CLINICAL SCIENCE

LAPAROSCOPIC PARTIAL CYSTECTOMY FOR URACHAL AND BLADDER CANCER

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PURPOSE: To report our initial experiences with laparoscopic partial cystectomy for urachal and bladder malignancy.

MATERIALS AND METHODS: Between March 2002 and October 2004, laparoscopic partial cystectomy was performed in 6 cases at 3 institutions; 3 cases were urachal adenocarcinomas and the remaining 3 cases were bladder transitional cell carcinomas. All patients were male, with a median age of 55 years (45-72 years). Gross hematuria was the presenting symptom in all patients, and diagnosis was established with trans-urethral resection bladder tumor in 2 patients and by means of cystoscopic biopsy in the remaining 4 patients. Laparoscopic partial cystectomy was performed using the transperitoneal approach under cystoscopic guidance. In each case, the surgical specimen was removed intact entrapped in an impermeable bag. One patient with para-ureteral diverticulum transitional cell carcinoma required concomitant ureteral reimplantation.

RESULTS: All six procedures were completed laparoscopically without open conversion. The median operating time was 110 minutes (90-220) with a median estimated blood loss of 70 mL (50-100). Frozen section evaluations of bladder margins were routinely obtained and were negative for cancer in all cases. The median hospital stay was 2.5 days (2-4) and the duration of catheterization was 7 days. There were no intraoperative or postoperative complications. Final histopathology confirmed urachal adenocarcinoma in 3 cases and bladder transitional cell carcinoma in 3 cases. At a median follow-up of 28.5 months (range: 26 to 44 months), there was no evidence of recurrent disease as evidenced by radiologic or cystoscopic evaluation.

CONCLUSIONS: Laparoscopic partial cystectomy in carefully selected patients with urachal and bladder cancer is feasible and safe, offering a promising and minimally invasive alternative for these patients.

KEYWORDS: Partial cystectomy; Laparoscopy; Bladder cancer; Urachal carcinoma; Outcomes.

INTRODUCTION

Partial cystectomy is indicated in specific cases of solitary dome/anterior wall bladder TCC, such as small unifocal tumors, solitary tumors in a bladder diverticulum, no concomitant carcinoma *in situ* (cis) or localized urachal adenocarcinoma. The goal of this surgical approach is to maintain a functional reservoir, while preserving continence and erectile function in male patients.[1] In the case of these very specific tumors, the laparoscopic approach has the following advantages: a shorter recovery time and reduced length of hospital stay as compared with the open surgery approach. While laparoscopic partial cystectomy (LPC) has been performed for benign tumors, such as pheochromocytoma and bladder leyomyoma, data for its use in malignant disease is still lacking. Accordingly, this paper reports 6 cases of laparoscopic partial cystectomy for bladder or urachal malignancy performed at 3 institutions.

MATERIALS AND METHODS

Between March 2002 and October 2004, 6 male patients underwent LPC for bladder cancer (n=3) or urachal cancer (n=3). The median age was 55.5 years (45-72). In all cases, the tumors were detected during clinical evaluation for gross

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hematuria. The 3D-CT scan demonstrated a solitary, small (< 3cm) bladder mass on the dome with normal preserved perivesical fat planes and normal upper tracts in all patients but one patient. This subject had a superficial grade 2 TCC in a para-ureteral diverticulum that was not amenable to transurethral resection. In three patients, the urinary cytology was positive for neoplastic cells. The pathologic diagnosis was confirmed by TURBT or by means of cystoscopic biopsy, and concomitant cis was ruled out.

All procedures were performed using a 5-port transperitoneal approach similar to that used during standard laparoscopic radical cystectomy.[2] The camera port was positioned at least 3 cm above the umbilicus to facilitate adequate mobilization of the urachal remnant. The initial peritoneal incision was in the form of an "inverted V" with the limbs of the "V" positioned laterally to each medial umbilical ligament. The urachus and peritoneum along with the surrounding pre-peritoneal fat were widely mobilized en bloc. Once the dissection proceeded caudally into Retzius' space, the tumor at the dome was typically visualized. At this point, the bladder was completely mobilized. The cystotomy began at a distance of 2 cm from the tumor under simultaneous cystoscopic guidance and was connected circumferentially leaving an adequate margin (2 cm) around the tumor. The tumor was resected en bloc together with the urachus and posterior rectus sheath. The surgical specimen was immediately placed into an EndoCatch® bag (USCC, Norwalk, CT) that was pre-positioned in the peritoneal cavity prior to creating the cystotomy. Bladder margins were sent for frozen section analysis. The bladder was then closed in two layers with a 2-0 Vicryl suture on a CT-1 needle and was filled with saline to identify areas of leakage that were subsequently reinforced with interrupted sutures. The retrieval bag was removed through an extension of the camera trocar site, and a Jackson Pratt drain was positioned in the prevesical space. The 10 and 12 mm port sites were closed using a Carter-Thomason port closure device with a 0 Vicryl suture. In the case of the patient who presented with a tumor in a para-ureteral diverticulum, a wide anterior cystotomy was initially created to clearly identify the opening of the diverticulum and the ureteral orifice. A wide bladder cuff was fashioned to include an adequate margin around the diverticular neck and the adjacent ureteral orifice. The bladder diverticulum containing the tumor and the distal ureter were excised by a combined intra- and extra-vesical approach. Real-time transrectal ultrasound guidance was utilized to guide this difficult surgical excision. The defect in the bladder base was closed with 2-0 Vicryl sutures. The ureter was reimplanted in the dome extravesically in a refluxing manner. Finally, the anterior cystotomy was closed using a single layer of running 2-0 Vicryl sutures.

RESULTS

All laparoscopic procedures were performed successfully without the need for open conversion. In one case of a high grade TCC located in a para-ureteral diverticulum, tumor resection involved a wide excision of the diverticulum together with the ureteral orifice, thereby requiring ureteral reimplantation, which was performed laparoscopically. The median estimated blood loss was 70 mL (range: 50-100 mL), the median operative time was 110 min (range: 90-220 min), and no intraoperative complications were noted. The median hospital stay was 2.5 days (range: 2-4 days). The postoperative course was uneventful in all 6 patients. In all cases, the indwelling Foley catheter was removed on the 7th postoperative day after a cystogram confirmed no leakage.

Intraoperative frozen section bladder margins were separately evaluated and were found negative for cancer in all cases. The final histopathologic analysis confirmed three cases of urachal adenocarcinoma and three cases of bladder transitional cell carcinoma, one of which featured sarcomatoid differentiation (Table 1). All surgical margins were negative for neoplastic cells. At a median follow-up

Table 1 - Perioperative and pathological data

	Age (yrs)	Operative Time (min)	EBL (mL)	Hospital stay (days)	Pathology	Grade	Stage
Patient #1	57	90	50	2	Urachal Adenocarcinoma	Moderate	II*
Patient #2	58	110	100	2	Urachal Adenocarcinoma	Moderate	II*
Patient #3	72	100	60	4	TCC	Low	IIa**
Patient #4	47	180	70	3	TCC	High	Ic**
Patient #5	54	90	50	3	Urachal Adenocarcinoma	Moderate	IIIa*
Patient #6	45	220	70	2	TCC	High	IIa**

* Urachal staging system by Sheldon et al.; ** AJCC staging system

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of 28.5 months (range: 26-44 months), all 6 patients were alive with intact sexual function and no signs of recurrent or metastatic disease on cystoscopic, cytological or radiologic follow-up.

DISCUSSION

The role of partial cystectomy in the treatment of bladder cancer is very limited. In the case of TCC, it may be considered in certain carefully selected patients who present with a solitary lesion located in the dome/anterior wall with no *in situ* carcinoma, or in those patients with tumors located in bladder diverticula.[2] Historical data on open partial cystectomy under these scenarios suggests a 5-year cancer-specific survival rate of 50-70%.[1,3,4]

Urachal carcinoma is a rare tumor, accounting for <1% of all bladder tumors. The predominant cell pathology is adenocarcinoma. The survival of these patients is usually poor, due to the fact that the condition is generally diagnosed at a very late stage. Once a negative margin is achieved, the outcome of urachal adenocarcinoma is strongly correlated with clinical stage, independent of the surgical procedure.[5]

Henly et al. published data on 30 patients who were initially treated by open partial cystectomy. No adverse effect on survival was reported as compared with patients who underwent radical cystectomy.[6] In a recent report by Ashley et al. that followed 130 patients with urachal masses, two predictors for malignancy were found: age over 55 years and presence of hematuria. Of the 60 cases of malignancy that were surgically treated, no survival difference was identified that could be correlated with the surgical procedure (partial cystectomy vs. radical cystectomy). The 5-year cancer-specific survival rate was 49%, with a local recurrence rate of 15%. Multivariate analysis revealed that surgical margins and tumor grade were independent predictors of mortality.[7]

Laparoscopic partial cystectomy was initially performed for vesical endometriosis and was subsequently expanded to include malignant conditions.[8,9] Mariano et al described their experience with LPC for bladder TCC in 6 patients. No open conversion was required, and a mean operative time of 205 min was reported, with an estimated blood loss of 200 mL, and an average hospital stay of 4 days. One patient in this study subsequently developed systemic disease.[10]

The bladder should be widely dissected laterally (and posteriorly when needed), preserving the surround perivesical fat together with the tumor. Identification of the exact location of the tumor may be difficult from outside of the bladder. If the tumor is not readily apparent from the laparoscopic view once the bladder is filled with saline, additional aids such as intraoperative cystoscopy should be utilized. Once the initial cystotomy is created, the tumor can be easily visualized from inside of the bladder. The use of intraoperative real-time transrectal ultrasound guidance was particularly helpful in the case of a patient whose tumor was lodged within a para-ureteral diverticulum. Before the cystotomy is created, the bladder should be completely deflated to minimize the risk of tumor spillage.

Although lymphadenectomy and umbilectomy were not identified as predictors in the aforementioned study, other researchers have reached different conclusions. As such, the role of these approaches in the treatment of urachal adenocarcinoma is still unclear. In a study performed by Wadhwa et al. of 3 patients who underwent LPC and lymphadenectomy for urachal adenocarcinoma, a mean operative time of 180 min was reported, together with a mean blood loss of 150 mL. Bilateral lymphadenectomy added 65 min to the procedure. One complication was reported, but the mean hospital stay remained at 4 days. No local recurrence or systemic disease was observed at a mean follow-up interval of 6 months.[11]

Again, certain technical aspects of LPC for urachal carcinoma deserve special attention: an en-bloc resection containing the urachus, bladder dome and posterior rectus sheath should be made, mobilization of the bladder is very useful and is particularly helpful during closure, and a wide surgical margin is important. In our study, lymphadenectomy and umbilectomy were not performed due to the small tumor sizes and the absence of enlarged nodes on imaging. However, pelvic lymphadenectomy can be performed completely laparoscopically if oncologically indicated. Even though the follow-up was short-term in this study, our data suggest both technical efficiency and low morbidity. Accordingly, we propose that this approach be considered a therapeutic option when an organ-sparing procedure is desired.

CONCLUSION

Our experience to date suggests that laparoscopic partial cystectomy as a means of treating carefully selected cases of bladder and urachal malignancy is feasible, efficient, and has a low morbidity when performed by surgeons with extensive prior experience with advanced laparoscopic procedures.

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