Case Report

Arteriovenous fistula after robot-assisted laparoscopic prostatectomy: A rare case report

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Abbreviations & Acronyms

AVF = arteriovenous fistula
CECT = contrast-enhanced computed tomography
CT = computed tomography
POD = postoperative day
POM = postoperative month
PSA = prostate-specific antigen
RALP = robot-assisted laparoscopic prostatectomy
TAE = transarterial embolization

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Introduction: Arteriovenous fistula after radical prostatectomy is very uncommon. We report a rare case of pseudoaneurysm associated with arteriovenous fistula following robot-assisted laparoscopic prostatectomy.

Case presentation: A 67-year-old man diagnosed with prostatic adenocarcinoma underwent robot-assisted laparoscopic prostatectomy. He had a fever and lower abdominal pain with sign of peritoneal irritation, and his blood hemoglobin level dropped on postoperative day 11. Hemorrhage in the pelvic space with extravascular leakage was detected by contrast-enhanced computed tomography, and he underwent emergency angiography. An aneurysmal dilatation with early venous drainage was confirmed in a branch of the left internal iliac artery, and we diagnosed arteriovenous fistula. Transcatheter arterial embolization was performed, and the aneurysmal structure subsequently disappeared.

Conclusion: Arteriovenous fistula may occur as a complication of robot-assisted laparoscopic prostatectomy. Transcatheter arterial embolization appears to be a useful and minimally invasive treatment.

Key words: arteriovenous fistula, prostatectomy, pseudoaneurysm, robotic surgery, transcatheter arterial embolization.

Keynote message

AVF may occur as a complication of RALP. Transcatheter arterial embolization appears to be a useful and minimally invasive treatment.

Introduction

AVF is classified as either congenital or acquired. Acquired AVF usually occurs post-traumatically or iatrogenically including secondary to vessel puncture or operations around major vessels. However, AVF after radical prostatectomy is very uncommon. We report a rare case of pseudoaneurysm associated with AVF following RALP treated by TAE.

Case presentation

Five years before referral to our hospital, a 67-year-old man underwent prostate biopsy because of an elevated serum PSA level of 7.37 ng/mL. He was diagnosed with prostatic adenocarcinoma with Gleason score of 3+3 in 1/10 cores, and he chose active surveillance. Re-biopsy was performed because of an elevated serum PSA level of 10.9 ng/mL, which confirmed adenocarcinoma with Gleason score of 3+3 in 3/10 cores. Tumor localization was suspected in the right side of the prostate based on magnetic resonance imaging (cT2aN0M0). As the patient elected curative therapy, he was referred to our hospital. He had a history of right-sided inguinal hernia mesh repair 8 years earlier. The patient underwent RALP with trans-peritoneal approach, head-down position at an angle of 25°, left-side nerve-sparing without pelvic lymph node dissection under general anesthesia. Total operative time was 3 h 36 min, and console time was 2 h 52 min. Estimated blood loss was 312 mL including blood in urine. Major blood loss occurred during left neuro-vascular bundles.
dissection. We preserved the left neuro-vascular bundles using ligature clip (Hem-o-lok®; Weck Closure Systems, Research Triangle Park, NC, USA) without using a thermal energy device, to minimize damage to neuro-vascular tissue. This was followed by 3-0 barbed sutures at the bleeding point and placing tissue-sealing sheets (TachoSil®, CSL Behring Japan, Tokyo, Japan) to control bleeding. Since steep head-down position and pneumoperitoneum during RALP prevent us from recognizing the presence of a hemorrhage, we confirmed the hemostasis under low pneumoperitoneum pressure (8 mmHg) at the end of prostate extraction carefully. Physical findings and laboratory data remained within normal limits until POD 7. Blood hemoglobin level on POD 1 was 11.4 g/dL. We removed the drainage tube on POD 4 when fresh blood in the discharge resolved. Cysto-urethrography was performed on POD 7 to confirm no urine leakage and revealed that the bladder was shifted to the right because of an intrapelvic mass that was a suspected post-surgical hematoma (Fig. 1). As a result, we delayed urethral catheter removal. The patient developed a fever, hematuria, and lower abdominal pain with signs of peritoneal irritation on POD 11, and his blood hemoglobin level decreased to 9.7 g/dL with no disturbance of his vital signs. Hemorrhage in the pelvic space with extravascular leakage was detected by CECT (Fig. 2). With a diagnosis of a rupture of a pseudoaneurysm, he underwent emergency angiography. We confirmed an expanse of contrast agent with early venous drainage in a branch of the left internal iliac artery, a pudendal artery (Fig. 3a), which we diagnosed as an AVF, and he underwent TAE using a gelatin-sponge agent. Extravascular leakage disappeared after embolization (Fig. 3b), and his recovery was uneventful. We confirmed shrinkage of the hematoma and disappearance of the AVF by CT on day 7 after TAE, removed the urethral catheter on day 10 after TAE, and he was discharged on day 12 after TAE, without subsequent symptoms at the 3-month follow-up.

Fig. 1 Cysto-urethrography showing that the bladder is shifted to the right because of an intrapelvic mass that was a suspected hematoma (arrowheads).

Fig. 2 CECT showing hemorrhage in the pelvic space with extravascular leakage (arrowhead).

Fig. 3 Angiography (a) showing an aneurysmal dilatation with early venous drainage in a branch of the left internal iliac artery, most likely a pudendal artery (arrowhead), and (b) confirming that the aneurysmal structure disappeared after embolization.
Discussion

Acquired AVF usually occurs post-traumatically or iatrogenically including secondary to vessel puncture and operation around vessels. Pseudoaneurysm also occurs similar situation. AVF is an abnormal connection or passageway between an artery and a vein. In contrast, pseudoaneurysm is a localized dilation of an artery caused by weakening of the elastic tissue and media of the arterial wall. AVF after radical prostatectomy is very uncommon. Furthermore, changes to a patient’s vital signs that indicate shock are expected following pseudoaneurysm or AVF bleeding, but our patient showed no unstable vital signs. We hypothesized that massive bleeding of AVF was suppressed by pressure of a pelvic hematoma, which was formed early postoperatively. Moreover, pressure secondary to bleeding from the AVF might breach the vesico-urethral anastomosis, resulting in gross-hematuria and abdominal pain due to urinary leakage on day 11.

To our knowledge, there are only two previous case reports of AVF after RALP (Table 1).1,2 AVF occurred at the internal pudendal artery in all patients, including in our patient. We hypothesized that AVF might have occurred at the neuro-vascular bundles preservation site where we sutured to control bleeding, in our patient.

The mechanisms of AVF and pseudoaneurysm development after surgery are not clear. In a previous report of renal pseudoaneurysm after laparoscopic partial nephrectomy, the authors suggested that larger needles used for parenchymal suturing result in pseudoaneurysm formation.3 We hypothesized that AVF occurs with a similar mechanism. However, it may be difficult to completely prevent AVF, especially using nerve-sparing procedures during RALP because suturing hemostasis is required to avoid heat damage to the neuro-vascular bundles using energy devices. As excess suturing may be a risk factor for AVF, it might be useful to minimize suturing at the bleeding point, especially with venous bleeding, and to use hemostatic agents – such as TachoSil® or oxidized cellulose (Surgicel®; Ethicon Inc., Somerville, NJ, USA) instead. We should also notice that steep head-down position and pneumoperitoneum during RALP prevent us from recognizing the presence of a hemorrhage.

In previous reports of AVF after RALP, both cases were diagnosed by CECT and treated with TAE. It is important to consider the possibility of AVF and to perform CECT as the first step when a hemorrhagic event occurs including severe gross hematuria or decline in blood hemoglobin level following RALP. We recommend immediate angiography if AVF or pseudoaneurysm is suspected by CECT.

No AVF recurrence was reported in all three reported patients who underwent TAE for AVF after RALP. TAE is an effective and minimally invasive treatment for AVF and pseudoaneurysm;4,5 however, excess embolization of the pudendal artery may effect erectile dysfunction.6 Postoperative sexual function is unclear in two previous cases, but selective minimum embolization is necessary to avoid erectile dysfunction.7

Conclusion

AVF may occur as a complication of RALP. We must consider the possibility of bleeding from iatrogenic pelvic AVF if hemorrhagic events including severe hematuria or acutely decreased blood hemoglobin levels occur. TAE appears to be a useful and minimally invasive treatment for AVF after RALP.

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Conflict of interest

The authors declare no conflict of interest.

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