

TOPIC: A patient on pacemaker Posted for TURP

**INTERNAL
EXAMINER:**

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SHORT CASE: PESIMSR Q&A

70Yr. Male with pacemaker
posted for TURP

- **What is Transurethral resection of the prostate(TURP)?**

- Transurethral resection of the prostate (TURP) involves the resection of benign hypertrophic prostatic tissue by means of a movable electrocautery cutting wire loop located at the end of a urethroscope.
- Simultaneously, an irrigating solution flows into the surgical site via a channel in the urethroscope to distend the bladder and to bathe the surgical site, washing away blood and tissue debris removed by the wire loop

- **Describe the anatomy of the prostate gland.**

- The prostate gland approximately weighs 20 g and underlies the apex of the male bladder and surrounds the prostatic portion of the urethra.
- The prostate is formed by enlargement of the urethral glands.
- The prostate gland is anatomically divisible into five lobes. The median and lateral two lobes of the prostate gland most frequently undergo benign prostatic hypertrophy..
- The nerve supply to the prostate derives from the prostatic plexus, which originates from the inferior hypogastric (pelvic) plexus.

- Afferent pain fibers of the prostate, urethra, and mucosa of the bladder originate primarily from sacral nerves 2, 3, and 4 (S2, S3, and S4).
- Pain impulses from an over stretched bladder travel with sympathetic fibers that have their origin in the twelfth thoracic and first and second lumbar nerves (T12, L1, and L2).
- Proprioceptive impulses from the muscular wall of the bladder, which are activated by stretching of the muscular wall as the bladder fills, are carried by the parasympathetic fibers of S2, S3, and S4.

- **How would you assess this patient for anesthesia?**

- TURP is generally performed on elderly men. Hence, one must also take into account multiple co-morbidities to which the elderly are prone like, i.e. IHD, HT, DM, renal dysfunction, etc.
- In addition, they may be on treatment for such conditions with medications like aspirin, oral anti-coagulants, etc..

- **What is the position of the patient for TURP?**

- An important aspect during TURP is the position given to the patient.
- For optimal surgical exposure, the patient is put in lithotomy position.
- The first consideration is to fit the equipment to the patient and not the patient to the equipment.

- Patient is positioned supine on the table, anaesthesia instituted and then patients' legs are elevated TOGETHER, flexed TOGETHER and only then put in stirrups.
- Hence, the thighs are flexed at about 90 degrees to the abdomen and outwardly rotated. For TURP- Lithotomy with obtuse angle between the thigh and abdomen is desirable.
- *Variations of lithotomy position*
 1. Lithotomy with Trendelenberg position.
 2. Walcher position.
 3. Exaggerated lithotomy position (Trendelenberg position with sheets/towels beneath the sacrum to tilt it up).

- **Describe the complications associated with lithotomy position?**

- 1. *Venous stasis*: Occurs in prolonged lithotomy. Stasis occurs at points of compression by equipment or at the groin due to thigh flexion. Patients with varicose veins are at high risk.
- Preventive measure: If lithotomy position is for more than 15 minutes then the legs have to be protected by elastic stockings.
- 2. *Peripheral nerve injury*: It occurs either due to direct trauma or usually due to compression of blood vessels supplying the nerves such as Obturator nerve, Saphenous nerve, Common peroneal nerve.

- 3. *Cardiorespiratory compromise*: The lithotomy position results in an 18% reduction in the vital capacity, which is further increased by Trendelenberg tilt (up to 14.5% with a 20° tilt).
- Spinal anaesthesia causes pooling of blood in the lower limbs, and this may be abruptly returned to the central circulation when the legs are raised to give the lithotomy position. All this may result in precipitation of respiratory and / or cardiac failure in elderly patients with pre-existing disease and diminished cardiopulmonary reserve.

- **What are the complications associated with TURP?**

- *Intraoperative complications:*

1. □TURP syndrome.
2. □Hypothermia: this is due to use of cold irrigation fluids.
3. □Myocardial infarction: the incidence of perioperative myocardial infarction ranges from 1–3%.
4. Bleeding and bladder perforation are also common occurrences during TURP.

- *Postoperative complications:*
- □TURP syndrome.
- □Clot Retention.
- □Bleeding.
- □Postoperative cognitive dysfunction.

- **What are the first signs and symptoms of TURP syndrome?**

- The development of TURP syndrome can be from 15 mins of procedure to 24 hours post-procedure.
- The clinical manifestations brought about by intravascular fluid absorption are referred to as the TURP syndrome, and the degree of symptoms depends on the type, magnitude, and extent of absorbed fluid.
- For the patient undergoing TURP under regional anesthesia, the first sign has been described classically as restlessness and mental confusion.
- The syndrome may manifest initially with nausea, vomiting, dizziness, headache, unresponsiveness, or transient visual changes.
- Hemodynamic instability (hypertension, hypotension, heart rate changes, cardiac arrhythmias, pulmonary edema, or cyanosis) may be the first indication of a development of TURP syndrome

- **Which is the best irrigating fluid for TURP?**

- Several types of fluids are available for use during a TURP procedure. But the ideal irrigant should be:

1. Iso-osmolar and non-hemolytic
2. Non-electrolytic
3. Non-toxic
4. Transparent
5. Non-metabolizable
6. Rapidly excretable
7. Inexpensive and sterile.

- **Give a brief description of all irrigating fluid used for TURP?**

1. Originally, distilled water was used-absorption of distilled water cause hyponatremia and hemolysis of red blood cells.
2. Isosmotic solutions such as saline or lactated Ringers solution are highly ionized and cause dispersion of high-frequency current from resectoscopes.
3. Present generation of irrigating fluids is electrically inert and isotonic- include glycine and a mixture of sorbitol and mannitol (Cytal).

- **What is TUR syndrome? Describe the physiology and management of TUR syndrome?**

- Transurethral resection syndrome is a constellation of symptoms and signs caused primarily by absorption of irrigating fluid. The features of the syndrome include:
- 1.CNS manifestations are disorientation, restlessness, confusion, agitation, drowsiness, convulsions and coma. This is usually due to water intoxication, dilutional hyponatremia and hypoosmolality. Blindness, delayed recovery from anaesthesia, drowsiness may be due to glycine toxicity.
- 2.CVS manifestations are dyspnea, pulmonary congestion, pulmonary edema, cardiac arrest. This is due to fluid overload and negative inotropic effect of hyponatremia.
- 3.Hemolysis.
- 4.Hypothermia—bladder irrigation with room temperature irrigation fluids can drop body temperature $> 2^{\circ}\text{C}$.

- **What are the methods to reduce the risk of the TURP Syndrome**

- 1. Number and size of the venous sinuses opened.
- 2. Duration of exposure: Reduction of the operative time to less than 1 hr decreases the chance of TUR Syndrome. The rate of absorption of fluid is 10–30 mL/min.
- 3. Venous pressure at irrigant-blood interface. The irrigating fluid bag should be at a maximum height of 60 cm (2 feet) above the level of the pubic symphysis.
- This leads to a hydrostatic pressure of 60 cm of water which is maximum allowable.

- **Enumerate complications of TURP?**

- 1. *Glycine toxicity*
- 2. *Hemolysis:*
- 3. *Blood loss:*
- 4. *Perforation:*

- **Describe anesthetic management of TURP? What is the preferable anesthetic technique and why?**

- *Anesthesia Management*

- Ideal anesthetic should provide adequate operative conditions and analgesia. Physiological disturbance should be minimal and compensatory mechanisms should not be compromised.
- Bleeding must be minimized. There should be adequate muscle relaxation to provide good irrigant flow into
- the bladder and to allow good surgical access. Doses of the drugs must be carefully adjusted to patient's requirement. The technique must allow early detection of over-hydration, perforation and hemolysis.
- Sub-arachnoid block is the method of choice as:
 1. Little anesthetic is required.
 2. Patient remains awake and mentation can be assessed regularly.
 3. Physiologic disturbance is minimal.
 4. Respiration is affected to the minimum.
 5. Early recognition of complications (Level to be restricted to T 10).
 6. Peripheral vasodilatation helps reduce circulatory
 7. Morbidity and mortality is low.

- **What is the treatment for TURP syndrome?**

- Terminate surgery as quickly as possible and switch to normal saline for continuous bladder irrigation. Be sure that the irrigation is warm, as the bladder irrigation now should be to prevent the development of hypothermia.
- □Support ventilation as needed and obtain the following baseline laboratory tests: complete blood count, platelet count, electrolytes, and clotting studies if a bleeding problem is suspected. Prothrombin time and/or international normalized ratio (INR), partial thromboplastin time, and fibrinogen level should be included in the coagulopathy work-up.
- □Administration of intravenous normal saline and diuretics may be all that is needed to correct the problem. Administer injection furosemide, 20 mg, intravenously. If the patient is on chronic diuretics, a dose of 40 mg or more may be required, but dosing should be based on the diuresis obtained initially from 20 mg bolus. 15% Mannitol can also be used as an alternative to furosemide. Maintain intravascular volume with normal saline as diuresis progresses

- If the patient demonstrates significant effects from hyponatremia, intravenous administration of hypertonic saline may be appropriate. Restrict the use of hypertonic saline to patients who have developed central seizures or cardiac dysfunction.
- □Consider placement of a central venous catheter to guide fluid replacement during the immediate postoperative period.
- □If hemodynamic instability develops, consider placement of an arterial catheter and pulmonary artery catheter to aid in resuscitation.
- □Monitor the serum potassium level. Patients frequently become hypokalemic as diuresis occurs.
- □Reassure patients that any symptoms, especially visual changes, are only temporary and that their symptoms will dissipate as their condition improves.

- **What can be done to minimize the risk of developing TURP syndrome?**

- The patient must be prepared properly for surgery. Preparation should include adequate hydration, electrolyte analysis, and coagulation profile. Patients who are debilitated and demonstrate poor reserve benefit from the placement of hemodynamic monitors for preoperative assessment and treatment as well as for intraoperative monitoring.
- The most important step in minimizing the risk of TURP syndrome is to limit the duration of surgery. Because fluid can be absorbed at a rate greater than 50 mL/min, it is possible to place nearly 3 L of fluid into the intravascular and interstitial spaces within 1 hour of resection time. Limit resection time to 1 hour or less.
- The hydrostatic pressure created by the fluid irrigating the surgical site must be minimized. Because the irrigating fluid flows by gravity, the bag of irrigation should not hang higher than 60 cm above the operative field.
- □ The surgeon should limit the extent of bladder distention created by the irrigant. Frequent drainage of the bladder by the surgeon reduces the amount of irrigant absorbed. venous sinuses and preserves the capsule of the prostate.

- Hence operator experience plays major role in prevention of TURP syndrome.
- □ Blood pressure must be stable. A decrease in pressure lowers the periprostatic venous pressure and allows increased absorption of fluid.
- □ Intraprostatic vasopressin injection shown to reduce bleeding and absorption of irrigating fluid
- □ Use of Newer techniques like bipolar electrode resection and laser excision of prostate (Holmium:yttriumyttriumaluminum-garnet and potassium-titanyl-phosphate lasers) can minimize the risk of bleeding and also absorption of irrigating fluid, practically eliminating the risk of TURP syndrome.

- **What are the indications for a permanent pacemaker?**

- Artificial Pacemaker is indicated for treatment of symptomatic bradycardia of any origin. Indications of permanent pacemaker implantation are as follows:

1. Acquired Atrioventricular (AV) block:

A. Third degree AV block

B. Second degree AV block

2. □□ After Myocardial infarction:

3. □□ Bifascicular or Trifascicular block:

4. □□ Sinus node dysfunction:

5. □□ Hypertensive carotid sinus and neurocardiac syndromes:

- **What are the various types of pacemakers?**

- Pacemakers can be classified as per the method of insertion,
- location of leads, etc.
- □ Transvenous
- □ Transcutaneous
- □ Epicardial
- □ Transesophageal.

I Chamber Paced	II Chamber Sensing	III Response	IV Programmability	V Tachycardia
O- None	O- None	O- None	O- None	O- None
A- Atrium	A- Atrium	I- Inhibited	C- Communicating	P- Pacing
V- Ventricle	V- Ventricle	T- Triggered	P-Simple programmable	S-Shock
D- Dual (A+V)	D- Dual (A+V)	D- Dual (I+T)	M- Multiple programmable	D- Dual(P+S)
			R- Rate modulation	

- **How will you evaluate this patient preoperatively?**

- Preoperative evaluation includes
 - □□ *Detailed evaluation of the underlying cardiovascular disease* responsible for the insertion of pacemaker
 - □□ *Other associated medical problems*
- □□ The initial indication for the pacemaker:
- □□ Bruits, signs of CCF
- □□ Evaluation of Cardiac status
- □□ Evaluation of the pacemaker
- □ Investigations
 1. Routine biochemical and hematological investigations
 2. Measurement of serum electrolytes (especially K⁺)
 3. A 12 lead electrocardiogram:
 4. X-ray chest-(for visualization of continuity of leads).

- **Discuss Intraoperative monitoring for patients with pacemakers.**

- Continuous ECG monitoring is essential to monitor pacemaker functioning.
- The artifact filter on the ECG monitor should be disabled in order to detect the pacing spikes. In addition, mechanical evidence of the cardiac contraction should be monitored by palpation of the pulse, pulse oximetry, precordial stethoscope and arterial line, if indicated. Presence of pacemaker is not an indication for insertion of pulmonary artery (PA) or central venous catheter.
- If these are indicated, care should be taken during insertion of the guide wire or central venous catheter as they are potentially arrhythmogenic and can also dislodge pacemaker leads, especially in recently implanted CRMDs.

- During use of unipolar electrocautery the ECG is frequently unreliable because of interference. The best monitor to determine if pacemaker is functioning properly is a hand on the pulse.
- The precordial or esophageal stethoscope or pulse oximeter can also be used. Since these patients frequently have underlying cardiac dysfunction other parameters of perfusion should also be monitored. These include capillary refill, urine output, peripheral temperature, etc.

- **What would be your choice of anesthesia for this patient? What precautions will you take during anesthesia?**

- The anaesthetic technique should be used according to the need of the patient.
- One must remember that a paced heart cannot compensate for hypotension by tachycardia and hence spinal anesthesia should be used cautiously.

- *Intraoperative management in case of GA:* Both narcotics and inhalational techniques can be used safely.
- These anesthetic agents do not alter current and voltage thresholds of the pacemaker.
- Skeletal myopotentials commonly encountered with succinylcholine, myoclonic movements, or direct muscle stimulation can inhibit or trigger pacemaker and should be avoided.
- Avoid perioperative hypothermia as muscle activity caused by shivering may affect pacemaker functioning.
- Use of nondepolarizing muscle relaxants is safe. In induction agents etomidate and ketamine should be avoided as these can sometimes cause myoclonic movements.

- What is the caution that should be exercised during use of coagulation current in TURP?

- Coagulation current used during TURP procedure has no effect, but the cutting current at high frequencies (up to 2500 kc/sec) can suppress the output of a bipolar demand ventricular pacemaker.
- When electrosurgical unit (ESU) use is anticipated reprogramming of pacemaker preoperatively to the asynchronous (fixed rate) mode should be performed.