CASE REPORT

Combined Robotic-Assisted Laparoscopic Prostatectomy and Laparoscopic Hemicolectomy

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ABSTRACT

A 60-year-old man with prostatic adenocarcinoma and a synchronous tubulovillous adenomatous polyp of the colon underwent a successful robotic radical prostatectomy combined with a laparoscopic right hemicolectomy. We describe the initial report of this combined, minimally invasive procedure involving separate organ systems and surgical disciplines, and describe our technique.

Key Words: Robotics, Prostatectomy, Radical, Colectomy, Laparoscopy.

INTRODUCTION

The adoption of robotic-assisted laparoscopic prostatectomy (RALP) has permitted the performance of concurrent laparoscopic procedures with minimal increase in morbidity. Previous cases of RALP combined with other minimally invasive procedures have been reported.[1,2] To the best of our knowledge, we present the first case of RALP combined with laparoscopic hemicolectomy.

CASE REPORT

History

A 60-year-old man with no significant prior medical or surgical history was referred for an elevated PSA. Prostate biopsy revealed prostatic adenocarcinoma in 2 of 12 core biopsies. Right base core biopsy showed Gleason 3+3=6 adenocarcinoma involving 30% of the sample, and a right mid gland core biopsy showed Gleason 3+3=6 adenocarcinoma involving approximately 10% of the core tissue. Additionally, upon screening colonoscopy, a large polyp was discovered in the right colon that was unresectable endoscopically. Upon biopsy, the polyp was identified as a tubulovillous adenoma, concerning for progression to adenocarcinoma and necessitating excision.

The patient was counseled regarding his treatment options and expressed interest in surgical treatment for the prostatic malignancy as well as full excision of the colonic polyp. The possibility of a combined procedure to accomplish both therapies was presented. The patient found this option to be particularly attractive due to the potential for decreased morbidity and a shortened period of convalescence compared to 2 independent procedures. Additionally, avoiding the cost and inconvenience associated with 2 separate hospital stays and postoperative recovery periods played a significant role in the decision. He was thus consented for a combined RALP and laparoscopic right hemicolectomy to be performed in a single operative session. The colonic polyp was inked in preparation for laparoscopic resection.

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METHODS

Robotic Prostatectomy

The procedure began as a standard RALP. Following the induction of general anesthesia, the patient was placed in the lithotomy position and prepped and draped in standard fashion. Pneumoperitoneum was achieved with a Veress needle. Trocar placement is depicted in **Figure 1**. A 12-mm trocar was inserted into the peritoneal cavity at the umbilicus. Two 8-mm robotic trocars were placed lateral to the rectus sheath in each lower quadrant, and an additional 8-mm robotic trocar was placed in the left lateral flank. A 12-mm trocar was placed in the right pararectal area superior to the umbilicus, and another 12-mm trocar was placed in the extreme right lateral flank.

The patient was placed in a steep Trendelenburg position, and the da Vinci S surgical robot (Intuitive Surgical, Sunnyvale, CA) was docked. A standard robotic radical prostatectomy with bilateral "curtain"-type nerve sparing and bilateral pelvic lymph node dissection was performed.[3,4] The prostate was placed in an EndoCatch sac (Covidien AG, Norwalk, CT) and positioned in the pelvis to be removed at the conclusion of the combined operation. Instruments were removed, and the robot was undocked. Trocars were kept in position and pneumoperitoneum was sustained, maintaining the possibility of trocar reuse during the next stage of the procedure.

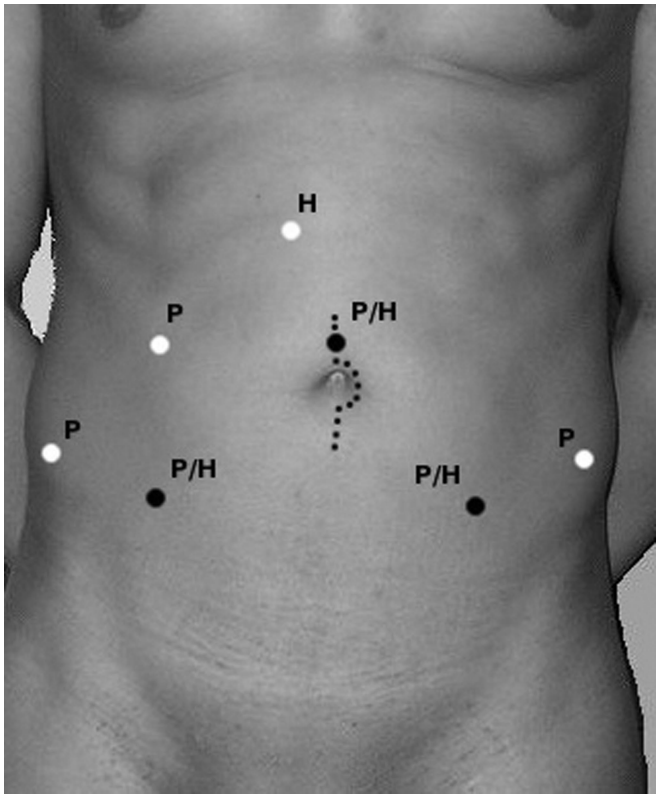

Figure 1. Trocar placement for the combined RALP and laparoscopic right hemicolectomy. H=hemicolectomy trocar, P=prostatectomy trocar.

Laparoscopic Right Hemicolectomy

The steep Trendelenburg was reversed towards supine in a slight head-down position. The table was rotated to place the patient in a modified left lateral decubitus position. Three trocar sites from the previous procedure were reused, namely the umbilical, left lower quadrant, and right lower quadrant. The 8-mm left lower quadrant robotic trocar was upsized to 12mm. Additionally, a 5-mm trocar was placed in the epigastrium **(Figure 1)**.

A standard laparoscopic right hemicolectomy was then performed. Identification of the inked margin near the hepatic flexure resulted in a resection from the terminal ileum to the midtransverse colon. Dissection and maintenance of exposure was made difficult by an excess of thick abdominal fat, but resection was completed successfully and without complications. The periumbilical trocar site was extended by 3cm around the umbilicus, a wound protector was placed, and the colonic specimen was removed. The prostatectomy specimen was also retrieved through the periumbilical site at this time. Complete resection of the adenomatous polyp was confirmed prior to proceeding. The bowel anastomosis was then performed intracorporeally in a side-to-side fashion using a laparoscopic stapling and suturing technique. Vascular integrity of the anastomosis, as well as lack of tension or torsion, was confirmed. A suction drain was placed in the left lower quadrant as per protocol following prostatectomy. A suture passer was used to close the fascia of the 2 right-sided 12-mm trocar sites. The remaining trocars were removed and pneumoperitoneum was released. The fascia of the extraction incision was closed with Vicryl sutures in a running fashion. The wounds were dressed, and the patient was returned to a supine position. Anesthesia was reversed, and the patient was extubated and transported to the recovery room in stable condition.

RESULTS

The total operative time was 332 minutes, 114 minutes for the prostatectomy, 218 for the hemicolectomy. Estimated blood loss was 250mL (prostatectomy, 150mL; hemicolectomy, 100mL). The patient's postoperative hospital course

was delayed due to an ileus, which resolved by postoperative day 7. No surgical interventions were needed, making this a Clavien grade I complication. The suction drain was left in place until postoperative day 8 due to high output, although fluid creatinine from the drain was the same as his serum creatinine, confirming that the fluid was not urine. The Foley catheter and suction drain were removed on postoperative day 8, and the patient was discharged on postoperative day 10. Final histopathology of the prostate revealed Gleason 3+4=7 prostatic adenocarcinoma, stage pT2cN0. Surgical resection margins and lymph nodes were negative. Final histopathology of the colon confirmed a tubulovillous adenoma with negative surgical resection margins. The patient had no further complications and did not require readmission within 90 days of the procedure.

DISCUSSION

Few reports exist of combined urologic and colorectal procedures in the treatment of malignancy.[5-7] In these instances, minimally invasive procedures were not utilized, and the colorectal involvement was limited to the rectum. Although the utilization of minimally invasive options for combined procedures is not without precedence for urologic malignancies,[1-2,8-11] there is a paucity of documented cases of combined minimally invasive procedures in the treatment of urologic and colorectal tumors, especially involving the use of robotic assistance. To the best of our knowledge, this is the first documented report of RALP for the treatment of primary prostatic adenocarcinoma combined with a laparoscopic hemicolectomy for the resection of a second primary colonic malignancy.

A combined robotic and laparoscopic procedure offers the patient a minimally invasive option for the treatment of malignancies in 2 separate organ systems. It avoids the morbidity inherent to multiple operations, especially in regards to postoperative adhesions, while also reducing the convalescence, inconvenience, and cost required for multiple independent procedures and additional hospital admissions. Because many of the trocar sites and the extraction site are utilized for both procedures, it can be assumed that the additional morbidity of the combined procedure is minimal compared to one procedure alone. The overall morbidity is less than what would have been required of 2 separate procedures, where each would require the creation of unique trocar and extraction sites.

In a separate concern, if the procedures were not done concurrently, one surgery would need to be deferred for several weeks to allow convalescence from the first procedure. Concurrent procedures avoid the delay in treatment of the deferred procedure, thereby eliminating the risk of interim cancer progression. It also avoids a potentially anxiety provoking choice regarding which of the 2 neoplasms to treat first.

A combined procedure is not without possible risks, limitations, and drawbacks. Complications from one procedure may impact the postoperative course of the other in ways that would be avoided if the procedures were performed separately. For example, a urinoma associated with a urethrovesical anastomotic leak could affect the integrity of the colonic anastomosis, potentially resulting in an enteric leak. However, such complications are rare and are likely outweighed by the avoidance of risk associated with adhesiolysis performed if the procedures were staged.

Our patient had a prolonged hospital course of 10 days due to an ileus. Clearly, this is a suboptimal outcome for a minimally invasive procedure. It is possible that his ileus may have been worsened by the increased intraperitoneal operative time and manipulation of bowel during the prostatectomy portion of the procedure. He also had significant output from his drain, which remained in place until postoperative day 8. Although this was determined not to be a urine leak by fluid creatinine, it may have been lymphatic fluid from the node dissection. This increased intraperitoneal fluid may also have contributed to his ileus. However, ileus is a relatively common complication of both RALP and colectomy. It is more common following bowel surgery (rates reported in the literature[12] range from 3% to 32%) than RALP ($\leq$1%[13-,4]), and it is thus unknown whether the concomitant RALP materially contributed to the ileus.

The operative time of a combined procedure is clearly lengthened in comparison to the component procedures, and therefore the patient must spend a prolonged time under general anesthesia (approximately 5.5 hours in this case), which presents the potential for a longer postoperative recovery time. It is possible that the ileus seen in our case may have been related to prolonged anesthesia exposure. Therefore, combined procedures should be limited to only those patients healthy enough to withstand an extended period of time under anesthesia.

Furthermore, the steep Trendelenburg position necessary to perform an RALP and the slight Trendelenburg of a hemicolectomy result in the patient's head being below his heart for the majority of the operative time. Prolonged surgeries in this position increase the risk of complications

associated with venous stasis, such as deep venous thrombosis and pulmonary embolism, and can even lead to compartment syndrome of the leg.[15] An increase in intraocular pressure from prolonged time in the Trendelenburg position, resulting in ophthalmologic complications have been reported in cases longer than 5 hours.[16] In this case, the patient was repositioned upon completion of the RALP and returned to a more neutral position for the remainder of the case. Minimizing the time spent in a steep Trendelenburg position, as well as a brief return to a neutral position at the transition point between the 2 procedures (a Trendelenburg "holiday"), may mitigate the risks associated with a lengthy operation in the head-down position.

Given the limited number of combined robotic procedures that have been documented, the true impact of the potential risks and benefits has not been described. However, both RALP and laparoscopic hemicolectomy are established procedures that are well described. When performed in a timely fashion, the complication rates for a combined procedure will likely be similar to the rates associated with either surgery performed alone. The extent of the risks and benefits of combined procedures would be further elucidated through more extensive case series. However, given the infrequency of situations where 2 separate organ systems have concurrent surgical conditions, it will require time to accumulate enough data from which to gain a more definitive characterization.

We decided to perform the RALP prior to the colectomy for 3 reasons. We wanted to avoid the risk of damaging the bowel anastomosis during the RALP, which is more likely to occur than damaging the urethrovesical anastomosis during colectomy. The bowel specimen was removed prior to the reanastomosis, necessitating an extension of one of the trocar incisions. Although it is possible to close the fascia of an extended incision and perform RALP,[17] this is suboptimal because it can be difficult to maintain insufflation. Finally, we wanted to minimize the operative time following the contaminated bowel reanastomosis portion of the procedure.

From a technical standpoint, trocar placement in combined robotic and laparoscopic procedures is important. Through our port placement strategy, we were able to reuse 3 trocar sites as well as the extraction site for both procedures **(Figure 1)**. Only 1 additional 5-mm trocar site in the epigastrium was required for the laparoscopic hemicolectomy. Therefore, only 7 trocar sites were needed for the completion of both procedures. In contrast, 9 or 10 trocar sites would have been needed had the procedures been performed separately, which likely would have increased operative morbidity.

The reuse of trocars requires coordination and planning by the surgical team; planning is of particular importance if different surgeons are performing the different procedures. The preoperative discussion for any combined robotic and laparoscopic procedure should include a strategy for potential reuse of trocar sites; ie, the technical requirements of the second procedure should be taken into consideration when placing trocars for the first procedure. The ideal trocar placement would maximize the efficient use in both procedures, while not compromising the safety and efficacious performance of either. This often necessitates slightly modifying standard trocar placement. For example, we placed our 8-mm right lower quadrant trocar slightly caudal to our normal placement to facilitate its use during the right hemicolectomy. Consideration for these types of modification may increase intraoperative efficiency and minimize the necessity of making additional abdominal incisions.

CONCLUSION

We present a successful combined robotic prostatectomy and laparoscopic right hemicolectomy for the treatment of synchronous prostatic adenocarcinoma and tubulovillous adenoma of the colon. Although his hospital course was delayed due to an ileus, a common complication following bowel surgery, it is possible that the combined procedure exacerbated the problem. However, we believe that this complication was an anomaly, and that, in the carefully selected patient, robotic procedures combined with other minimally invasive surgical methods can offer many benefits with minimal additional risk. These benefits include reduced morbidity with shortened hospitalization and convalescence, and reduced inconvenience and cost compared to 2 independent procedures and hospital admissions. The potential risks involved in combined operations may be minimized through careful preoperative planning and execution.

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