PREVENTION OF HYPOTENSION AFTER SPINAL ANESTHESIA FOR TRANSURETHRAL RESECTION OF THE PROSTATE USING 6% HETASTARCH VERSUS LACTATED RINGER'S SOLUTION

Omar Momani MD, Mohammad Khasawneh MD***

ABSTRACT

Objective: To compare the use of 6% Hetastarch with Lactated ringer's solution for prevention of hypotension after spinal anesthesia for transurethral resection of the prostate.

Methods: In a randomized double blind study, 60 patients who underwent subarachnoid anesthesia for transurethral surgery were divided into two equal groups: group A were given Lactated ringer's solution and group B were given 6% Hetastarch. One thousand ml of Lactated ringer's solution for group A and 500 ml of 6% Hetastarch for group B was started to be administered intravenously to patients 10 minutes before the administration of the spinal anesthesia. Heart rate, blood pressure and oxygen saturation were recorded prior to, during and after surgery. Also the incidence of nausea and vomiting and the use of ephedrine were recorded.

Results: The incidence of hypotension was higher in group A (83%) than in group B (43 %). Systolic blood pressure < 90 mmHg occurred in 25 patients out of 30 who received Lactated ringer's solution compared to 13 patients who received Hetastarch. More patients required ephedrine to treat hypotension in group A than in group B. Nausea or vomiting was lower in group B also.

Conclusion: Six percent Hetastarch is superior to Lactated ringer's solution for prevention of hypotension after spinal anesthesia for transurethral resection of the prostate.

Key words: Transurethral resection of the prostate, Spinal anesthesia, Subarachnoid anesthesia, Hypotension, Lactated ringer's, Hetastarch

JRMS December 2008; 15(3): 26-28

Introduction

Transurethral surgeries are common surgical procedures performed under general or spinal anesthesia,[1,2] except for a small number of cases were local anesthesia is preferred. Spinal anesthesia has proved to be an excellent choice for such surgery.[3,4] Hypotension after spinal anesthesia remains a common and potentially serious complication, despite the use of prophylactic ephedrine and fluid loading with crystalloids.[5,6] Although, Mathru *et al.*[7] found that administration of Albumin (15ml/kg) prior to spinal anesthesia for cesarean section completely prevented hypotension. Albumin is not widely used for this purpose, perhaps because of its high cost. Other less expensive colloids are available and gelatin has

*From the Departments of Anesthesia, Prince Rashed Bin Al-Hassan Hospital, (PRHH), Irbid-Jordan
Correspondence should be addressed to Dr. O. Momani, P. O. Box 91 Eydoon, Irbid-Jordan, E-mail: omardr@yahoo.com
Manuscript received March 15, 2006. Accepted July 21, 2006

proved effective in decreasing the incidence of hypotension after spinal anesthesia for transurethral resection of the prostate (TURP).[8]

Hetastarch (average molecular weight 70000)[9] has a similar colloid oncotic pressure (34 mmHg) to that of serum (27mmHg) and should be as effective as albumin for the prevention of hypotension.[10] However, in studies comparing the effectiveness of Hetastarch and crystalloids before epidural or spinal anesthesia for cesarean section no difference was detected in the incidence of hypotension.[11,12] In this study we compared the efficacy of 6% Hetastarch (HES) with Lactated ringer's solution (LR) in prevention of hypotension when it is given before spinal anesthesia for TURP.

Methods

Sixty ASA I-III male patients were included in this study, which was equally divided into two groups, A and B, 30 patients each. Subjects were randomly assigned to receive either 1000 ml of LR or 500 ml of HES. All patients in both groups signed a written consent form. No patient had contraindication for spinal anesthesia. Upon arrival to the operating room, baseline measurements of heart rate (HR), systemic arterial pressure (SAP) and oxygen saturation were recorded. Intravenous (IV) access was assured for each patient and intravenous fluids initiated. The patient was placed in the sitting position and under strictly sterile conditions; a 23 gauge spinal needle was introduced into the subarachnoid space at the level of L 2-3 or L 3-4. Heavy 0.5% Bupivacaine 2.5-3ml was injected intrathecally. Patients were then turned to the supine position for 3-5 minutes and the height of the block was assessed. Meanwhile, HR, SAP, and oxygen saturation were monitored. When the sensory block reached T12 level patients were placed in the lithotomy position and surgery started. SAP was recorded at 3 minutes intervals at the onset of the block, 5 minutes intervals for the following 30 minutes, then 15 minutes intervals until the resolution of the block. Oxygen was administered for all patients via a face mask. Midazolam 1-3 mg was administered IV when patients request sedation. Hypotension was defined as SAP < 90 mmHg or 30% less than the baseline pressure.

Statistical analysis of the results was performed using the Student's t-test and the Chi-squared test. P value <0.05 was considered significant.

Techniques for Treatment of Hypotension were:

Trendelenburg position by 15 degrees, administration of IV fluids 500 ml of HES for group B or 1000ml of LR for group A and bolus doses of ephedrine 3-6 mgs as required. Metoclopromide 10 mg was administered IV stat to patients who developed nausea or vomiting.

Results

Patients in both groups were comparable in terms of age, height, and duration of surgery (45-70 minutes). Both groups had similar preinduction HR and SAP. However, after spinal anesthesia minimum SAP was significantly lower and maximum HR higher in the LR group A, also, hypotension occurred earlier in group A (LR) than group B (HES). The incidence of hypotension was higher in group A than in group B (83% vs. 43%) respectively. Group A (LR) required more doses of ephedrine indicating more episodes of hypotension. Summary of changes of HR and SAP and the anesthetic block are shown in Table I.

Table I. Summary of changes of heart rate, systemic arterial pressure and the anesthetic block

	Group B (HES)	**Group A (LR)**
-Block level at 5 mints	T5 – T7	T6-T8
-Block level at 10 mints	T4-T6	T5-T6
-Baseline systolic blood pressure (mmHg)	117±13	116±15
-Baseline heart rate (bpm)	80±10	84±12
-Minimum systolic blood pressure (mmHg)	93±12	85±12
-Maximum heart rate (bpm)	104±16	115±17
-Percentage of patients with hypotension	43%	83%
-Number of patients with hypotension	13	25
-Hypotension requiring Ephedrine	6	10
Bradycardia requiring Atropine	2	2

SAP decreased in both groups, hypotension occurred in 25 (83%) patients in group A compared to 13 (43%) patients in group B, the difference was significant ($p<0.05$). Immediate measures were taken to correct hypotension, ephedrine in bolus doses 3-6mg was administered to 10 patients in group A compared to 6 patients from group B in addition to increasing the rate of administration of the IV fluids were sufficient to correct the

hypotension. Six patients from group A and 3 patients from group B developed nausea 10-15 minutes after induction of the spinal anesthetic which was transient and the difference between the groups was not significant, Metoclopromide 10 mg was administered IV as a bolus dose for each patient. Two patients from each group became bradycardic of less than 50/minute which was corrected with atropine 0.3-0.6mg IV.

Discussion

Colloids were widely used for prevention of hypotension after spinal anesthesia for Cesarean section; this study was designed to determine whether the administration of 6% HES decrease the incidence and severity of hypotension after spinal anesthesia for TURP surgery.

We have demonstrated a significantly lower incidence of hypotension in patients who received 6% HES compared to those who received LR solution. This is consistent with the findings of others who have compared colloids and crystalloid fluid administration prior to spinal anesthesia. Mathru *et al.*[7] found no hypotension (defined as SAP less than 100 mmHg) when patients received 15ml/kg of 5% albumin prior to spinal anesthesia for cesarean section. In males having spinal anesthesia for transurethral resection of the prostate, Baraka *et al.*[8] reported 11% incidence of hypotension after administration of 7ml/kg of 3% gelatin compared with 52% after the same volume of crystalloid. In females having spinal anesthesia for postpartum tubal ligation, Sharma *et al.*[13] reported that patients given 500ml of HES had a 16% incidence of hypotension compared to a 52% incidence in patients given 1000ml of LR solution. A similar study, Riley *et al.*[14] compared 6% HES with lactated ringer's solution in females having spinal anesthesia for cesarean section; the incidence of hypotension was 35% in the HES group and 85% in the LR group.

Conclusion

Six percent HES despite its high cost is superior to LR solution for prevention of hypotension after spinal anesthesia for transurethral resection of the prostate.

References

1. **Lepage JY, Rivault O, Karam G, *et al*.** Anesthesia and prostate surgery. *Ann Fr Anesth Reanim* 2005; 24: 397-411.
2. **Erhan E, Ugur G, Anadolu O, *et al*.** General anaesthesia or spinal anaesthesia for outpatient urological surgery. *Eur J Anaesthesiol* 2003; 20: 647-652.
3. **Shreideh ZF, Kelani MT, Ajlouni SM.** Spinal anesthesia for transurethral surgery. A comparative study between heavy bupivacaine 0.5% and lignocaine plus low dose fentanyl. *JRMS* 2002; 9: 43-46.
4. **Kararmaz A, Kaya S, Turhanoglu S, Ozyilmaz MA.** Low dose bupivacaine-fentanyl spinal anaesthesia for transurethral prostatectomy. *Anaesthesia* 2003; 58: 526-30.
5. **Hartmann B, Junger A, Klasen J, *et al*.** The incidence and risk factors for hypotension after spinal anesthesia induction: an analysis with automated data collection. *Anesth Analg* 2002; 94: 1521-1529.
6. **Burns SM, Cowan CM, Wilkes RG.** Prevention and management of hypotension during spinal anaesthesia for elective Caesarean section: a survey of practice. ***Anaesthesia*** 2001; 56: 794-798.
7. **Mathru M, Rao TL, Kartha RK, *et al*.** Intravenous albumin administration for prevention of spinal hypotension during cesarean section. *Anesth Analg* 1980; 59: 655-658.
8. **Baraka AS, Taha SK, Ghabach MB, *et al*.** intravascular administration of polymerized gelatin versus isotonic saline for prevention of spinal–induced hypotension. *Anesth Analg* 1994; 78: 301-305.
9. **Prough DS, Kramer G.** Medium starch, please. *Anesth Analg* 1994; 79: 1034-1035.
10. **Tonnessen T, Tollofsrud S, Kongsgaard UE, Noddeland H.** Colloid osmotic pressure of plasma replacement fluids. *Acta Anaesthesiol Scand* 1993; 37: 424-426.
11. **Yokoyama N, Nishikawa K, Saito Y, *et al*.** Comparison of the effects of colloid and crystalloid solution for volume preloading on maternal hemodynamics and neonatal outcome in spinal anesthesia for cesarean section. *Masui* 2004; 53: 1019-1024.
12. **Karinen J, Rasanen J, Paavilainen T, *et al*.** Uteroplacental and fetal haemodynamics and cardiac function of the fetus and newborn after crystalloid and colloid preloading for extradural Caesarean section anaesthesia. *British Journal of Anaesthesia* 1994; 73: 751-757.
13. **Sharma SK, Gajraj NM, Sidawi JE.** Prevention of hypotension during spinal anesthesia: A comparison of intravascular administration of hetastarch versus lactated ringer's solution. *Anesth Analg* 1997; 84: 111-114.
14. **Riley ET, Cohen SE, Rubenstein AJ, Flanagan B.** Prevention of hypotension after spinal anesthesia for Cesarean Section: six percent hetastarch versus lactated ringer's solution. *Anesth Analg* 1995; 81: 838-842.