COMPARISON OF INTRAOPERATIVE SAFETY OF BIPOLAR VERSUS MONOPOLAR TRANSURETHRAL RESECTION OF BLADDER TUMOR (TURBT) IN TERMS OF OBTURATOR NERVE REFLEX (ONR) AND BLADDER PERFORATION

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ABSTRACT

Cystoscopy and transurethral resection of bladder tumor (TURBT) is mainstay surgical treatment for initial diagnosis and evaluation of extent of tumor into detrusor muscle for staging.TURBT is performed with monopolar cautery system. The close proximity of obturator nerve in inferio-lateral wall of bladder poses significant danger during resection of laterally placed bladder tumor as electric current can easily stimulate the nerve and cause adductor reflex. Obturator nerve reflex (ONR) at times causes grave intraoperative complications in terms of bladder wall perforation, excessive bleeding, resection abandonment and thus incomplete resection and longer hospital stay.

Objectives: To compare bipolar versus monopolar transurethral resection of bladder tumor in term of obturator nerve reflex and jerk related perforation.

Material and Methods: This randomized control trail was performed at institute of kidneys diseases from January 2013 to January 2014. Total of 100 patients randomized into monopolar and bipolar transurethral resection of bladder tumor. Intraoperative parameters of active obturator jerk (ONR) and jerk related perforations in two groups were analyzed.

Results: Total of 100 resections done during Jan 2013 to Jan 2014, were randomized into two groups. The mean age of patients in group 1 (B-TURBT) 58 years, while mean age in group 2 (M-TURBT) was 59 years. In bipolar TURBT group only 4 patients had active obturator nerve reflex while 46resections were event less .On other hand active obturator reflex was observed in 14(28%) patient in monopolar TURBT group, while no such jerk observed in 36patients while doing resection on lateral bladder wall in monopolar group. Obturator jerk related perforation necessitating abandonment of procedure happened in 4 patients in M-TURBT group.

Conclusion: Bipolar transurethral resection of bladder tumor is associated with lower incidence of obturator reflex and jerk related bladder perforation compared to monopolar resection.

Key words: Trans Urethral Resection Of Bladder Tumor (TURBT), Obturator Nerve Reflex (ONR)Bipolar

INTRODUCTION

Bladder tumor is most common urinary tract malignancy with estimated 40,000 new cases diagnosed and 10,000 deaths each year in United States[1]. Cystoscopy and transurethral resection of bladder tumor (TURBT) is mainstay surgical treatment for initial diagnosis and evaluation of extent of tumor into detrusor muscle for staging.

Since its inception TURBT is performed with monopolar cautery system[2]. The close proximity of obturator nerve in inferio-lateral wall of bladder poses significant danger during resection of laterally placed bladder tumor as electric current can easily stimulate the nerve and cause adductor reflex[3]. Obturator nerve reflex (ONR) at times causes grave intraoperative complications in terms of bladder wall perforation, excessive bleeding, resection abandonment and thus incomplete resection and longer hospital stay[3].

There have been several published reports of bladder perforation during TURBT, however the numbers of such incident are far less than we face in clinical practice, particularly for laterally placed tumors.[5,6]

As TURBT is usually performed under spinal anesthesia, some sort of obturator nerve block is required for resection of laterally placed tumor to avoid above mentioned complications[3]. This has on its own added morbidity.[6]

One of much recent advancement in field of urology is incorporation of bipolar technology for transurethral resection[8]. In bipolar system, the electric circuitry is confined into resectoscopic sheet, thus obviating the need for passage of current through body[2]. These innovative systems also avoid need of non-conductive irrigating fluid and allow resection to be performed in presence of normal saline[9].

The theoretical advantage closed circuitry of bipo-

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lar system is claimed to reduce events obturator nerve stimulation and bladder perforation[7] and thus obviating need of separate obturator nerve block while resecting laterally located tumors during transurethral resection under spinal anesthesia.

We want to establish this proclaimed superiority of bipolar TURBT in avoiding ONR and ONR related bladder perforation through randomized control trail.

MATERIAL AND METHODS

Settings: Institute of Kidneys Disease, Hayatabad Medical Complex Peshawar.

Study design: Randomized control trial

Duration of study: Jan 2013 to Jan 2014

Sample size: total 100 patients who underwent TURBT for bladder tumor who fulfilled inclusion criteria were analyzed.

Sampling method: (Consecutive) Non probability sampling

Inclusion criteria

All patients aged 45 to 60 who present to inpatient department, who are candidate for TURBT, having laterally placed tumor primary tumor were includedin study.

Exclusion criteria

Previous history of prostatic surgery (open or transurethral). Patient with prior history of TURBT and primary tumor located elsewhere in bladder than lateral wall. American Society of Anesthesiology (ASA) class > III, patients requiring anticoagulation. Patient with known compromised renal, cardiac or pulmonary function, DM or uncontrolled hypertension. Patient who refuse to participate in study. All above are confounders and had made the study results biased if included.

DATA COLLECTION PROCEDURE

After approval from hospital ethical committee, all patients presenting to in-patient department of institute of kidney disease, fulfilling the inclusion criteria was selected for study. History and examination basic and relevant investigations including cystoscopy were done. Exclusion criteria had applied to select patients for study.

Informed consent was taken from patient. Patient would be randomly segregated into two groups on lottery method and was enrolled for either Bipolar or Monopolar TURBT. Patients in group A underwent Monopolar TURBT. Patients in group B underwent Bipolar TURBT.

Monopolar TURBT was performed with Storz, 24 charriere resectoscope, using ERBE 350 generator, set at 120/50W (cutting/coagulation) and 1.5% glycine was used as irrigant.

Bipolar TURBT was performed with Olympus TURis system, using UES 40 generator set at 260/100 W (cutting/coagulation) and 24 charriere resectoscope. 0.9% normal saline was used as irrigant.

The operative procedure was performed by single group of surgeons who have at least three year experience in doing TURBT at institute of kidneys diseases under spinal anesthesia. 250ml of N/saline and prophylactic antibiotic was infused to all patients at induction of anesthesia. Obturator nerve blockade was not performed in any patient. For each patient age, gender tumor size, location, stage, grade, presence of obturator jerkand jerk related bladder perforation were noted in OT room. Jerk related perforation was defined as visible perivesical fats or excessive bleeding necessitating abandonment of procedure.Patients were followed in recovery till discharge from facility and availability of histological report. All the information was collected on structured proforma

DATA ANALYSIS

All data collected was entered in SPSS Version 13 for windows. Mean + standard deviation was calculated for quantitative variables. Frequency and percentage were calculated for categorical variables. The chi square test was used to evaluate the results between each group. P valve of <0.05 was considered statistically significant. All the results were presented as tables.

RESULTS

Total of 100 resectionsdone during Jan 2013 to Jan 2014, were randomized into two groups on lottery methods. The mean age of patients in group 1 (B-TURBT) 58 year with standard deviation of$\pm$ 7.212, while mean age in group 2 (M-TURBT) was 59 years with standard deviation of $\pm$ 7.212 years. Amongall, bulk of patient were male that is 40 (80%) in bipolar group and 44(88%) in monopolar group, while 10 (20%) were female in bipolar and 6(12%) were female in monopolar group. There was no significant difference among two groups as far age and gender distribution was concerned.

As far as tumor stage was concerned 20 (40%) patients in bipolar was having TA stage while 30(60%) patients were having T1 stage. Similarly 18(36%) patients were having TA and 32(64%) patients were having T1 stage in monopolar group respectively. These stage distribution among two group was not statistically significant with p value >0.05.

Histological report confirmed that 28(56%) patients in bipolar group had low grade (G1) and 22(44%) had high grade (G3) tumor. On other hand in monopolar group 26(52%) patient were having G1 tumor and 24(48%) had G3 tumor. This distribution of grade of

Table. 1 Patient characteristics

		B-TURBT*	M-TURBT#	P valve
No. of patients		50	50	0.000
Mean age /SD		58 years ± 7.06	59 years ±7.212	0.242
Sex				0.275
	No. Male	40(80%)	44(88%)	
	No. Female	10(20%)	6(12%)	
Tumor stage				0.680
	TA	20(40%)	18(36%)	
	T1	30(60%)	32(64%)	
Tumor Grade				0.688
	G1	28 (56%)	26(52%)	
	G3	22 (44%)	24(48%)	

* B-TURBT Bipolar transurethral resection of prostate
# M-TURBTMonopolar transurethral resection of prostate

Table. 2 Perioperative parameters

		B-TURBT*	M-TURBT#	P-Value
Obturator reflex				0.00924
	Yes	4(8%)	14(28%)	
	No	46(92%)	36(72%)	
Perforation/Excessive bleed				0.041
	Yes	0(0%)	4(8%)	
	No	50(100%)	46(92%)	

* B-TURBTBipolar transurethral resection of prostate
# M-TURBTMonopolar transurethral resection of prostate

tumor among two group was also not significant p value=0.688

The numbers of active obturator nerve reflex (ONR) were compared between two groups. In bipolar TURBT group only 4 (8%) patients had active obturator nerve reflex while 46(92%) resection were event less. On other hand active obturator reflex was observed in 14(28%) patient in monopolar TURBT group,while no such jerk observed in 36(72%) patients while doing resection on lateral bladder wall in monopolar group.

Also events of jerk related bladder perforation or excessive bleedingnecessitatingabandonment of procedureswas compared among two groups. Not a single such event was observed in bipolar group among all fifty resections. While 4(8%) patients had major jerk related perforation of bladder in monopolar group. When these two parameters were analyzed, there was statistically significant difference between two groups in terms of active obturator jerks and jerk related bladder perforation with p valve of 0.009 and 0.041respectively. The full data is shown in table 1 and 2.

DISCUSSION

Transurethral resection of bladder tumor (TURBT) is gold standard for diagnosis and treatment of non-muscle invasive bladder cancer (NMIBC). The aim of initial resection is to remove all visible tumors along with deep biopsy of muscle wall of bladder to know histological type and vertical extension of tumor. Conventionally TURBT is performed with monopolar cautery system.

Conventional monopolar system consists of active cutting loop and passive electrode placed under patient buttock, and the current has to pass a large distance to get diffuse in passive electrode. This passage of current inside body may sometime cause stimulation non related neighboring structure in close vicinity of bladder. Obturator nerve by virtue of its close proximity to lateral bladder wall is always prone to such stimulation, causing sudden contraction of medial muscle of thigh.[10] the resulting obturator nerve reflex may lead to severe complication; at worstto a perforation of bladder wall.

To avoid this complication, an obturator nerve block is performed preoperatively and this is especially important for tumor located on lateral wall[1,4,10]. However nerve block is not always perfect and increase time and cost of procedure[6].

Bipolar in new innovation in treatment bladder tumor where active and passive electrode are both inside the resectingsheet. This closed circuitry avoid passage of current into neighboring structure. BipolarTURP has already acquired popularity among urologist. We wanted to check safety of this modification for resection of bladder tumors. However there is limited number of studies about bipolar TURBT and proposedtheoretical superiority of bipolar TURBT in terms of obturator nerve reflex is not widely validated with mixed result from many studies.

Mansour A,etal[11] in randomized control trail analyzed 311 resections and intra and perioperative parameters were analyzed, including bladder perforation and active obturator nerve reflex. The incidence of bladder perforation was 13.2% in monopolar and 2.4% in bipolar group ($p=0.02$) similarly, obturator reflex occurred more frequently in monopolar group (26.5% versus 4.8% $p=0.01$).

Ibrahim Y et al reported comparison of 34 TURBTs from turkey also claimed that bipolar TURBT is safer in terms of perioperative parameters including bladder perforation and obturator nerve reflex as compared to monopolar TURBT.

Sugihara t and et al[12] used nationwide population based data to compare perioperative outcome, including severe bladder injury, between monopolar and bipolar TURBT and generated 8,188 matched pairs for two groups. He found that bipolar resection was associated with significantly lower incidence of bladder injury (0.3% versus 0.6%) and other complications. This study clearly establishes superiority of bipolar TURBT.

In our study we observed that monopolar energy activate obturator nerve more frequently as compared to bipolar cautery system. As obturator jerk happen in blink of second, unwanted perforation can happen due to jerk. Among 8 perforations in monopolar group 2 were severe enough necessitating open repair and placement of drain. Unwanted complications during TURBT increase hospital stay and cost of procedure along with much needed post-operativemitomycin skipping in majority of cases.

CONCLUSION

Bipolar transurethral resection of bladder tumor is associated with lower incidence of obturator nervereflex (ONR) and reflex related bladder perforation compared to monopolar resection. These findings support the benefits of bipolar over monopolar resection in management of laterally located bladder tumor.

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