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Robotic-Assisted Laparoscopic Cystoprostatectomy for Prostatic Carcinosarcoma

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ABSTRACT

Carcinosarcoma of the prostate is a rare neoplasm with malignant epithelial and mesenchymal components. Herein, we report the case of a patient who underwent multiple transurethral resections of the prostate showing adenocarcinoma initially then carcinosarcoma. He underwent a robotic-assisted laparoscopic cystoprostatectomy, bilateral pelvic lymph node dissection, and ileal conduit urinary diversion and was discharged on postoperative day 7. Carcinosarcoma is discussed as an extremely rare malignancy of the prostate, with less than 50 cases reported in the literature. Robotic-assisted radical cystoprostatectomy is also discussed as a new procedure in minimally invasive surgery and as the first reported use for prostatic carcinosarcoma.

Key Words: Prostate, Robotic surgery, Carcinosarcoma, Laparoscopy.

INTRODUCTION

Carcinosarcoma of the prostate gland is a rare malignancy characterized by an admixture of malignant epithelial and mesenchymal components. Because it was presumed that the origin of these tumors was a carcinoma with varying degrees of differentiation including a sarcomatoid pattern, these tumors were first called "sarcomatoid carcinoma."[1] The contemporary classification, carcinosarcoma, is a more accurate description of this tumor because it comprises components of both adenocarcinoma and sarcoma. In contrast, a sarcomatoid carcinoma would apply to pure spindle cell tumors with epithelial differentiation.

The incidence of carcinosarcoma is estimated to be less than 0.1%,[2] with only 50 documented cases in the English literature. Of interest, 48% to 55% of patients diagnosed with prostatic carcinosarcoma have a history of adenocarcinoma of the prostate.[3] The objectives of this paper are to report a case of carcinosarcoma of the prostate resected by robotic-assisted radical cystoprostatectomy as well as discuss this new minimally invasive procedure as the first reported use for prostatic adenocarcinoma.

METHODS

A 73-year-old man who had undergone transurethral needle ablation of the prostate in the past underwent transurethral resection of the prostate (TURP) for obstructive voiding symptoms refractory to alpha blockade. The pathology was notable for 2 foci of Gleason 3+3=6 adenocarcinoma and several foci of high-grade prostatic intraepithelial neoplasia. The patient elected observation but developed recurrent obstructive voiding symptoms within 6 months. A cystoscopy at that time demonstrated extensive prostatic regrowth, and the patient underwent a second TURP. The pathology from the second TURP revealed adenocarcinoma with Gleason 5+4=9 involving approximately half the prostatic chips.

At this point, androgen ablation therapy was initiated and a PSA nadir of 0.3ng/mL was achieved. One year later, a third TURP was required for recurrent urinary retention. At this time, the pathology demonstrated carcinosarcoma. A metastatic evaluation including whole body PET CT scan and MRI of the head were negative and PSA was <0.1

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ng/mL. At this point, the patient was referred to our institution for definitive management.

RESULTS

After cystoscopic examination that demonstrated extension of the tumor into the bladder neck, a robotic-assisted laparoscopic cystoprostatectomy, bilateral pelvic lymph node dissection, and ileal conduit urinary diversion were performed. Operative time was 6 hours. Estimated blood loss was 250 mL, and 2 units of packed red blood cells were given intraoperatively for a hemoglobin of 9.6mg/dL and a hematocrit of 26.8% compared with preoperative values of 13.3 mg/dL and hematocrit of 38.1%. Posttransfusion hemoglobin was 11.4 mg/dL and hematocrit was 30.7%. The patient had an unremarkable postoperative course and was discharged from the hospital on postoperative day 7. He was fully recovered 3 weeks following the procedure and traveled to Mexico on a family vacation.

The gross pathology demonstrated tumor protruding into, but not invading, the bladder **(Figure 1)**. Microscopic examination revealed leiomyosarcoma and a separate focus (1% of specimen) of adenocarcinoma, Gleason grade 4 **(Figure 2)**. The pathologic stage was T3 N0, with extracapsular extension. Surgical margins were negative.

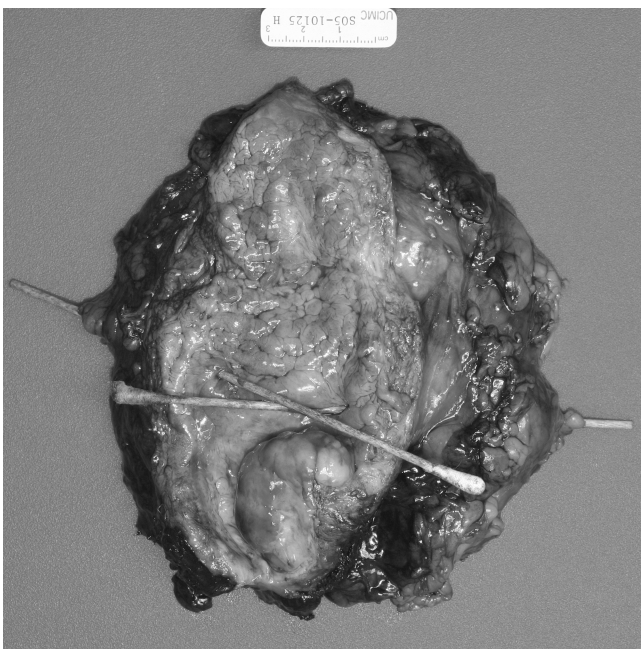

Figure 1. Gross cystoprostatectomy specimen. Pathology demonstrated prostatic carcinosarcoma.

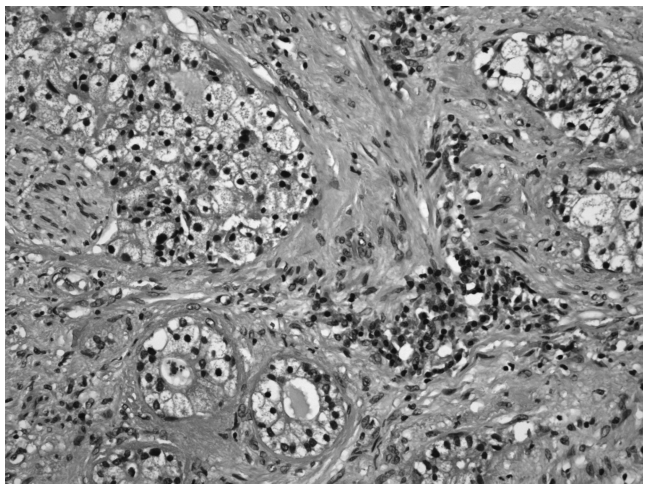

Figure 2. Hematoxylin and Eosin (H&E) stain showing spindle cells and adenocarcinoma.

The patient is currently undergoing adjuvant external beam radiation.

DISCUSSION

Carcinosarcoma of the prostate was first reported in 1967.[4,5] Multiple theories exist about the development of prostatic carcinosarcoma. One postulation is that both carcinoma and sarcoma develop simultaneously from different areas of the prostate. A second theory is dual differentiation from an immature totipotential cell. Other possibilities include transformation of adenosarcoma into sarcoma or transformation of sarcoma into adenosarcarcinoma. Finally, tumor dedifferentiation due to radiation or hormone therapy has been proposed.[2,6]

Postradiation sarcoma (PRS) of the prostate was described by Canfield et al[7] in 2001. They distinguished between carcinosarcoma and PRS of the prostate by histology and latency period. Carcinosarcoma was defined as prostatic cancer containing poorly differentiated adenocarcinoma mixed with sarcomatous elements, sometimes associated with a history of radiation or hormone ablation, less than 10 years before diagnosis. Pure PRS of the prostate was described as sarcoma alone, in a previously irradiated patient, 25 years after the original neoplasm (one testicular cancer and one prostate cancer, histology not reported). The study concluded that with only 2 cases of PRS of the prostate reported, the entity was extremely rare. Considering this extremely small number and the fact that only a fraction (14% to 21%)[3] of patients with carcinosarcoma have a history of radiation therapy, radiation

likely plays a minor, if any, role in development of carcinosarcoma.

Similarly, as the number of patients treated by androgen deprivation therapy greatly exceeds the number of cases of carcinoma arising in patients with previous androgen deprivation therapy, hormone therapy is unlikely to have a role in development of carcinosarcoma. In a series of 21 patients with carcinosarcoma by Dundore et al[3] in 1995, only 5 of 21 patients (24%) had a history of androgen deprivation therapy.

Biochemically, prostatic carcinosarcoma usually have a PSA level within normal ranges.[6] This may be explained by the undifferentiated nature of the sarcoma cells, hence the inability to produce PSA.[8]

Histologically, the epithelial portion is adenosarcoma with a variable sarcoma component. A review of 41 cases[2] demonstrated osteosarcoma to be the most common (50%), followed by chondrosarcoma (33%), leiomyosarcoma (17%), rhabdosarcoma (12%), malignant fibrous histiocytoma (10%), fibrosarcoma (7%), spindle cell sarcoma (7%), myosarcoma (5%), undifferentiated sarcoma (2%) and angiosarcoma (2%). Up to 41% of reported cases had more than one type of sarcoma.[3]

Metastases are found in 25% to 64% of cases at diagnosis.[2,6] A review of 41 cases[2] of carcinosarcoma found the lungs to be the most common site (43%) followed by bone or spine (26%), lymph nodes (19%), liver (17%), brain (10%), and 2% each of peritoneum, pancreas, spleen, penis, kidney, retroperitoneal space, pleura, and adrenal glands.

Radical surgery is recommended for carcinosarcoma due to its malignant nature and poor prognosis; however, radiation, chemotherapy, and hormonal therapy are also utilized. Overall prognosis with any treatment is poor, with a survival period of approximately 7 months, ranging from 34 days to 5 years.[2] The 3-year survival rate is approximately 10%.[6] No factor, including age, history of radiation, or androgen deprivation therapy, histologic subtype, percentage of necrosis, percentage of sarcoma, sarcoma grade, or Gleason grade of adenocarcinoma, has been found to be predictive of outcome.[2,3]

Robotic-assisted laparoscopic radical prostatectomy has become widely adopted and robotic-assisted laparoscopic cystoprostatectomy is now being developed in several centers. Gill et al[9] reported the initial two cases of laparoscopic radical cystoprostatectomy with ileal conduit performed completely intracorporeally in 2000. In 2003, Menon et al[10] reported a series of 17 robotic-assisted radical cystoprostatectomies and urinary diversions for bladder cancer focusing on nerve preservation. They used a 3-step technique of robotic pelvic lymphadenectomy and cystoprostatectomy followed by externalization of bowel and extracorporeal neobladder reconstruction, and internalization of the neobladder with robotic urethravesical anastomosis. Balaji et al[11] reported one case of robotic-assisted radical cystoprostatectomy and ileal conduit urinary diversion performed totally intracorporeally. Blood loss was 500mL, operative time 828 minutes, and hospital stay 10 days. Concurrently, Yohannes et al[12] reported 2 cases of robotic-assisted radical cystoprostatectomy with ileal conduit urinary diversion with intracorporeal ileal conduit construction. Estimated blood loss was 435mL and 1800mL, operative time 10 hours and 12 hours, and hospital stay 6 days for both patients.

CONCLUSION

To date, all reported robotic-assisted cystoprostatectomies have been performed for bladder cancer. We report the first case of robotic-assisted radical cystoprostatectomy for prostatic carcinosarcoma. Our acceptable operative time and short convalescence suggest that the robotic interface may facilitate minimally invasive cystoprostatectomy. Larger studies are certainly needed to determine whether robotic-assistance provides any advantages over standard open surgery.

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