Post Operative Hypothermia following TURP procedure

Neil P. Ray, M.D.

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Daniel I. Sessler, M.D.

“Behavioral compensations are the most effective thermoregulatory response, and it is primarily behavioral defenses that allow humans to live and work in extreme environments.”
Perioperative Hypothermia

- Shivering and Thermal Discomfort
- Increased Cardiac Output
- Cardiac Arrhythmias
- Wound Infections
- Platelet Dysfunction and Bleeding
- Decreased Drug Metabolism
- Increased Hospital Stay
Uncontrolled Perioperative Hypothermia Following TURP

- 76-year-old Caucasian male for TURP
- 5'7" and weighed 135 pounds (61.4 kg's).
- PMHX: hypertension, benign prostate hypertrophy and glucose intolerance
- MEDS: Atenolol, Verapamil, and HCTZ
- Urinary Obstruction from BPH and a urine Foley catheter placed 4 weeks prior to the surgery.
Anesthetic Management

• Pre-induction Vitals: Temperature 98.6 (37.0 Celsius), HR 59, BP 131/59 and SpO2 99%.
• L4-L5 Spinal with 15 mg bupivacaine and 10 mcg fentanyl.
• Bilateral T8 dermatome level obtained.
• Lithotomy position + O₂ Face Mask at 4 Liters.
• Upper Body Bair Hugger® set at 43 Celsius
• Operating room thermostat was set to 22.2 (72.0)
Surgical Course

• 2.5 hours for the prostate resection

• 39 liters of 1.5 % room temp glycine irrigation used

• Blood loss was estimated to be 100 ml’s

• Patient received 1200 ml’s of room temp LR
PACU Course

- Temperature 96.5 (35.8 Celsius), HR 53, BP 137/43 and Spo2 100% on 4 liters O2

- Patient reported no thermal discomfort

- No evidence of shivering

- Motor Block Present in Lower Extremities
Post Operative Course

- Lower Body Bair Hugger Placed on Patient in PACU

- Pt regained euthermia as spinal wore off

- Pt discharged from hospital POD#2 without evidence of myocardial strain, increased post-operative bleeding or wound infection
Factors Contributing to Perioperative Hypothermia

• Inadequate Heat Loss Replacement

• Surgical Technique

• IV Fluids

• Spinal Anesthesia
Inadequate Heat Loss Replacement

• Our Pt’s Net Heat Loss 21 KCAL/HR

37°C - 35.8°C = 1.2°C
61.4 Kg *70% H_2O = 43 Liters H_2O
(43 L * 1.0 KCAL*C/L * 1.2°C) = 52 KCAL

52 KCAL over 2.5 HR = 21 KCAL/HR
Surgical Technique

- 39 liters of Gycline Solution Resulted in Heat Loss of 48.4 KCALS/HOUR
- Baseline Temp of Solution was 18.5°C
- Post-irrigation Temp of Solution was 21.6°C
- Temperature change of 3.1°C
- Specific Heat of Solution is 1.0 kcal*Celsius/ml
- Total Heat Loss (39 * 3.1 * 1.0 = 120.9 KCAL)
- Over 2.5 Hours (120.9/2.5) = 48.4 KCALS/HOUR
More on Hear Exchange

• 1 Liter of IV fluid at 20°C per Hour
  \[ 1 \text{ L} \times 1.0 \text{ KCAL/C/L} \times [37°C - 20°C] = 17 \text{ KCAL/HR} \]

• Air Humidification not clinically significant

• Upper Body Bair Hugger® delivers 100 KCALS/HR
Algebra 101

- Our Pt’s Net Heat Loss 21 KCAL/HR
- Heat Loss from Irrigation 48.4 KCALS/HOUR
- Heat Loss from IV fluids 9 KCAL/HR
- Heat Gain from Hugger® 100 KCAL/HR

+100 + -48.4 + -9.0 +??? = -21

Net Heat Loss of 64 KCAL/HR
Spinal Anesthesia

- Significant Heat Loss from Spinal
- No Bair Hugger® from T6 and below
- Vasoconstriction Inhibited from T8
- Patient unable to Sense Cold and actually Reported Feeling Warm
- Patient unable to Shiver
- Propofol and Opioids but not Versed impair thermal regulation
Consider other Warming Blankets

Torso Bair Warmer designed for tucked arms
Moral of Story

- Perioperative euthermia is a MUST!!!!!!
- Room Temp Irrigation Leads to Heat Loss
- Spinal Anesthesia is Preferred Technique for TURP but Leads to Heat Loss
- Combination of Spinal + Lithotomy Position leads to Unopposed Heat Loss with no ability to Compensate with Forced Air Convection.
REFERENCES


