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Incidence, clinical manifestations and outcome of TUR (transurethral resection) syndrome in patients undergoing TURP under spinal anaesthesia: results from clinical observations in a cohort of 50 patients at a tertiary care centre in North India

Christina George¹, Parvez David Haque^{2*}, Kim J. Mammen³

¹Department of Anesthesiology, ²Department of Surgery, ³Department of Urology, Christian Medical College and Hospital, Brown road, Ludhiana, Punjab, India

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*Correspondence:

Dr. Parvez David Haque, E-mail: pdhaque@gmail.com

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ABSTRACT

Background: 'TUR syndrome' is clinically detectable in 2% of patients undergoing an otherwise safe operation. Currently, spinal anaesthesia is the most widely anaesthetic technique for TURP as it is easier to detect signs of TUR syndrome in an awake patient. This study aimed at looking at the clinical spectrum and outcomes of TUR syndrome in patients undergoing TURP under spinal anaesthesia.

Methods: This clinical study was conducted over a period of 6 months in the departments of anesthesiology and urology at the Christian medical college and hospital Ludhiana in a cohort of 50 male patients electively admitted for TURP under spinal block belonging to ASA I or II groups. Patients received intermittent irrigation with 1.5% glycine, and monitored for TUR symptoms and electrolyte estimations perioperatively.

Results: In our study the incidence of TURP syndrome was 10 %. Under spinal block clinical manifestations along with serum sodium values monitored perioperatively helped diagnose and manage the patients. All patients successfully completed resection, with no mortality related to TURP syndrome.

Conclusions: In patients undergoing transurethral resection of prostate under spinal anaesthesia, monitoring clinical symptoms for the rare TURP syndrome and additional serum sodium levels act as an adjunct in diagnosis. In both situations diagnosis and early intervention prevents extreme neurological symptoms and reduces mortality.

Keywords: Spinal anesthesia, TURP (Transurethral resection of prostate), TUR (transurethral resection) syndrome

INTRODUCTION

Transurethral resection of the prostate (TURP) remains the surgical gold standard for the treatment of benign prostatic hyperplasia. 'TURP syndrome' complicating the procedure of transurethral resection of the prostate (TURP) is due to absorption of irrigation fluid and clinically detectable TURP syndrome occurs in 2% (range 2-10%) of patients undergoing an otherwise safe operation.1 TUR syndrome is a term applied to a constellation of symptoms and signs ranging from nausea, vomiting, apprehension, disorientation and visual disturbances to the extreme neurological symptoms associated with large volumes of fluid absorption including stupor, seizures, or coma.

A conscious patient under spinal anesthesia may report seeing flashing lights or other visual disturbances. Facial warmth and prickling sensations are also early signs of fluid absorption. Fluid overload presents with signs of the subsequent pulmonary edema and heart failure. Patients initially develop hypertension, dyspnea, chest pain and cyanosis. Rapid absorption of large volumes of glycine can lead to reflex bradycardia and marked decrease in systolic arterial pressure. The latter are likely to require an admission to intensive care. Severe TUR syndrome is rare; however, it carries a mortality risk of up to 25%.

Anaesthetists must be aware of these symptoms in order to promptly diagnose this syndrome. This is facilitated by the use of spinal anesthesia. Currently, spinal anaesthesia is the most widely anaesthetic technique for TURP as in theory it is easier to detect signs of fluid overload and neurological symptoms in an alert and awake patient.²

This present clinical study aimed at looking at the incidence, clinical manifestations and outcomes of TUR syndrome in patients undergoing TURP under spinal anaesthesia.

METHODS

This prospective clinical study was conducted over a period of 6 months in the departments of anesthesiology and urology at the Christian medical college and hospital Ludhiana in a cohort of 50 patients undergoing TURP (November 2004 to May 2005). Research and ethics approval were taken prior to initiation of the study. Informed consent was taken from all patients. Male patients in the age group 60, electively admitted for transurethral resection of prostate and belonging to ASA I or II were included.

Procedure was conducted under spinal block (levels L3-L4 or L2-L3 intervertebral spaces) using a spinal needle injecting 0.5% heavy sensocaine (2-3ml). Patients received intermittent irrigation with 1.5% glycine, irrigation fluid container, kept at a height of 50cm for all patients. With initiation of resection, patients were closely monitored for TUR symptoms, signs and vitals at 1,3,5,10,20,30,40,50,60-minute intervals and electrolyte estimations (serum sodium and potassium) were sent at 30mins intervals till resection was completed and one hour in the postoperative period.

During the monitoring for signs of TUR syndrome electrolytes (serum sodium and potassium) were estimated every 30 minutes from the time the resection started till 1 hour after it finished. Any intraoperative signs and symptoms of TUR syndrome, viz. nausea, chest pain, blurring of vision and breathlessness were looked for and recorded.

Injection Frusemide was given, whenever the resection time exceeded 1 hour or when symptoms suggestive of intravascular absorption appeared. The time when the resectoscope was inserted and resection started was noted as the resection time. Similarly, the total time consumed from the insertion of the cystoscope till the end of the resection and insertion of catheter was noted as the

operating time. Postoperative care and vigilant monitoring of pulse rate, blood pressure and oxygen saturation was done every 15 minutes for 1 hour and then 1 hourly for 24 hours, Neurological and cardiovascular symptoms were specifically looked for.

All results were compiled and analyzed statistically using chi-square test, student 't' test and Pearson's correlation coefficient 'r'.

RESULTS

In the study group of 50 patients (Table 1), the mean age was 69.36 years±8.18 SD; range 60 88 years, majority of the patients (13 versus 37, 26% versus 74%) belonged to ASA II category.

Carcinoma prostate was the histological diagnosis in 7 patients (14%), benign prostatic hyperplasia (BPH) was the histological diagnosis in the majority, 43 patients (86%).

Table 1: Demographics of the study group of 50 patients undergoing TURP.

		ASA	categor	y Aetiol	ogy
Age		I	II	BPH	CA prostate
		(n :	= 50)	(1	n = 50
Mean	69.36±8.8	13	37	43	7
Range	60-88 yrs	26%	74%	86%	14%

The mean heart rate at the beginning of resection was 78.08±14.39beats per minute (bpm) (Table 2), with a range of 48-130 bpm. Subsequently, the mean heart rate decreased and continued to stay below the initial level until at 40 minutes from spinal block, the mean heart rate increased to 82.67±17.63bpm. Heart rate stayed higher than the mean baseline value at all intervals of the recovery period. Similarly mean SBP immediately post spinal block was 127.80±12.98mm Hg, with a range of 110-150mm Hg.

Thereafter mean systolic blood pressure decreased to 116.60mm Hg at 1 minute, and continued to be lower than the baseline value throughout the period of surgery, being lowest at 50 minutes (105.0mm Hg). At 15 minutes of recovery the mean SBP was 121.54±15.42mm Hg. SBP continued to be higher in the recovery period, with the maximum value at 60 minutes of recovery (123.61±10.67mm Hg). The decrease in SBP from the mean baseline value was found to be statistically significant from the 1st minute to the 30th minute intraoperative (p<0.05) and highly significant at the 40th minute intra-operative (p<0.01). Mean oxygen saturation at time 0 min was 99.90±0.31%, with a range of 99-100%, saturation readings showed minimal fall at all times of measurement, lowest being 98.80%. Nausea, an early sign of irrigation fluid absorption, was seen in 3 patients (6%), Inj. Frusemide was given to all the 3 patients. Dyspnea was seen in 1 patient (2%) intraoperatively, ECG revealed no ischemic changes and this symptom was self-limiting, resolved after 20 min, patient was administered injection frusemide. One patient (2%) however had chest pain intraoperatively, ECG revealed ischemic changes, resection was stopped, Tab sorbitrate along with inj frusemide was given and patient was shifted to I.C.C.U. for further management (Table 3).

Table 2: Heart rate and systolic blood pressure (SBP) readings during the procedure in the study group.

Time from spinal block						Time in recovery				
	0	5	20	30	40	60	15	30	45	60
Heart rate range	48-130	59-125	57-129	56-120	60-118	-	62-120	64-106	68-100	66-96
Mean	78.08	76.04	76.18	75.51	82.67*	-	79.43	80.23	80.67	81.55
SD	14.39	15.27	14.05	14.43	17.63	-	14.54	15.21	14.79	14.01
P-value	-	>0.10	>0.10	>0.10	>0.10	-	>0.10	>0.10	>0.10	>0.10
SBP range	110-150	90-150	100-142	100-130	100- 120	-	100-175	100-154	98-146	100-144
Mean	127.80	108.96	107.84	106.29	105.56	-	121.54	122.38	122.51	123.61
SD	12.98	12.75	11.19	19.42	7.26	-	15.42	8.64	12.94	10.67
P-value	-	< 0.05	< 0.05	< 0.05	< 0.01	-	< 0.10	>0.10	>0.10	>0.10

Significant change in the blood pressure recorded during the procedure (P value <0.05, <0.01) at 30 and 40 minutes

Table 3: Patients identified to have TURP syndrome.

Diagnostic criteria	No. of patients (%)
Hyponatremia	3 (6%)
Symptoms/manifestations	
Nausea	5 (10%)
Dyspnea	3 (6%)
Chest pain with	1 (2%)
ECG changes	1 (2%)
Injection frusemide administration***	5 (10%)
Resection discontinued	5 (10%)
TURP syndrome	5 (10%)

None of the patients had extreme neurological symptoms of loss of consciousness, headache, seizures or dizziness. For all symptomatic patients' resection was stopped temporarily or completely depending on the persistence of a symptom.

The mean preoperative serum sodium was 137.84±3.69mEq/L (range of 131-149 mEq/L), intraoperative serum sodium at 30 minutes had a mean level of 134.38mEq/L±15.47 SD and mean post-operative serum sodium levels were 135.38±4.87 mEq/L (range 119-146). 3 patients (6%) were found to have hyponatremia. Hyponatremia was defined as a fall in post-operative serum sodium readings from its preoperative values, with the post-operative serum sodium value being less than 135 mEq/L.

The mean preoperative serum potassium was 4.04 ± 0.44 mEq/L (range of 3.1-5.5mEq/L), intra-operatively potassium levels at 30 minutes showed a decrease from their pre-operative values, being 3.93 mEq at 30 minutes

(Table 4). 5 patients (10%) received Inj. Frusemide, as TURP syndrome was suspected in view of signs and symptoms and or documented hyponatremia.

In these 5 patients (10%) resection was temporarily discontinued, 3 out of the 4 patients in whom TURP syndrome was detected, the mean decrease in serum sodium was 5.24±9.11mEq/L (Table 4 and 5).

Table 4: Correlation of symptoms and serum Na⁺ values (mEq/l) in patients administered Inj frusemide to treat TURP.

Subject	Symptom	Preop Na ⁺ (meq/l)	30min Na ⁺ (meq//l)	Postop Na ⁺ (meq/ll)
11	Nausea	136	125	142
13	Nausea	136	130	119
29	Dyspnea	137	129	123
35	Nausea	132	131	121
36	ECG change	131	130	135

Table 5: Serum Sodium (mEq/L) levels during resection.

Serum- Na ⁺ (mEq/l)	Pre-op	30min	60min	Postop
Mean	137.84	134.38	-	135.38
Range	131-149	128-146	-	119-146
SD	3.69	15.47	-	4.87

The mean resection time was 20.84±7.14 minutes (range of 10-45 minutes), while operating time was 31±7.14 minutes (range 20-55 minutes), not reaching or exceeding 60 minutes (Table 6). There was no mortality in the

cohort of patients on follow up till discharge from the hospital.

Table 6: Resecting and operating times in patient cohort.

	Mean	SD	Range
Resection time*(minutes)	20.84	7.14	10-45
Operating time (minutes)	31.00	7.14	20-55

DISCUSSION

BPH (Incidence about 0-1.1%) is the most common benign enlargement of the prostate causing symptomatic obstruction of the bladder outflow in men older than 60 years of age. Transurethral resection of the prostate (TURP) surgical procedure performed for the same requires irrigation of closed body spaces which lead to perioperative fluid and electrolyte shifts. During TURP, the wide plexus of venous sinuses opens up and the absorption of the irrigation fluid causes a group of symptoms and findings that is called TURP syndrome.^{1,2} Absorption of the irrigation fluid (2000 ml or more) may lead to TURP syndrome which causes headaches, anxiety, confusion, dyspnoea, arrhythmia, hypotension and seizures and can be fatal if not treated. The symptoms of TURP are generally caused by an excessive fluid load in circulation.3,4

Major risk factors for TURP syndrome include the size of the opened venous sinuses, the amount of the irrigation fluid used, using excess amounts of hypotonic intravenous fluids and most importantly, the duration of the resection. The risk is increased if the duration of the resection is longer than 60 min (10-30ml/min rate of irrigation fluid absorption). Mild-to moderate TURP syndrome may occur in 1-8% of patients, overall mortality is 0.2-0.8%. and may present as early as 15 min after resection starts or as late as 24 h after operation. Severe TURP syndrome is now rare; however, it carries a mortality of up to 25%.5 Excessive absorption of the irrigation solutions used during TURP, which are highly hypotonic leads to dilutional hyponatremia, hypoosmolality resulting in severe neurological symptoms manifesting at serum sodium concentrations below 120 mmol/1.6-9

In a conscious and alert patient under spinal anaesthesia, clinical manifestations like nausea, vomiting, confusion and irritability can easily be noticed and may be the first sign of TURP syndrome and bladder perforation. Early changes may also manifest related to the cardiorespiratory system and include decreased oxygen saturation and ECG changes. ¹⁰ Early diagnosis is the keystone in the treatment of TURP syndrome. The treatment must be arranged according to the severity of the symptoms. First, the absorbed water must be eliminated, resection withheld temporarily or completely, hypoxaemia and hypoperfusion must be prevented. Loop

diuretics such as furosemide are used to eliminate excess fluid. 11,12

In present cohort of 50 patients, the incidence of TURP syndrome was 10% (5 patients). Clinical manifestations, which were mild along with serum sodium values monitored perioperatively helped us diagnose and manage the patients with injectable frusemide and temporarily withholding resection; resection and operating time not exceeding 60 min. Regional anaesthesia gave us the advantage of clinical manifestations being monitored easily in an alert patient. All patients successfully completed resection, with no mortality related to TURP syndrome.

CONCLUSION

In patients undergoing transurethral resection of prostate under spinal anaesthesia, monitoring clinical symptoms for the rare TURP syndrome, including nausea, vomiting, confusion and irritability can easily be diagnosed. Monitoring serum sodium levels act as an adjunct in those with manifestations or the asymptomatic patient, in whom the irrigation fluid absorption leads to hyponatremia; in both situations diagnosis and early intervention prevents extreme neurological symptoms and reduces mortality.

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Institutional Ethics Committee

REFERENCES

- 1. Okeke AA, Lodge R, Hinchliffe A, Walker A, Dickerson D, Gillatt DA. Ethanol-glycine irrigating fluid for transurethral resection of the prostate in practice. Br J Urol. 2000;86:43-6.
- 2. McGowan-Smyth S, Vasdev N, Gowrie-Mohan S. Spinal anesthesia facilitates the early recognition of TUR syndrome. Current Urol. 2016;9(2):57-61.
- 3. O'Donnell AM. Anaesthesia for transurethral resection of the prostate. Continuing Educ Anaesth Crit Care Pain. 2009;9:92-6.
- 4. Gravenstein D. Transurethral resection of the prostate (TURP) syndrome: a review of the pathophysiology and management. Anesth Analg. 1997;84:438-46.
- 5. Mebust WK, Holtgrewe HL, Cockett AT, Peters PC. Transurethral prostatectomy: immediate and postoperative complications: operative study 13 participating institutions evaluating 3885 patients. J Urol. 1989;142:243-7.
- 6. Rassweiler J, Teber D, Kuntz R, Hofmann R. Complications of transurethral resection of prostate (TURP)-incidence, management, and prevention. Eur Urol. 2006;50:969-80.
- 7. Rao PN. Fluid absorption during urological endoscopy. Br J Urol. 1987;60:93-9.

- Clemente RL, Ramasco RF, Platas SA, Archilla EJ, Romero CI, Corbacho FC, et al. Reabsorption syndrome after transurethral resection (TUR) of the prostate: review of physiologic, diagnostic, and therapeutic features. Actas Urol Esp. 2001;25:14-31.
- 9. Gray RA, Lynch C, Hehir M, Worsley M. Intravesical pressure and the TUR syndrome. Anaesthesia. 2001;56:461-5.
- 10. Hahn RG. The volumetric fluid balance as a measure of fluid absorption during transurethral resection of the prostate. Eur J Anaesthesiol. 2000;17:559-65.
- 11. Hahn RG, Essén P. ECG and cardiac enzymes after glycine absorption in transurethral prostatic resection. Acta Anaesthesiol Scand. 1994;38:550-6.

12. Demirel I, Ozer AB, Bayar MK, Erhan OL. TURP syndrome and severe hyponatremia under general anaesthesia. BMJ Case Reports; 2012.

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