

# Laparoscopic Treatment of Hypertension After Micturition: Bladder Pheochromocytoma

Alp Bozbora, Umut Barbaros, MD, Yesim Erbil, Isin Kiliçarslan,  
Esra Yildizhan, MD, Selcuk Ozarmagan

## ABSTRACT

Bladder pheochromocytomas are extremely rare and constitute less than 5% of bladder tumors. The initial symptoms of the patient are mostly nonspecific caused by hypertension. The postmicturition hypertensive crisis is the typical warning sign of this disease. In this article, we present a 29-year-old female having hypertensive attacks following micturition. Radiological imaging techniques revealed a 3x3x4-cm bladder tumor that was hormonally active. This is the first case reported of bladder pheochromocytoma that was laparoscopically treated without using the adjunct transurethral resection. The postoperative follow-up of the patient confirms the success of the surgical procedure.

**Key Words:** Bladder, Pheochromocytoma, Laparoscopy.

## INTRODUCTION

Paragangliomas are extraadrenal neoplasms of neural crest derivation that are called pheochromocytoma if hormonally active. Bladder pheochromocytomas are exceedingly rare, accounting for less than 5% of bladder tumors.<sup>1</sup> The most common presenting symptoms of bladder paraganglioma are hypertensive attacks precipitated by micturition (65% to 75%) and hematuria (55% to 58%).<sup>2</sup> They are believed to arise from embryonic rests of chromaffin cells in the sympathetic plexus of the detrusor muscle.<sup>3</sup> In this article, we present the case of a 29-year-old female patient with a vesical tumor and experiencing hypertensive attacks after micturition.

## CASE REPORT

A 29-year-old woman was admitted to our hospital with complaints of hypertension and palpitation attacks after micturition occurring for 1 year. Her history revealed that she suffered from palpitations and headache following micturition. She had no urinary tract symptoms including gross hematuria and urgency. Her medical history and physical examination were completely normal. Blood pressure measurements during preoperative hospitalization showed a systolic range of 110 mm Hg to 200 mm Hg. Her pulse rate fluctuated between 70 and 106 while she was supine.

Preoperative imaging techniques showed the existence of a vesical tumor. On magnetic resonance imaging (MRI) of the abdomen, a 3x3x4-cm soft tissue mass located anterolaterally on the right side of the vesical dome was visualized (**Figure 1**). Also, the same pathological mass was detected in the bladder on computerized tomography (CT) of the abdomen. No other metastatic lesion implying the malignancy of the tumor was found on chest x-ray and iodine 131-methiodobenzylguanidine (<sup>131</sup>I -MIBG) scan.

Laboratory tests including plasma and 24-hour urine collections for catecholamines showed high levels (**Table 1**). The mass was functional.

Phenoxybenzamine 30 mg twice daily was continued for 1 month during the preoperative preparation period, and

Istanbul University, Istanbul Medical School, Department of General Surgery, Capa, Istanbul, Turkey (Professors Bozbora, Erbil, Ozarmagan, Dr Barbaros).

Istanbul University, Istanbul Medical School, Department of Pathology, Capa, Istanbul, Turkey (Professor Kiliçarslan).

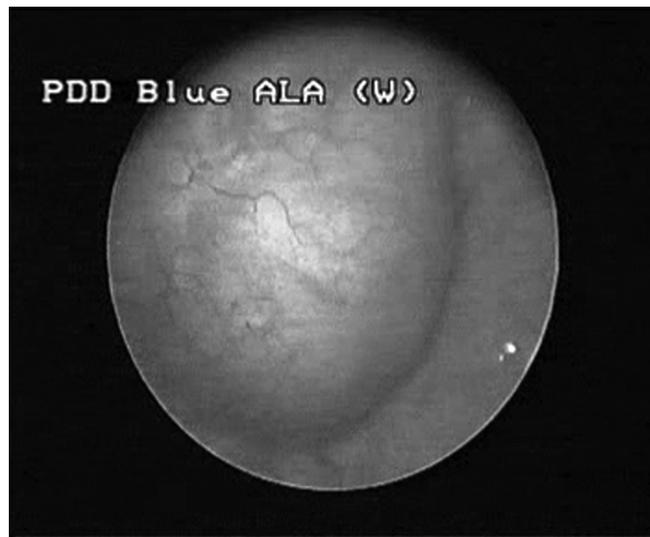
Okmeydanı Training and Research Hospital, Istanbul, Turkey (Professor Yildizhan).

Address reprint requests to: Umut Barbaros, Istanbul University, Istanbul Medical School, Department of General Surgery, Capa, Istanbul, Turkey, GSM: 0 5423425115, E-mail: umutbarbaros@yahoo.com.

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**Figure 1.** Sagittal MRI view of the vesical tumor.



**Figure 2.** Cystoscopic view of the lesion.

**Table 1.**

Results of Plasma and 24-Hour Urine Tests

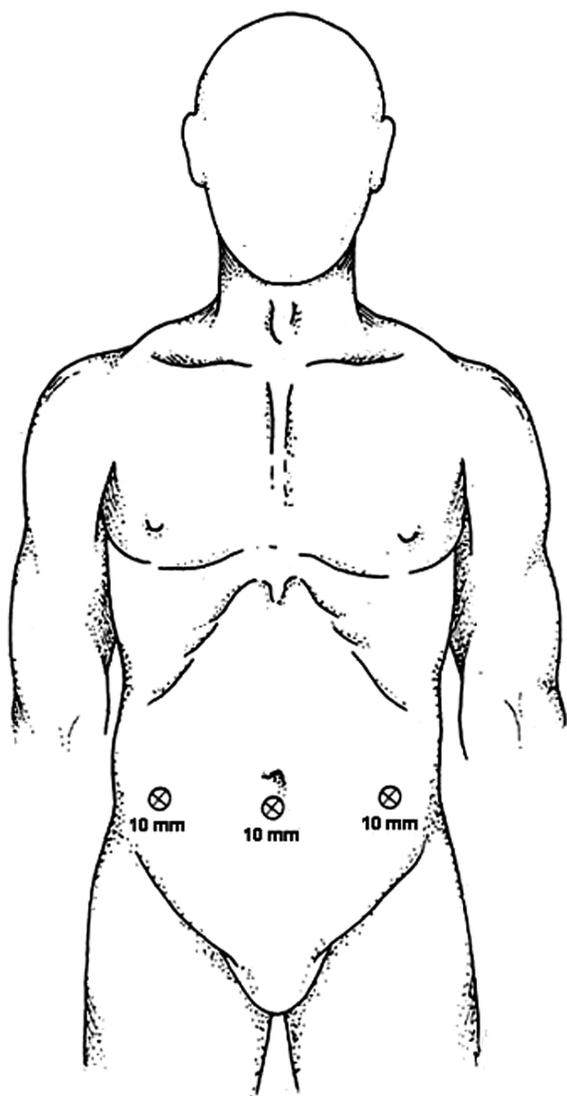
	Results	Normal Range
Plasma		
Noradrenaline (pg/mL)	1063	95–445
Adrenaline (pg/mL)	60	10–67
24-Hour Urine		
Normetanephrine (microgram)	5171	<354
Metanephrine (microgram)	126	<298
Vanillylmandelic acid (milligram)	10.2	1.5–7

the arterial blood pressure range was brought down to normal levels.

In the operating room before starting the surgical procedure, initial cystoscopic examination with the patient under general anesthesia revealed a lobulated submucosal mass on the right anterolateral side of the bladder dome (**Figure 2**). The lesion was away from the ureteral orifices. The laparoscopic procedure was started with general exploration of the abdomen through the 10-mm umbilical port. Two additional ports, a 10-mm port on the right site of umbilical port and a 5-mm port on the left side, were used during the operation (**Figure 3**). The vesical mass was protruding into the abdomen under the peritoneum (**Figure 4**). The peritoneal covering of the

lesion was opened first, and then the fatty vesicular tissue around the mass was dissected with careful hemostasis. The lesion was surrounded by detrusor muscle. During the manipulation of the mass, significant blood pressure elevations occurred that required serious antihypertensive interventions and interrupted the surgical procedure. After determination of the lateral borders of the mass, the bladder was partially resected including a mass with a 1-cm margin. After the removal of the specimen, the torn bladder wall was repaired. The first layer of mucosa was closed continuously with a 2.0-polyglactin suture applied with an Endostitch device (Autosuture Corp, Norwalk, Conn). The second layer of detrusor muscle together with peritoneum was repaired with 2 interrupted U-shaped mattress sutures by using the same device. Distension of the bladder with methylene blue and saline solution did not show any leakage from the suture sites. A closed suction drain was left in the pelvis. An 18 F silicone Foley catheter was placed into the bladder transurethraly. Total surgical time was 290 minutes. Blood loss was approximately 200 mL. The patient ate breakfast 12 hours after the operation. In the postoperative period, no hypertensive attacks occurred despite the cessation of antihypertensive drugs. The patient was discharged on the 10th postoperative day after removal of the Foley catheter. Two months after the surgery, the patient was normotensive and rid of her past complaints. Her endocrinological tests returned to normal levels.

The final histopathological examination confirmed the diagnosis of bladder pheochromocytoma with free surgical margins.



**Figure 3.** Port sites during the laparoscopic intervention.

## DISCUSSION

Extraadrenal paragangliomas, which account for 5% to 10% of these tumors, are most often found in the retroperitoneum, thorax, and urinary bladder. The first case of extraadrenal paragangliomas in the urinary bladder was reported in 1953.<sup>4</sup> More than 200 cases have been reported in the literature. However, this is the second case reported in the literature of bladder pheochromocytoma treated laparoscopically.

Typical symptoms of these tumors are related to increased catecholamine release in association with detrusion during micturition and consist of headache, palpitations, sweating, blurred vision, and hypertension. Painless he-



**Figure 4.** Laparoscopic view of the lesion protruding into the abdomen.

maturia is also another common symptom. According to localization of the tumor in the bladder, obstructive symptoms have also been reported.<sup>5</sup>

Diagnosis of a functionally active pheochromocytoma can be confirmed in almost all patients with the demonstration of elevated serum basal catecholamine levels and urinary total or fractionated catecholamine levels.<sup>6</sup> In addition to this, these tumors also secrete other bioactive amines and peptides, such as neuropeptide Y, somatostatin, vasoactive intestinal peptide, gastrin, and serotonin.<sup>7,8</sup> This may explain the hypertensive attacks precipitated by micturition in some cases of bladder paraganglioma in patients with normal catecholamine levels.<sup>2</sup>

Computed tomography and magnetic resonance imaging are used to determine the size, location, and local extent of the tumor.<sup>1</sup> Nuclear medicine scanning using the radioisotope<sup>131</sup>iodine metaiodobenzylguanidine is the imaging study of choice for localizing small pheochromocytomas and has sensitivity and specificity of 77% to 90% and 95% to 100%, respectively.<sup>9</sup> Recently, positron emission tomography (PET) imaging has been described as a highly sensitive adjunctive test for detecting extraadrenal pheochromocytomas and its existing metastases.<sup>10</sup>

Biopsy should not be considered as a diagnostic method due to the risk of a hypertensive crisis as occurs in adrenal pheochromocytomas. Also any cystoscopic intervention in the diagnosis of bladder pheochromocytomas requires blood pressure control with alpha-adrenergic blockade and use of an operating room. Therefore in our case, we

preoperatively performed cystoscopy in the operating room.

Careful preoperative alpha blockade for at least 1 week to 2 weeks is necessary for neutralization of the effects of released catecholamines.<sup>11</sup> After the initiation of alpha blockade if tachycardia and arrhythmias occur, the use of beta-blockers may be planned.

Standard treatment of benign-looking bladder pheochromocytomas are localized partial resection of the bladder by keeping the tumor intact. Because no defined histological features exist to safely distinguish benign and malignant pheochromocytomas, if any local invasion or lymph node metastasis occurs, radical cystectomy with pelvic lymph node dissection is performed. Even with local invasion or metastatic spread, excision should be performed to prolong survival and provide palliation.<sup>1</sup> Radiotherapy and chemotherapy have limited effectiveness in the treatment of locally recurrent or metastatic pheochromocytoma. In general, radiotherapy is considered only in the palliative treatment of painful bony metastasis or spinal cord compression.<sup>1</sup> Approximately 10% of bladder pheochromocytomas are malignant. Therefore, although the initial lesion is solitary and totally resected, life-long follow-up is necessary to define any metachronous metastases and localized recurrences.<sup>3</sup>

Kozlowski and colleagues<sup>11</sup> performed the first laparoscopic partial cystectomy to treat vesical pheochromocytoma.<sup>11</sup> In this procedure, endoscopic manipulation is also associated with laparoscopy by using cystoscopic resection. This shows in localized preoperatively benign-looking lesions of bladder pheochromocytomas that laparoscopic partial excision of the tumor can be performed. In our case, we performed laparoscopic partial cystectomy without applying adjunct transurethral resection. The tumor was totally excised, and the lesion kept intact with a fine vesical tissue margin. The specimen was also extracted with a nylon bag.

## CONCLUSION

Correct diagnosis and tumor location together with sufficient preoperative preparation of the patient with bladder pheochromocytoma are enough for successful laparo-

scopic resection by surgical teams experienced in minimally invasive surgery.

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