

Original Article

Lateral resection of a bladder wall tumor with the upside-down loop method to prevent the obturator nerve reflex: a report of 64 cases

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Abstract: To report the results of lateral resection of a bladder wall tumor with the upside-down loop method in a clinical setting to prevent the obturator nerve reflex (ONR). Sixty-four patients underwent trans-urethral resection of a bladder tumor (TURBT) under lumbar anesthesia. First, the top of the tumor above the bladder wall was resected in the traditional way. Second, the loop of the cutting ring was flipped 180°, and the residual tumor was resected with the upside-down loop from the side wall of the tumor. Of 64 cases, 47 had a little ONR. However, the movement of the body was not obvious, and it did not affect the operation. Serious complications such as perforation of the bladder and injury of the nerve and blood vessel did not occur. Lateral resection of a bladder wall tumor with the upside-down loop method can effectively prevent a strong ONR. This procedure is safe, free of complications, efficacious, cost-effective, and it does not increase the patient's pain.

Keywords: Bladder neoplasms, obturator nerve reflex, upside-down loop, lateral resection

Introduction

The obturator nerve reflex (ONR) sometimes occurs during trans-urethral resection of a bladder tumor (TURBT), and it is the main cause of perforation of the bladder and injury of the pelvic nerve and blood vessel. We used the upside-down loop method in patients with a bladder wall tumor who underwent lateral resection in our department. This procedure was effective for avoiding a strong ONR, and we obtained a satisfactory curative effect. Herein, we report the results of lateral resection of a bladder wall tumor with the upside-down loop method for preventing ONR.

Methods

Patients

From January 2012 to December 2015, 64 patients (41 men and 23 women) aged 32 to 78 years (average age, 61.5 years) underwent the upside-down loop method for a bladder wall tumor (**Table 1**). The tumor was located in the left wall of the bladder in 34 cases and right

side wall of the bladder in 30 cases. Twenty-eight cases had a single tumor and 36 had multiple tumors; it was the initial tumor in 49 cases, and it was a recurrent tumor in 15 cases. The diameter of the tumors ranged from 0.8 to 4.5 cm, and the average size was 1.8 cm. All patients were pre-operatively evaluated, and the Tumor Node Metastasis classification of the tumors was $\leq T_2$ (no lymph node and no distant metastasis). Fifty-four cases had non-muscle invasive bladder cancer (NMIBC), and 18 had muscle invasive bladder cancer (MIBC). The ethics approval was obtained from the ethics committee at the Third affiliated Hospital of Nantong University and all samples were collected after the informed consents of the patients were written.

Surgical method

With patients under lumbar spinal anesthesia or continuous epidural anesthesia and in lithotomy position, a trans-urethral resectoscope was inserted into the bladder (British Gyrus bipolar plasma resectoscope; inner sheath, F24; outer sheath, F27; sight glass, 30°; elec-

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Table 1. Characteristics and clinicopathological parameters about our including patients

Parameters	Case	P
Gender		
Male	41	0.114
Female	23	
Age (years)		
>61	38	0.231
≤61	26	
Tumor size (cm)		
>2.0	16	<0.05
≤2.0	48	
Tumor number		
Unifocal	28	0.147
Multifocal	36	
Tumor position		
Left	34	0.312
Right	30	
Grade		
G1/G2	51	<0.05
G3	11	
Disease status		
NMIBC	44	<0.05
MIBC	18	
Obturator nerve reflex (ONR)		
Little	47	<0.05
Severity	0	
None	17	

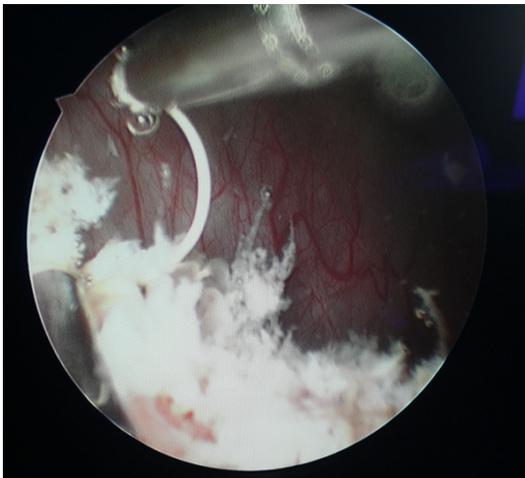


Figure 1. Resection performed with the upside-down loop method.

tric power, 160-200 W; electric coagulation power, 80-100 W; and washing liquid, normal saline). Then the location, number, size, and



Figure 2. Smooth post-operative wound of the bladder wall.

substrate of the tumor were observed and recorded. We adjusted the electric power to 40-60 W to cauterize the bladder mucosa with discontinuous points 2.0 cm around the tumor. First, the tumor was resected from the bladder lumen by using the conventional method. Second, the loop of the cutting ring was flipped 180°, and the residual tumor was cut into small pieces with the upside-down loop from the side wall of the tumor (**Figures 1, 2**). Patients underwent post-operative diagnostic trans-urethral resection, biopsy, and fast pathology to further clarify the nature of the tumor (i.e., the grade and stage). In cases of NMIBC, we resected the tumor base 1.5 cm outside of the bladder mucosa and the superficial muscle layer with the conventional method. In cases of MIBC, we cut the entire layer of the muscle and 2 cm from the tumor basement, and then we confirmed the negative margin again with a biopsy specimen. Surgeons should reduce the perfusion fluid intake and avoid excessive filling of the bladder during surgery. Slight ONR may occur, but generally, this should not affect the operation. Lastly, the catheter was removed 3 to 5 days after surgery.

Statistical analysis

All statistical analyses in this study were conducted with the SPSS (Statistical Package for Social Sciences, Chicago, USA) software. Group means were compared by Student's t-test. A two-sided P-value <0.05 was considered statistically significant.

Results

The operation was successfully performed in all 64 patients. The operative time was 15 to 75 min (average time, 31 min). Of 64 patients, 47 (73.4%) had little ONR during the operation (adductor muscle contraction occurred during fibrillation). However, the movement of the body was not obvious, and serious complications such as perforation of the intra-peritoneal bladder and syndrome of trans-urethral resection of prostate did not occur. Three cases of MIBC and extra-peritoneal perforation of the bladder were caused by non-ONR, so the catheter was not removed until 10 to 14 days; no other special treatment was necessary. No post-operative complications such as bleeding or urinary tract infection occurred. Post-operative pathologic examination findings showed the following: 2 cases had carcinosarcoma and 62 had a bladder urothelial carcinoma (level I G1 in 35 cases, level II G2 in 16 cases, and level III G3 in 11 cases).

Discussion

TURBT is the first-choice treatment for superficial bladder tumors [1], and avoiding ONR is always important during this procedure [2]. When the obturator nerve is stimulated, the bladder wall suddenly elevates. However, the surgeon cannot remove the electrocautery device in a timely manner; thus, this can lead to serious complications such as perforation of the bladder, bleeding due to an iliac vascular injury, and perforation of the colon. First, we used a bipolar plasmakinetic resectoscope to partially resect the bladder wall convex to the bladder lumen with a conventional electric cutting method. Second, we flipped the loop of the electric cutting ring by 180°, buckled it, and contacted the tumor tissue or bladder wall with the electric cutting ring. Since the electrical current passes vertically through the bladder wall, it is difficult to stimulate the obturator nerve during the operation. The conventional cutting method is different in that the current passes horizontally through the bladder wall, which increases the chance of stimulating the obturator nerve. Resection with the upside-down loop method can also cause mild ONR. However, because the cutting ring is against the bladder wall, the sudden lateral elevation of the bladder wall caused by ONR will not increase the contact area between the ring and the bladder

wall. Thus, this method will not further increase the stimulated intensity of the obturator nerve. Now severe ONR can be avoided, and the operation can be performed smoothly.

Currently, a variety of methods are used to prevent severe ONR during surgery, including the use of a holmium laser. A holmium laser does not produce an electrical field or current and it uses normal saline as perfusion fluid, so it will not stimulate the obturator nerve [3, 4]. However, this technology can only punctiform cut tissue, it has a long operative time, it results in a rough postoperative wound, it has poor visualization, and residual tumor tissues develop. However, by performing resection of a bladder wall tumor with the upside-down loop method, the anatomic structure can be clearly visualized, and a smooth wound can be achieved (**Figure 2**). In addition, many researchers have tried to use the obturator nerve block (ONB) method to prevent ONR, such as the transvesical ONB technology without nerve stimulation and only by anatomic landmarks, which is a safe and effective methods of ONB before TURBT; local blockade of the obturator nerve during cystoscopy, which is effective to avoid ONR in TURBT; and the trans-resectoscope stimulation, which can not only selectively block the contraction of the thigh adductor but also avoid unnecessary ONB [5-8], but the procedure is complicate and the time to recurrence will be prolonged [9, 10]. Tracheal intubation and general anesthesia, which were either applied in above novel technologies, are effective for preventing ONR; yet, these methods have certain risks for some elderly patients who have conditions such as heart disease and brain dysfunction, and they are associated with a longer postoperative recovery time and increased operational cost.

In summary, lateral resection of a bladder wall tumor with the upside-down loop can effectively prevent a strong ONR. In addition, this method is safe, simple, easy, cost-effective, and it does not increase the patient's pain. Thus, it is worth popularizing and using this method in clinical practice.

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Disclosure of conflict of interest

None.

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