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ORIGINAL ARTICLE

Transurethral Resection Versus En-Block Ho-Yag Laser Enucleation for Papillary Bladder Cancer : Prospective Randomized Study

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ABSTRACT

Objectives: to compare between transurethral en-block Ho-yag laser enucleation and transurethral resection for papillary bladder cancer.

Methods: this is a prospective randomized study, carried out at urology department, zagazig university hospitals during the period from 15/7/2017 to 15/2/2018. Aimed to compare between laser en-block enucleation and transurethral resection for papillary bladder cancer as regard intraoperative outcomes (perforation, obturator jerk and bleeding) and post-operative outcomes (wash time, catheter time, hospital stay and blood transfusion).

Results: we studied 52 patients randomized in two groups, group for Ho-yag laser en-block enucleation and group for monopolar TURBT. We found that Ho-Yag laser was superior to TURBT in term of intraoperative complications and postoperative.

Conclusions: Laser enucleation appear to be reliable procedure with many advantages over monopolar TURBT, despite it need longer resection time, it reduces intra-operative complications and post-operative complications, it allow to remove the tumour completely from tumor's bed so decrease the probability of local persistence of malignant tissue.

Key words: comparison between Ho-yag laser en-block enucleation and monopolar TURBT in NMIBC

INTRODUCTION

The most prevalent cancer of the urinary tract is tumor of the urinary bladder. It includes a broad range of histological heterogeneous tumor types arising mostly from the urothelium lining of the urinary bladder and ureters, including bladder transitional cell carcinoma (BTCC), squamous cell carcinoma, adenocarcinoma, and other less frequent lesions. More than 90% of the bladder tumors are diagnosed as BTCC and the majority of BTCC (70%) are recognized as papillary bladder cancer. (Stage pTa, T1) [1]. Cystoscopy is recommended in all patients with symptoms suggestive of Bladder Cancer. It cannot be replaced by cytology or by any other non-invasive test [2]. Cystoscopy combined with urine cytology is routinely used for the diagnosis of BTCCs [3]. The goal of TURBT in Ta, T1 Bladder Cancer is to make the

correct diagnosis and completely remove all visible lesions. It is a crucial procedure in the diagnosis and treatment of Bladder cancer. TURBT should be performed systematically in individual steps. The strategy of resection depends on the size of the lesion. Separate resection of larger tumors provides good information about the vertical and horizontal extent of the tumor and helps to improve resection completeness [4].

PATIENT AND METHOD

1) Technical design:

This is a prospective randomized study, Carried out at Urology Department, Zagazig University hospitals during the period from 15/7/2017 to 15/2/2018. Aimed to compare between laser en-block enucleation and monopolar TUBRT for papillary bladder cancer as regard intraoperative outcomes (perforation , obturator jerk and bleeding) and post-operative outcomes (wash time

,catheter time , hospital stay, blood transfusion ,residual).

Inclusion criteria:

☞ Patients with bladder mass proven by Ultrasonography and pelvic CT and scheduled for Diagnostic cystoscopy and TURBT.

☞ Single lesion.

☞ Tumor size (1 – 3 cm).

Exclusion criteria:

☞ Recurrent tumor.

☞ Any contraindication to monopolar TURBT (pace maker, uncontrolled coagulopathy etc.).

☞ Other bladder or urethral pathologies (e.g. urethral stricture, bladder stone etc.).

☞ Tumor with histopathologic result showing T2.

2) Operational design

Patients' evaluation:

❖ History taking and physical examination.

❖ Lab investigations:

• Urine analysis.

• CBC.

• Coagulation profile.

• Renal and liver profile.

❖ Radiologic investigations

• KUB & US.

• Pelvi-abdominal CT with i.v contrast if serum creatinine less than 2 mg/ml. (if more than 2 mg/ml CT cystogram).

Informed consent

All patients were informed about their surgical condition and different modalities of treatment with possible side effects. Patients who refused to participate were excluded from our study. Written informed consent was obtained from all participants and the study was approved by the research ethical committee of Faculty of Medicine, Zagazig University. The work has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

Randomization

Patients were randomized using 1:1 ratio in both group A and B respectively.

The procedure:

In both groups [Ho-Yag laser En-block enucleation (group A) and in monopolar TURBT (group B)]

1. Procedure in both groups was done by single experienced surgeon.

2. Anesthesia, all patients received regional anesthesia.

3. Patient positioning in lithotomy position.

4. Examination under anaesthesia.

5. Diagnostic urethrocystoscopy.

Diagnostic urethrocystoscopy made by cystoscope, started by inspection of urethral meatus then intraurethral injection of lubricant gel, straightening the penis, cystoscope inserted into fossa navicularis. Inspection of urethral mucosa, external sphincter, prostatic urethra with verumontanum then bladder neck. Then inspection of urinary bladder mucosa in all walls, checking ureteric orifice site, shape and if any abnormalities, inspect urine efflux.

Description of bladder masses

☞ Site, Size, Shape, number, Surrounding mucosa, presence of calcification.

A. In Ho-YAG en-block resection : (group A)

After cystoscopy, and adequate mapping of the bladder is done, we introduce the resectoscope with the laser working element adapted with 2 metal fenestrated spatula. Isotonic saline is used during the procedure. We use the 100 w sphinx machine as source for Ho-Yag laser. Laser power is set as Power 1.5 - 2 joules, Frequency 17-20 pulse per minute and Pulse duration 350-550 microsecond on the 1000 micrometre laser fibre.

A marking is done using Ho-Yag laser in coagulation (defocused mode) around the bladder mass including the tumor and 2 – 5 mm of surrounding normal mucosa. This helps in orientation during the procedure. Then an incision is made in the bladder mucosa using the laser fibre in cutting (contact) mode following the marking around the mass.

Using the laser energy to cut and create plan under detrusor muscle, tension is made on the tumor using metal spatula, to create counter traction a plan is created beneath the bladder mass and the tumor bed. This plan is gradually developed and followed all around the tumor till the mass is completely detached from the bladder wall. Bleeding is coagulated using laser fibre is defocused (coagulation) mode. Tumor is retrieved either with

irrigation of the bladder using (Elliks) evacuator, using 26 French nephroscope and its grasper or using basket.

B. In Monopolar TURBT resection : (group B)

After localizing the tumor, resection started by placing resecting loop behind the tumor, then retraction the resecting loop towards resectoscopy shaft, taking the tumor in fraction, started from up to the base of tumor, after resecting all the tumor, deep sample taken from tumor bed to rule out deep muscle invasion.

After resection:

- ✚ Cup biopsy was taken from the tumor's bed in group A and deep cut by monopolar in group B.
- ✚ Examination under anaesthesia (PR examination).
- ✚ Catheter fixation and irrigation: triple way Foley cath was fixed in all patients [20-22 F] with continuous irrigation for 6 hours post operatively.
- ✚ Immediate instillation of mitomycin c (40mg in 40 ml saline) was done in all patients during 6 hours post-operative.
- ✚ Specimens sent in 2 containers in each group, in group A (1 container containing the tumor in 1 piece and 1 container containing tumor

bed) and in group B (1 container containing tumor chips and 1 container containing tumor bed).

Postoperative operative care:

- ✚ Observing vital sign.
- ✚ Pain control.
- ✚ Early mobilization.
- ✚ Observe the Color of the bladder irrigation.
- ✚ Foly's catheter removed on the day of discharge.

Follow up plan

1. First visit after one week of discharge:
 - ✚ Checking results of histopathology.
 - ✚ Preparation for check cystoscopy (routine LAB investigation and U.S imaging to be done few days before scheduled check-up cystoscopy).
2. Check-up cystoscopy after 4-6 weeks.

STATISTICAL ANALYSIS

Data collected throughout history, clinical examination, radiological investigations, laboratory investigations, intra-operative complications and post-operative complications, analysed using Microsoft Excel software. Data were then imported into Chi-square Analysis program version 2.5 for analysis.

Table (1): Operative and catheter time and hospital stay.

Variable	Group A (N=26)	Group B (N= 26)	P value
	Mean±sd	Mean±sd	
Total operative time (min)	48.38±10.852	27.50±7.90	<0.001 (HS)
Resection time /Enucleation (min)	40.96±10.200	20.54±6.993	<0.001 (HS)
Wash time (hour)	6.2±1.62	7.65±2.48	0.016 (S)
catheter time (day)	2.96±1.84	4.04±1.90	0.04 (S)
Hospital stay (day)	1.19±0.49	1.88±1.21	0.009 (HS)

Table (2) Pre-Operative and post-operative haemoglobin level.

Group	Preoperative haemoglobin	Postoperative haemoglobin	P value
Group A mean±sd g/dl	14.65±0.99	14.26±1.01	0.165 (NS)
Group B mean±sd g/dl	14.36±0.96	13.57±1.9	0.064 (NS)

Table (3): Intra-operative & post-operative complications.

Variable		Group				P value
		Group A		Group B		
Intraoperative complications	Obturator jerk	0	0.0%	5	19.2%	0.04 (S)
	perforation	1	3.8%	3	11.5%	
Postoperative complications	Blood transfusion	0	0.0%	1	3.8%	0.07 (NS)

Table (4): Tumor bed result.

Biopsy from tumor bed after finishing resection / enucleation	Group				P Value
	Group A N= 26		Group B N=26		
Free	26	100.0%	23	88.5%	0.07 (NS)
Positive	0	0.0%	3	11.5%	

RESULT

This study was done at zagazig university , we assessed 62 patients of eligibility , 5 of them excluded (3 cases converted to monopolar in group A after starting en-block laser enucleation (large tumor more than 3cm) and 2 cases refused to participate) , 57 randomly allocated in two groups , 28 in group A (laser enucleation) and 29 in group B (monopolar TURBT) , 1 case lost follow up and 1 case it's pathology result came T2 in group A and 2 cases lost follow up and 1 case it's pathology result came T2 in group B. so 26 cases analyzed in each group.

Both the total operative time and resection/enucleation time were significantly statically longer in group A compared to

group B (P value <0.001 and P value <0.001 respectively) (table 1).

On the other side the wash time was shorter in group A compared to group B (P value 0.016) , also the catheter time was shorter in group A compared to group B (P value 0.04) (table 1).

The hospital stay in group A was significantly shorter compared to group B (P value 0.009) (table 1).

No significant hemoglobin drop observed in both groups between pre-operative and post-operative period (P value 0.165 in group A and P value 0.064 in group B) (table 2) , blood transfusion was needed only in 1 case in group B (table 3).

No obturator jerk observed in group A while seen in 5 cases in group B , perforation

happened in 1 case in group A and in 3 cases in group B (P value 0.04) (table 3).

After resection in group B there were 3 cases with positive tumor bed while in group A tumor bed was free in all cases after tumor enucleation (table4).

DISCUSSION

Transurethral resection of urinary bladder (TURBT) is the most common and most important procedure which all urologist should be familiar with it because of its importance in diagnosis and treatment of urinary bladder cancer , it is a gold standard procedure in staging all types of urinary bladder cancer, different technique can be used during TURBT , the most commonly technique used is monopolar resection , monopolar TURBT has good result in treatment of bladder cancer and less time needed during operation and good hemostatic effect during resection but at the same time there is undesired complications of this technique which can be avoided by using new resection techniques.

Even though conventional TURBT is the gold standard procedure for making diagnosis and treating non-muscle invasive bladder cancer, however this technique has many limitations including:

The standard TURBT technique involves piecemeal resection of the tumour, which liberates tumour cells into the bladder and may explain the high recurrence rates (50–70%) for superficial bladder cancer [5].

At re-resection (depending on tumor location and number), residual tumor was observed in up to 76% of patients [6].

Obturator jerk

Resection of tumors on the lateral wall can stimulate the obturator nerve, resulting in sudden leg adduction which can force the resectoscop to produce bladder perforation [7].

Peri-Operative outcomes

In the current study the resection time was significantly longer in en-block enucleation compared to TURBT, which may be explained by the fact that the study was done for relatively large tumors and bleeding control took longer time in en-block enucleation. In contrast, Song Xishuang and

co-workers could not find significant difference in operative time between TURBT and Ho-Yag laser resection. However, in their study the Ho-Yag laser was used to resect rather than to enucleate the tumors, also the mean tumor size ranged from 15-18mm. [7].

In this study at the end of cystoscopy a cup biopsy was taken from the tumor bed and in group A negative biopsy was obtained in all cases compared to group B and this was with high significance. This result was similar to the study done by Saito et al. [8] as they found that laser en-block resection method had the advantage of complete and accurate removal of superficial urinary bladder tumor.

CONCLUSION

Laser enucleation appear to be reliable procedure with many advantages over monopolar TURBT , despite it need longer resection time, it reduce intra-operative complications and post-operative complications, it preserve tumor histological architecture and it allow to remove the tumor completely from tumor's bed so decrease the probability of local persistence of malignant tissue.

Declaration of interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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None declared

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