovascular, cardiac and respiratory systems. The range of nonsurgical complications is quite large.[2] Cardiovascular complications, corneal abrasions, and pulmonary embolism occur in 0-0.56%, 3%, and 0.2% patients respectively.[2-4] Gastric reflux [5] with heartburn and compartment syndrome [6] form other minor complications. Most of the complications that make the perioperative period look grave are rather self-limiting with resolution within 24 hours with proper management and vigilance. What makes the situation look complicated is the difficult access to the patient in such positions by the anaesthesiologist.

Prolonged steep Trendelenburg position increases the risk of cerebral and airway oedema which may present with stridor after the operation. Functional residual capacity and ventilation-perfusion (V/Q) mismatch are worsened, and with cephalad movement of the lungs, the tracheal tube may migrate endobronchial. [7] A 'well leg compartment syndrome', a combination of impaired arterial perfusion to raised lower limbs, compression of venous vessels by lower limbs support and reduced femoral venous drainage due to pneumoperitoneum is another rare but devastating complication of steep Trendelenburg position. Presentation is similar to compartment syndrome of lower limbs with pain, rhabdomyolysis, and myoglobin-associated acute renal failure.[8] Prevention is by intermittent compression stockings, moving the patient's legs at regular intervals and using heel/ankle supports instead of calf/knee supports (Lloyd Davies stirrups).

Intra abdominal insufflation of carbon dioxide to enable sufficient visualization for laparoscopy increases intraabdominal volume and pressure and decreases abdominal compliance with intra-abdominal pressure (IAP) exceeding physiological thresholds and individual organ system compromise. Cardiovascular effects include increasing systemic vascular resistance due to mechanical compression of the abdominal aorta and release of vasopressin and renin-angiotensin aldosterone

system activation, inferior vena cava compression with a reduction in preload, decreasing cardiac output and arterial pressure. Reduced pulmonary compliance and functional residual capacity with pulmonary atelectasis and altered V/Q relationships and hypoxaemia are observed. Perfusion to kidney and liver is compromised. Persistent IAPs over 20 mm of Hg reduce mesenteric and gastrointestinal mucosal blood flow up to 40% with tissue acidosis. Acute kidney injury with a decrease in glomerular filtration rate by ~25% develops at IAP > 20 mm of Hg. Raised intra-cerebral pressure due to limited cerebral venous drainage as a consequence of raised intra-thoracic pressure, contributes to temporary neurological dysfunction.

CONCLUSIONS

Insight into complications pertaining to Trendelenburg positioning can help anticipate problems and troubleshoot them. Herein, despite best efforts, some unavoidable complications of steep Trendelenburg position did play a role for delayed postoperative recovery but vigilant management perioperatively promoted patient recovery with bare minimal patient morbidity. We recommend intermittent neutral position or reverse Trendelenburg position every two hours for better patient outcomes.

CONFLICT OF INTEREST

Dr. Sandeep Mutha, Dr. Shripad Mahadik, Dr. Munira Dilawer and Dr. Deepak Phalgune declare that they have no conflict of interest.

REFERENCES

1. Ezgi E, Cihan D, Ayca O, Cem S, Elvin K. Mask Phenomenon Following Robot-assisted Prostatectomy: A Rare Complication due to Trendelenburg Position. *J Anesth Clin Res* 2014;5:431-32.
2. Gainsburg DM. Anesthetic concerns for robotic-assisted laparoscopic radical prostatectomy. *Minerva Anesthesiol.* 2012;78:596-604.
3. Hong JY, Oh YJ, Rha KH, Park WS, Kim YS, Kil HK. Pulmonary edema after da Vinci-assisted laparoscopic radical prostatectomy: a case report. *J Clin Anesth.* 2010;22:370-2.
4. Danic MJ, Chow M, Alexander G, Bhandari A, Menon M, Brown M. Anesthesia considerations for robotic-assisted laparoscopic prostatectomy: a review of 1,500 cases. *J Robot Surg* 2007;1:119-23.
5. Irvine M, Patil V. Anaesthesia for robot-assisted laparoscopic surgery. *Cont Educ Anaesth Crit Care Pain* 2009;9:125-29.
6. Galyon SW, Richards KA, Pettus JA, Bodin SG. Three-limb compartment syndrome and rhabdomyolysis after robotic cystoprostatectomy. *J Clin Anesth.* 2011;23:75-8.
7. Hayden P, Cowman S. Anaesthesia for laparoscopic surgery. *Cont Educ Anaesth Crit Care Pain.* 2011; 11:17780
8. Simms MS, Terry T. Well leg compartment syndrome after pelvic and perineal surgery in the lithotomy position. *Postgrad Med J.* 2005;81:534-6.