

## Anesthesia considerations radical prostatectomy

Vinod Malhorta, M.D.\*

\* Department of Anesthesiology, Weill Cornell Medical College, New York Presbyterian Hospital, New York, NY

- I. Open radical retropubic prostatectomy – general, regional or combined anesthesia – does it make a difference?
- II. Robotic Radical Prostatectomy – new challenges for the anesthesiologist.
- I. Radical Retropubic Prostatectomy (RRP)

### INTRODUCTION

RRP is performed to treat localized prostate cancer. Although originally described in 1905 via transperineal approach, the retropubic approach is mostly used nowadays. The prostate, the ejaculatory ducts, the seminal vesicles and a part of the bladder neck are removed along with the pelvic lymph nodes.

- RRP's have increased 6-10 fold in the U.S. in the last decade because of routine PSA testing in men, the use of newer nerve sparing techniques, and introduction of new technology including robotic and laparoscopic techniques.
- Number of procedures done at our institution have doubled in the last 3 years and continue to increase.
- Generally the procedure has been performed via open Laparotomy but Laparoscopic and Robotic Surgery are being increasingly utilized.
- Significant blood loss is associated with this surgery. Perioperative complications include bleeding, seroma, hematoma, infections, thrombo embolism and venous air embolism. 30-day mortality is less than 1%.

### ANESTHETIC TECHNIQUES COMPARED

What constituted the best anesthesia for prostatectomies was debated as early as 1924, with proponents of regional anesthesia gaining ground quickly thereafter.

### OUR EXPERIENCE (UP TO 1994)

1. Our study in 1994 compared Epidural, General and Combined Epidural-General Anesthesia in 204 consecutive radical prostatectomies. Data collected included patient demographics, anesthetic technique, duration of surgery, intraoperative blood pressures, blood loss, blood transfusions, time to ambulate and hospital discharge. Medical and surgical complications and their outcomes were recorded. Appropriate statistical tests were applied.
2. Notable was a significantly lower intraoperative blood loss, the surgery time and the time to discharge from the hospital in the epidural group compared with the other two groups.
3. Pulmonary embolism occurred in 4 patients and ulnar neuropathy in 2 patients, all in the general anesthesia group. Other complications such as hematoma, seroma, lymphocele, wound infection, and ruled out myocardial infarction were similarly distributed among groups.
4. Our findings, that epidural anesthesia is associated with a significantly less intraoperative blood loss, decreased operative time and hospital stay, were similar to the results of other investigators.
5. Further, we confirmed that epidural anesthesia is associated with decreased thrombo embolic phenomenon in postoperative period when compared with general anesthesia.
6. Of notable interest was the finding that the blood loss in the general anesthesia and the combined anesthesia group was significantly more than in the epidural anesthesia group despite little differences in arterial pressures among the three groups. We postulated that the increased venous pressures as a result of IPPV was the most likely cause of increased bleeding in the general and the combined anesthesia groups during radical prostatectomy. This had been described by Modig et al in previous studies. The

authors conclusively demonstrated that the central and peripheral venous pressures were lower in patients during spontaneous ventilation under epidural anesthesia when compared with patients receiving intermittent positive pressure ventilation during general or combined epidural-general anesthesia.

#### REPORTED EXPERIENCE IN THE SUBSEQUENT TEN YEARS (1994-2004)

Many investigators have reported their findings comparing the three anesthetic techniques for radical retropubic prostatectomy and the following trends emerge.

1. Intraoperative blood loss is significantly less if epidural anesthesia or a combined epidural and general anesthetic with spontaneous ventilation is used.
2. Epidural anesthesia alone or when added to a general anesthetic decreases postoperative hypercoagulability thereby decreasing the risk of thrombo embolism.
3. Pre-emptive analgesia provided by the epidural block decreases postoperative pain and analgesic requirements.
4. Homeostasis of Neuroendocrine responses maybe better maintained with regional block compared with general anesthesia.
5. The length of stay and the cost of hospitalization are decreased with the judicious use of epidural anesthesia and establishing clinical pathways.
6. There is paucity of outcome data to support increased safety of any one technique over the others.

#### SOME OBSERVATIONS

1. Regional anesthesia with an awake, sedated patient may help detect and diagnose intraoperative complications such as venous air embolism earlier allowing quick intervention and possibly improved outcome.
2. Divergent results of several studies comparing these anesthetic techniques maybe a consequence of having small numbers of subjects in studies, use of different techniques e.g. thoracic vs. lumbar epidural block, the use of spontaneous ventilation vs. IPPV and use of local anesthetics with or without opiates.
3. Literature abounds with studies comparing regional anesthesia with general anesthesia for pelvic surgery viz. TURP, gynecological surgery, bowel surgery; abdominal surgery and vascular surgery. Similar trends and controversies exist.
4. Local practices such as the preferences of the urologists, anesthesiologists and patients assume precedence over science.

#### THE FUTURE IS HERE (2004-2006)

What was considered the future direction in RRP 3 years ago is already gaining practice. With the increasing use of Laparoscopic radical retropubic prostatectomy and the introduction of Robotic surgery for this procedure, the anesthetic techniques are changing. For example, epidural anesthesia alone or spontaneous ventilation is no longer an option for robotic laparoscopic prostatectomy. The outcomes, we hope, will improve but we have traded newer complications for the existing ones.

#### II. ROBOTIC ASSISTED RADICAL PROSTATECTOMY (RARP)

Also described as Robot Assisted Laparoscopic Radical Prostatectomy (RALRP), Robotic Laparoscopic Prostatectomy (RLP), Robot Assisted Prostatectomy (RAP), Total Endoscopic Robotic Prostatectomy (TERP), Total Endoscopic Robot Assisted Radical Prostatectomy (TERARP).

Many advantages of robotic assisted radical prostatectomy (RARP) are described and these include: better visualization, more controlled finer movements of robotic arms allowing better dissection, less blood loss and improved continence and potency rates. Newer challenges arise for the anesthesiologists however. These are primarily related to 1) steep head down tilt and 2) pneumoperitoneum required for surgery.

#### PHYSIOLOGIC CHANGES DUE TO PNEUMOPERITONEUM

Ventilatory and respiratory changes:

- Decreased compliance
- Increased airway pressures
- V:Q mismatch
- Hypercapnia with resultant hypercarbia, acidosis, tachycardia, arrhythmias and other deleterious hemodynamic and CNS effects.

#### HEMODYNAMIC CHANGES:

- Decrease in cardiac output
- Increased filling pressures
- Decreased venous return

#### COMPLICATIONS OF PNEUMOPERITONEUM:

- Endobronchial intubation
- Subcutaneous emphysema
- Capnothorax
- Pneumothorax, pneumomediastinum, pneumopericardium

Physiologic changes of steep head down tilt  
(Trendelenburg position)

This position produces complex cardiovascular effects.

#### HEMODYNAMIC EFFECTS:

- Decreased perfusion pressure of lower extremities
- Increased mean arterial pressure at Circle of Willis
- Increased central blood volume, decreased cardiac output and decreased perfusion of vital organs in a normovolemic patient.
- Increased myocardial oxygen consumption, ischemia, arrhythmias and decreased oxygen delivery in patients with cardiac disease.

#### RESPIRATORY EFFECTS:

- Decreased compliance
- Reduced vital capacity and functional residual capacity

- 20% decrease in lung volumes
- V:Q mismatch
- Pulmonary congestion and edema

#### OTHER EFFECTS:

- Increased intracranial pressure
- Increased intracranial pressure
- Venous air embolism
- Brachial plexopathy
- Arthralgias and finger injuries
- Regurgitation

#### OTHER CONSIDERATIONS FOR RARP

- Maintaining normothermia may be a problem in some cases because of prolonged pneumoperitoneum with dry cold gases.
- Adequate space for the anesthesiologist and anesthesia equipment needs to be balanced against space needs for robotic equipment.

INITIAL EXPERIENCE WITH THESE CASES WILL BE PRESENTED IN THE LECTURE

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