

Anesthesia For Robot Assisted Cystectomy: Our Initial Experience

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Citation

J Punj, R Pandey, V Darlong. *Anesthesia For Robot Assisted Cystectomy: Our Initial Experience*. The Internet Journal of Anesthesiology. 2007 Volume 16 Number 1.

Abstract

Robot assisted surgeries though still not very common are now being undertaken in many Institutes. All India Institute of Medical Sciences, N Delhi, India is the first in South East Asia to procure a da Vinci Robot (Intuitive Surgical, Sunnyvale, CA, USA.) for robot assisted urologic surgeries. Robot assisted cystectomies have recently been undertaken in our Institute. We will discuss the perioperative management, in the learning curve of surgeons and the anesthetists, of the first 9 cases of robot-assisted cystectomies with formation of ileal conduit.

INTRODUCTION

The patients were premedicated with tablet diazepam 10mg and tablet ranitidine 150mg the night before and coming morning. In the operation theatre, a 16 G cannula was inserted in the non-dominant hand. After standard monitoring of ECG, SPO₂, NIBP, a lumbar epidural catheter was inserted. The patient was induced with standard anesthetic technique followed by insertion of endotracheal tube not more than 1.5-2 cm beyond the vocal cords. Anesthesia was maintained with air: O₂ or N₂O: O₂ mixture with 0.5-2 MAC of isoflurane and intravenous boluses of morphine to maintain entropy to about 60 or whenever hear rate or /and blood pressure increased to more than 20% with the same value of end tidal CO₂. After induction, capnomac, entropy, airway pressure, temperature, flow volume loop was measured. Radial arterial line was inserted for invasive blood pressure monitoring and blood gases, if required. Central venous pressures were monitored by either cannulation of internal jugular vein (if the hematocrit was <27) or right cephalic or basilic vein.

The patient was then strapped to the bed. Thermal blankets were put over legs and chest. The eyes were covered with paraffin gauze and padded. A ryles tube was inserted. Temperature was monitored with nasopharyngeal probe. The patient was gradually positioned in steep trendelenburg position of 30-45°, keeping a watch on airway pressure. The robotic ports were inserted and pneumopetonium was created. The ventilation was either pressure controlled or volume controlled to maintain end tidal CO₂ to 38-40

mmHg. Epidural boluses or infusions were not used at this stage. A close watch on fluids was kept. Only replacement and maintenance fluids were given. If the central venous pressure showed a higher value (> 30cm H₂O), then fluids were further restricted by giving only colloids (Hetastarch). At the end of robotic assisted cystectomy, which requires about 3-5 hours, patient was made supine and ports were removed. We gave epidural bolus at this stage, 0.25% bupivacaine 10-12 ml with 3 mg of morphine after negative test dose of 3ml of xylocaine with adrenaline. The surgeons then make a midline infraumbilical incision to construct an ileal conduit. The central venous pressure and conjunctival edema were checked at this stage. If the CVP was still raised and/or with there is moderate to severe conjunctival edema, a bolus of furosemide 5-10 mg was given. The making of an ileal conduit till completion of surgery requires about 2-3 hours. Towards the end of surgery, ondansetron 4-8 mg was given intravenously. The trachea was extubated on the operating table after reversal of muscle relaxants. Postoperatively, patients are usually kept in high dependency unit for 24 hours with epidural boluses/infusions, with rescue analgesia with either morphine 3 mg or tramadol 1mg/kg.

RESULTS

9 patients were operated for robot-assisted cystectomy with ileal conduit from January 2006 to December 2006. Out of these, 1 patient was converted to open procedure after 2 hours of anesthesia because of adherent tumour tissue to iliac vein. Out of these 7 were male patients and 1 was a

female patient.

The average age of the patients was 64.6 years with an average weight of 52 kg. Average time of anesthesia was 7.8 hours, with 10 hours anesthesia required for the female patient as ileal conduit was constructed robot assisted in this patient. Average anesthesia time in trendelenburg position was 4.5 hours and anesthesia in supine position was for 2.3 hours. (Take in Table 1). The preoperative hemoglobin of all but 3 patients ranged between 11- 13 gm%, with 2 patients with less than 10 gm% and one patient with >13 gm %. One of these patients had hemoglobin of 7gm%. As he was bleeding continuously, he was taken up as semi-emergency case. The average blood loss in these patients was 640ml per patient. However, only 2 patients were transfused blood. The patient with Hg of 7gm % bled 1.2 litres and was transfused 4 units of blood and 6 units of fresh frozen plasma. The other patient bled 1 litre as the bladder was stuck to the left lateral wall of the pelvis owing to extravascular perforation sustained during cystoscopic clot evacuation done 2 months prior to surgery. He was transfused with 2 units of blood and 2 units of fresh frozen plasma intraoperatively. None of the patients required postoperative blood transfusion. (Take in Table 2)

The average Central venous pressure at the beginning of surgery was 7 ± 2 cm of H₂O and 26 ± 3 cm H₂O after 10 minutes in head down position .7 patients required furosemide 5mg at the end of the surgery.

None of the patients required postoperative ventilation except the female patient. She underwent robot assisted ileal conduit formation and thus was in head down position for about 10 hours. She was electively ventilated overnight.

Intraoperative requirement of opioids was 12 mg morphine in all patients' with additional requirement of morphine 3 mg in 2 patients who complained of pain on waking up.3 patients required rescue doses of tramadol 100mg in the first 12 hours postoperatively along with epidural boluses/ infusions. The patients were given epidural boluses of epidural morphine 3 mg in 10 ml of saline every 12-24 hours for the next 3 days in the ward. All patients were made mobile the next day of surgery.

Figure 1

Table 1: Analysis of patient variables

Age	64.6yrs
Weight	52kg
Anesthesia in trendelenburg	4.5 hrs
Anesthesia in supine	2.3 hrs
Total anesthesia time	7.8hrs

Figure 2

Table 2: Analysis of blood loss and hospital stay

Blood loss	640ml/pt
Blood replacement	260ml/pt
Mean hospital stay	9.2 days

DISCUSSION

The advantages of robotic assisted surgeries have recently been highlighted (1). Our initial experience with anesthesia for about 40 robotic assisted prostatectomies helped us to manage the cases of robot-assisted cystectomies better.

Use of epidural drugs in robot assisted prostatectomy had made us aware that the steep trendelenburg position causes severe hypotension, probably as most of these patients are older and because of pneumoperitoneum and steep trendelenburg position. We have since stopped using an epidural catheter in these patients. Epidural drugs were used in robot assisted cystectomies only when the patient was made supine to construct an ileal conduit.

Costello et al (1) used epidural infusions in their cases, but encountered severe hypotension and relative bradycardia with no clear benefit from this. Costello et al used remifentanyl infusion whereas we used intravenous boluses of morphine as remifentanyl is not available in our country.

It has been speculated that trendelenburg position causes decreased venous return from head causing increased ICP leading to pressure on optic nerve which can cause visual loss or impairment (2). No study tells us how much time or what value of IOP can cause visual damage or loss. It probably would be lesser for predisposed patients and in certain conditions (3). Recently, intraocular pressure changes were studied in detail during laparoscopic radical prostatectomies (4). Though not formally published, the results were presented at ASA Annual meet. The authors found that a baseline IOP of 16 ± 3 , increases to 25 ± 4 at 30

minutes, 30 ± 3 at 60 minutes, 36 ± 3 at 240 minutes. However, as soon as the patient was made supine, the IOP decreased from a mean IOP of 35 ± 1 to 22 ± 2 within 5 minutes.

Head down position also causes increased cerebral blood volume (5), which can cause cerebral edema, hampering an awake and alert patient at the end of surgery.

Because our patients were made supine at the end of radical cystectomy for about 2.3 hours till completion of surgery, we presume that IOP as well as cerebral edema would have decreased considerably. We did not monitor intraocular pressure intraoperatively, but we monitored central venous pressure and conjunctival edema to give us an idea about corresponding intraocular pressure and cerebral edema. If towards the end of the surgery, the central venous pressure was high with moderate to severe conjunctival edema, we gave a shot of lasix 5-10 mg, which we have seen is sufficient to decrease central venous pressures. Also, giving epidural drugs in the supine stage decreases the CVP by at least 2-3 cm of H₂O. Mannitol was not required in our patients.

In robot-assisted cystectomy, an advantage compared to robot assisted prostatectomy is that patient is supine for 2-3 hours before the end of the surgery. This reverses some of the effects of increased IOP and cerebral edema compared to robot-assisted prostatectomy in which surgery ends in trendelenburg position itself not giving enough time to reverse these effects.

Less intraoperative blood loss is one of the main advantages in these surgeries. Costello et al didn't insert any central lines but, lower hematocrit values of Indian patients allows for less allowable blood loss volume. We insert a peripheral long line in all patients and internal jugular vein cannulation in patients with lower hematocrit and compromised cardiovascular status. The average blood loss in our patients was 620ml per patient.

The mean hospital stay in our patients was 9.2 days which is much longer than other studies (1). This could be because most of our patients come from far off or remote places. Also the cost of operation and stay in our government hospital is considerably less compared to western counterparts. These patients were mobile the very next day, but preferred to go home only after all the tubes were removed.

We have not compared postoperative ileus but all our patients were allowed sips of water on the second postoperative day.

These surgeries were of a long duration with inherent problems of prolonged anesthesia especially in head down position. Whenever surgeons try out new surgical techniques and instruments, it is the learning curve for both surgeons and anesthetists.

This is especially more tough when not much data is available in literature to rely on and learn from. It is the most difficult time for both surgeons and anesthetists as this is the time when we all learn and protocols are set. As not much information is available on anesthesia for robot assisted cystectomy with ileal conduit, we thought of sharing our information which could be of help to other centers conducting similar surgeries.

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