

A Novel Method of Laparoscopic Approach in A Giant Bladder Diverticulum With Renal Cell Carcinoma "Double Trouble" - Literature Review and Case Study

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1. Abstract

Congenital diverticular are rare and caused from weakening of the bladder mucosa with the entire wall of the diverticulum. Giant vesical diverticulum are uncommon and total of 13 cases are been reported. The gold standard of treatment this bladder diverticulum is with extra vesical diverticulectomy approach. We would like to report on a complexity case which presented with renal cell carcinoma and concurrent giant bladder diverticulum. This will be the first case report on the laparoscopic extravesicle approach done concurrently in a renal malignancy patient which have proved to be safe, effective, and minimally invasive and therefore superior to open extravesical diverticulectomy which is the gold standard.

2. Case Report

A 76 years old Chinese gentleman with a known case of hypertension, IHD and BPH. Presented to casualty with complaint of abdominal distention and pain over the lower quadrant for past 5 months. Patient also had symptoms of lower urinary symptoms such as nocturia, urgency, hesitancy, straining. On physical examination patient was pink, comfortable. His blood pressure was 146/79 mmHg with tachycardia 96/min. Per abdomen was distended with a vague mass over the right lower quadrant measuring 15cmx15cm, non tender, non pulsating. Digital rectal examination prostate was enlarged with median sulcus obliterated. No nodule or mass palpable. We proceeded with abdominal X-ray shows the bowel pushed upwards. Our initial diagnosis was intra abdominal mass for further investigation. Differential diagnosis was mesenteric cyst, lymphoma, GIST, retroperitoneal soft tissue tumor. We

proceeded with ultrasound abdomen and shows a highly vascular right renal mass most likely represent a renal cell carcinoma and a large urinary bladder diverticulum. CT renal 4 phase shows a lobulated enhancing mass at interpole of right kidney measuring 8.8 x 6.6 x 8.6cm. A large well defined hypodense mass of fluid attenuation from superior urinary bladder, extend superiorly till L2 level measuring 15.6 x 22.4 x 18.2cm compressing on right ureter causing hydroureter and hydronephrosis. This features suggestive of right RCC with large urinary bladder diverticulum. We proceeded with laparoscopic right nephrectomy with diverticulectomy. The intra operative findings was multiple nodules at right kidney, giant bladder diverticulum located at lateral part of the bladder wall and cirrhotic liver. Patient had a speedy recovery and was discharge home with Continues bladder cathater after day 10 of post operative. The Histopathology result of bladder wall specimen shows consistent with diverticulum with no evidence of malignancy. The renal specimen shows clear cell renal cell carcinoma with Fuhrman nuclear Grade 2 T1b N0 M0.

3. Discussion

A diverticulum is an abnormal sac or pouch protruding from the wall of a hollow organ. Most bladder diverticula are primary, congenital, or secondary to outflow obstruction or neurogenic bladders. Congenital diverticula usually occur in areas where there is insufficient muscle, typically at the ureterovesical junction, or between bundles of hypertrophied muscle. They are usually asymptomatic and are discovered incidentally. Occasionally, a diverticulum may produce urinary obstruction as a result of compression

of the urethra, or urinary tract infection arising from retention of urine within the diverticulum. Normally the usual surgical technique for managing a giant bladder diverticulum is open extravesical diverticulectomy approach but in our case we have performed a laparoscopic transvesical diverticulectomy approach. The indications for surgery are persistent or recurrent urinary tract infection, the presence of a stone in a diverticulum, development of tumor in a diverticulum cavity, the lower urinary tract symptoms and voiding symptoms and vesicoureteral reflux due to diverticulum or ureteral obstruction.

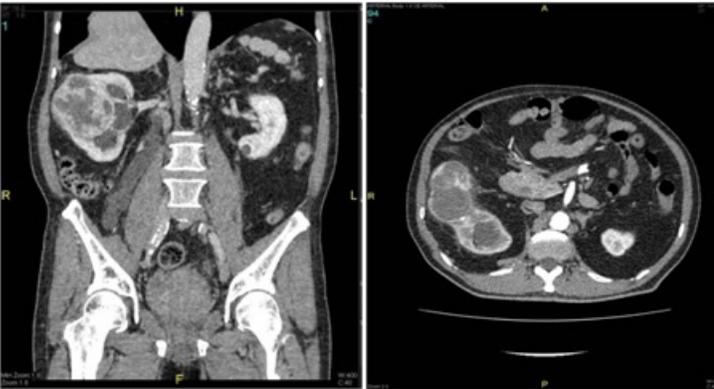


Figure 1

Figure 2

Figure 1 and 2 is the CT renal 4 phase shows a lobulated enhancing mass at interpole of right kidney measuring 8.8 x 6.6 x 8.6cm suggestive of right renal cell carcinoma

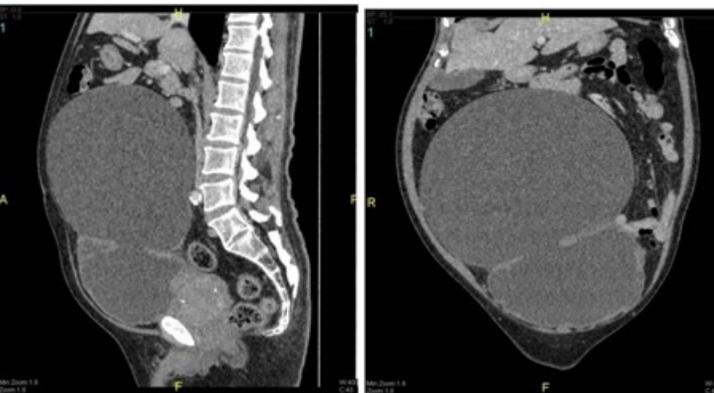


Figure 3

Figure 4

Figure 3 and 4 is the CT renal 4 phase shows a large well defined hypodense mass of fluid attenuation from superior urinary bladder, extend superiorly till L2 level measuring 15.6 x 22.4 x 18.2cm compressing on right ureter causing hydronephrosis and hydroureter suggestive of large urinary bladder diverticulum

We would like to describe the complexity of surgical approach for a giant vesical diverticulum which was associated Renal Cell carcinoma. From our literature search we have found 13 cases of "giant bladder diverticulum". All this giant bladder diverticulum was operated with open extravesical diverticulectomy. We have summarized this 13 cases based on the characteristics such as initial presentation, diagnosis and treatment approach (Table 1).

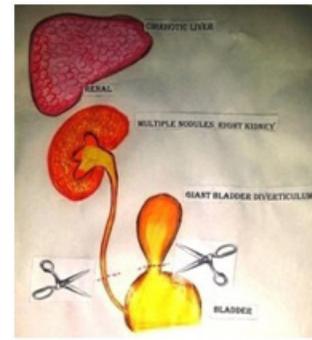


Figure 5: Pictorial diagram of Intraoperative findings: Multiple large nodules at right kidney, giant bladder diverticulum the neck opening at lateral part of the bladder wall with cirrhotic liver.



Figure 6

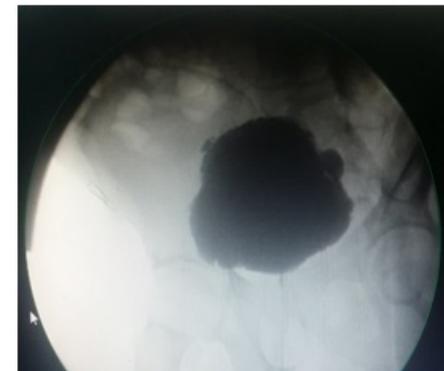


Figure 7

Figure 6 and 7 shows postoperative Cystogram shows no evidence of contrast leakage from area of diverticulectomy.

We would like to discuss the various technique and approach which are available for giant bladder diverticulum. As for most urologists, surgical excision by mean of open surgical technique remains the most common treatment option. Open bladder diverticulectomy can be performed either extravesical, intravesical, or combination approach [14].

However for our patient we have chosen laparoscopic method over open surgery because this patient also had right renal cell carcinoma which requiring nephrectomy. Laparoscopic bladder diverticulectomy represents a minimally invasive alternative to the

open approach. It can be performed either transperitoneally or extraperitoneally. The principles for laparoscopic diverticulectomy are the same as for open diverticulectomy approach which include:

1) Complete mobilization of the diverticular sac and neck; 2) Excision of the diverticulum; and 3) Precise double-layer bladder closure [15].

Table 1: A summary of 13 cases of giant vesical diverticula from year 1957 to 2009

Ref.	Yr	Age	Sex	Medical history	Initial symptom	Diagnosis	Management
Kauffman et al [4]	1957	70	M	Not available	Constipation	X-ray films, intravenous urography	Diverticulectomy
Taha et al [5]	1987	65 yr	M	Not available	Abdominal distension, slow stream of urine	Intravenous urography, CT	Reduction cystoplasty
Farhi et al [6]	1991	31 yr	F	Recurrent urinary infection	Ovarian cyst	USG, cystogram	Not available
Burrows et al [7]	1998	16 yr	M	EDS type 1	Outflow obstruction	Cystogram	Diverticulectomy
Suzuki et al [8]	2002	84 yr	M	Bladder injury with bullet	Abdominal distension	CT, cystogram	Diverticulectomy
Siddiqui et al [9]	2003	77 yr	M	TURP was performed twice because of urinary retention	Acute urinary retention	Intravenous urography	Diverticulectomy
Shukla et al [10]	2004	11 yr	F	EDS	Infection, incomplete voiding	Cystogram	Diverticulectomy
	2004	4 month	M	No medical	Decreasing urinary	Not available	Not available
	2004	3 yr	M	history of voiding dysfunction	stream and urinary retention	Not available	Not available
Mirow et al [11]	2007	84 yr	M	Sigmoid carcinoma	Abdominal pain, intestinal obstruction	Intraoperative	Diverticulectomy
Shaked et al [12]	2009	76 yr	M	Hypertension, diabetes mellitus	Abdominal pain, constipation	CT	Not available
Akbulut et al [13]	2009	57 yr	M	History of trauma	Abdominal pain, intestinal obstruction	CT	Diverticulectomy

CT: Computed tomography; EDS: Ehlers-Danlos syndrome; TUR-P: Transurethral prostatectomy; USG: Ultrasonography.

Laparoscopic transperitoneal technique for bladder diverticulectomy was described by Gill. This technique involves insertion of four or five transperitoneal laparoscopic ports. Followed by selective distension of the diverticulum. An incision at the peritoneum is made over the diverticulum. A circumscription of the neck and excision of the diverticulum at its ostium. The bladder is closed in two layers [15]. Porpiglia et al. compared the safety and effectiveness of laparoscopic transperitoneal bladder diverticulectomy to open bladder diverticulectomy [16]. They conclude that in open compared with laparoscopic diverticulectomy patients the blood loss (18% vs. 27% drop in hemoglobin), post-operative analgesic requirements, and hospital stay (3.2 vs. 9.6 days) respectively. There were no complications reported in both groups. The authors concluded that the transperitoneal laparoscopic approach is safe and more effective.

Laparoscopic extraperitoneal technique for bladder diverticulectomy was first described by Nadler et al. in a patient with a 300 mL diverticulum. The principle of bladder diverticulectomy is the same as, described above. A 2cm incision is made below the umbilicus, which was used to introduce the surgeon's finger. A self made dilating balloon catheter was used to create a retroperitoneal space. The dilating balloon was inflated with 1000mL of normal saline to accomplish this. Four laparoscopic ports was then inserted. They dissected the diverticulum emanating just lateral the right ureteral orifice. Since then, only a few other cases using this technique have been reported [17 - 19].

We have chosen the extravescicle approach instead of intravescicle approach. This was because we wanted to avoid a separate cystotomy incision to inspect the bladder lumen. Beside that this was a renal cell carcinoma patient. This technique allows the urologist to visualise directly the location of the neck of diverticulum within the bladder lumen. The extravescical approach was described by Nerli et al [20]. We used laparoscopic method to identify the bladder diverticulum. We then inserted a continuous bladder drainage to collapse the diverticulum. The neck of diverticulum was identified. The laparoscopic cautery device was then used to score the extravescical surface to mark the site of the incision on the bladder. A circumferentially incision was made around the lesion with a 4-5 cm margin. Followed by making a full-thickness bladder incision using cautery. A complete excision of bladder pathology with a healthy margin of bladder wall is essential in order for a success operation. The advantages of this technique include the lack of a second cystotomy site thus requiring fewer bladder closures and less risk of post-operative urinary leak.

However beside the extravescicle approach there is the intravescical approach which was first described by Mariano and Tefilli. They performed a small cystotomy which was made on the bladder dome. With the Foley catheter clamped, the pneumoperitoneum entered the bladder and rapidly distended it. The laparoscope and instruments could then be advanced into the distended bladder. Excision of the bladder lesion was then performed under direct vision through the cystotomy [21]. The advantage of this technique is its

simplicity. The disadvantage of this approach was that creating a larger transverse cystotomy defect in order to insert several instruments. This cystotomy itself must be large enough to accommodate them. This may result in difficulty to close the wound and thus a higher risk or post-operative urine leakage.

4. Conclusion

In our experience, this is the first case report on the laparoscopic extravesicle approach was done concurrently in a renal malignancy patient which have proved to be safe, effective, and minimally invasive and therefore superior to open extravesical diverticulectomy which is still the gold standard.

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