Robotic Assisted Partial Cystectomy Using Tile-Pro Feature: A Case Report

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Abstract
Bladder preserving surgery is an accepted mode of surgical management for adenocarcinoma arising from the dome of the bladder. Challenge in performing a robotic partial cystectomy is achieving optimal oncological and functional results. To achieve these results precise amount of bladder margin with the tumor has to be excised. In an endeavor to achieve this precision, we describe a robotic partial cystectomy for adenocarcinoma of bladder arising from the dome, using Tile-Pro™ (Intuitive surgical, Sunnyvale, CA, USA) view, while performing simultaneous cystoscopic-guided tumor margin marking.

INTRODUCTION
Primary Adenocarcinoma of the urinary bladder or Urachal adenocarcinoma may present as a mass in the dome of the bladder [1]. Bladder preserving surgery is an accepted mode of surgical management for this disease. This procedure is possible in patients who have a solitary tumor at dome of the bladder and no evidence of widespread bladder involvement like CIS [2]. Robotic assisted partial cystectomy is a safe and efficient technique, which has decreased morbidity and has better patient safety [3]. During Robotic assisted partial cystectomy, marking of the tumor and achieving negative margins is a challenge. The use of Tile-Pro™ (Intuitive surgical, Sunnyvale, CA, USA) application developed by intuitive surgical (Sunnyvale, CA) has been previously described successfully in robotic assisted radical prostatectomy and partial nephrectomy for tumor marking [4]. We describe a robotic partial cystectomy for adenocarcinoma of bladder arising from the dome, using Tile-Pro™ (Intuitive surgical, Sunnyvale, CA, USA) view, while performing simultaneous cystoscopic-guided tumor margin marking.

CASE PRESENTATION
40-year female with no co-morbid illness, presented with hematuria. On Ultrasound kidney urinary bladder examination, she was found to have a bladder mass, which was 4 cm x 4 cm located at the dome of bladder. Bilateral kidney and ureter were reported as normal. Contrast enhanced Computed Tomography (CECT) of abdomen and pelvis was done, which was suggestive of solitary, asymmetrical, in-homogenously enhancing mass arising from the dome of the bladder, measuring 5.5 cm x 4.5 cm x 1.4 cm in maximum diameter (Figure 1). Patient underwent cystoscopy and transurethral biopsy of bladder tumor. Cystoscopy was suggestive of, solitary friable mass at the dome of the bladder, measuring 5 x 4 cm, rest of bladder appeared normal. On histopathological examination, the mass was found to be of mucinous adenocarcinoma of bladder. In view of solitary mass arising from the dome of the bladder and biopsy suggesting mucinous adenocarcinoma we preceded with a robotic partial cystectomy in this patient.

Patient was placed in steep Trendelenburg position. Six ports were placed in inverted fan shaped configuration. A 12 mm supra-umbilical camera port was placed 3-4 cm above the umbilicus, three 8 mm robotic ports, and two 12 mm assistant ports were used (Figure 2). The procedure was started by making an incision lateral to medial umblical ligament on both the sides, whole Urachus along with anterior peritoneum, was...
taken down up to the dome of bladder and space of retzius was entered. Anterior and lateral walls of bladder were dissected free from surrounding attachments. After distention with normal saline, tumor bulge was seen at dome and anterior wall of the bladder. At this stage flexible cystoscopy was done using Karl Storz™ (Tuttlingen, Germany) cysto-nephroscope scope. Tumor was visualized simultaneously under cystoscopic and robotic view with help of Tile-Pro™ (Intuitive Surgical, Sunnyvale, CA, USA) feature. At this stage the light intensity of the robotic lens was decreased so that the tumor could be trans-illuminated by the cystoscope (Figure 3). Cystoscopic view could be seen at the bottom of the console screen using the Tile-pro™ feature. Area to be resected was marked with monopolar scissors, using electrocautery on the peritoneal surface of bladder, 1 cm away from the tumor margin (Figure 4). Using simultaneous visualization, bladder was incised with a margin of 1 cm around the tumor and tumor was excised along with Urachus, anterior peritoneum and perivesical fat. Specimen was directly bagged without letting it come in contact with the peritoneal surface. Intraoperative frozen sections from all the four walls was sent and was negative for malignancy. Bladder wall was sutured using V-lock™ 2-0 (Medtronic, Minneapolis, USA) continuous suture in 2 layers. Bilateral standard lymph node dissection was done. Abdominal drain was placed and specimen was retrieved through supra umbilical incision by extending the camera port.

Total operative time was 156 minutes and console time was 125 minutes. A total estimated blood loss was 245 cc. Postoperative course was uneventful; drain was removed on postoperative day (POD) 3 and per urethral catheter was removed on POD day 5. Post-operative histopathology of resected specimen was suggestive of mucinous adenocarcinoma of bladder (Figure 5). At six months follow-up patient had no evidence of recurrence on clinical examination and imaging.

DISCUSSION

Partial cystectomy is an accepted standard of care for solitary bladder tumors at the dome, Urachal adenocarcinoma and tumors arising in bladder diverticulum [5,6]. By offering bladder-sparing surgery, the complications of a radical cystectomy can be avoided and continence and erectile function can be preserved [7]. The prerequisite for a partial cystectomy is good capacity bladder and also post partial cystectomy patient should have an appropriate residual capacity of bladder. The above has to be achieved without compromising the oncological outcomes. The challenge in using minimally invasive surgery for partial cystectomy is to excise just appropriate amount of bladder so that all the margins are microscopically free of tumor and we are still able to retain the maximum amount of the normal bladder. Traditionally after dissection of the bladder it is distended moderately with saline, air, distilled water and in some cases with Mitomycin-C. In the above method, after distention, bladder is incised at a point where surgeon sees bulge of the tumor ending and after considering a margin of about 1-2cm [8]. In open surgical technique palpation of bladder is also used as a guide to determine the margin of excision. In minimally invasive surgery like in laparoscopy and robotic surgery these cues are absent and the surgeon has to rely totally on his visual perception. Though in terms of operative vision, benefits to the operating surgeon and post operative recovery minimally invasive approach using robotic platform is superior to open approach. For oncological and functional
outcome to be superior a precise amount of bladder along with the tumor has to be removed [9].

Tile-pro™ (Intuitive surgical, Sunnyvale, CA, USA) is software application that allows integration of separate camera feeds into console monitor apart from main robotic camera view. Therefore, surgeon can have two simultaneous camera views in form of picture in picture at the bottom of his screen. Use of this application allows simultaneous laparoscopic and cystoscopic visualization of the bladder. The console surgeon can mark the bladder tumor under cystoscopic guidance, when the laparoscopic light is dimmed, the tumor appears dark in the presence on cystoscopy light and rest of the bladder glows as it has clear saline (Figure 1). The tumor margins are well demarcated and surgeon can mark an incision 1 cm away from the tumor all around (Figure 2). The bladder can be entered at a point where the tumor has the sharpest shadow. At this stage the tumor and the bladder can be clearly seen and excised. Flexible and rigid cystoscopy can both be done to visualize the bladder. Although, the same can be replicated in laparoscopic surgery, but the surgeon requires two separate screens and has to concentrate on both of them. While using the Tile pro application of the Da Vinci™ system (Intuitive surgical, Sunnyvale, CA, USA) both the images can be seen on the robotic console and using the advantages of the robotic platform surgeon can precisely mark and excise the tumor. Intraoperative ultrasound can be used to localize the tumor, but a separate machine and probe is required which every operating room may not have, but all the urological operating rooms will definitely have a cystoscope [10].

Though this is a single case report, this technique has a potential to decrease positive margin rate in partial cystectomy, while maintaining a good bladder capacity.

CONCLUSION

Robotic assisted Partial Cystectomy using Tile Pro application is feasible; it would help surgeon achieved better oncological results without compromising functional outcomes.

REFERENCES