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Management of Localized Prostate Cancer by Retroperitoneal Laparoscopic Radical Prostatectomy in Patients after Kidney Transplantation

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Abstract

Purpose: Kidney transplant recipients (KTRs) are at high risk for de novo malignancies, and the incidence of prostate cancer (PCa) is about 2-fold higher in these patients than in the general population. Laparoscopic radical prostatectomy (LRP) is an accepted minimally invasive treatment for organ-confined PCa. However, the procedure is challenging in KTRs because of the potential risk of allograft and ureteral injury. In this study, we report our experience with LRP in patients following kidney transplantation.

Methods: Between 2006 and 2013, 234 consecutive LRPs were performed at Tokyo Women's Medical University Hospital. We report the outcomes for three patients with prior renal transplants who underwent retroperitoneal LRP.

Results: the mean age of the patients was 56.3 years. The average operative time was 236 min (range, 180–315 min). The mean estimated blood loss was 54.6 mL, with no patients requiring blood transfusions. Although tension-free urethrovesical anastomosis was achieved in every patient, anastomotic leakage occurred in two patients. The average hospital stay was 18.3 days, and the mean duration of urethral catheterization was 21 days. Serum creatinine levels remained unchanged in two patients who had functioning renal allografts. The third patient commenced hemodialysis postoperatively and resumed a continuous ambulatory peritoneal dialysis regimen two weeks after the operation.

Conclusion: Although technically challenging, retroperitoneal LPR remains an effective treatment option for localized PCa in patients who have undergone kidney transplantation.

Keywords: Prostate cancer; Laparoscopic prostatectomy; Kidney transplantation

Introduction

Kidney transplant recipients (KTRs) are at high risk for de novo malignancies. Genitourinary malignancies have been reported to represent the second most common type of malignancy in the KTR population in the United States. However, the incidence of prostate cancer (PCa) in renal transplant recipients is not more than around two times that of the general population. For clinically localized PCa, radical prostatectomy (RP) is the standard treatment. Laparoscopic RP (LRP) is an accepted minimally invasive treatment for organ-confined PCa. Robotic prostatectomy is also accepted as a standard treatment for localized PCa. However, KTRs are at risk for allograft and ureteral injury; therefore, sophisticated techniques are required. We report our experience with LRP in KTRs and discuss possible treatment choices for localized PCa in KTRs, especially surgical management.

Patients and Methods

Between 2006 and 2013, 234 consecutive LRPs were performed at Tokyo Women's Medical University Hospital. Of the 234 patients, three patients had previously undergone living donor kidney transplantation. All three patients had American Society of Anesthesiologists Physical Status 3. The patients' preoperative serum creatinine levels were measured on the day of surgery, and their postoperative levels were recorded on the date of discharge. Pathological assessments were performed at our institution, and the patients' disease was staged using the 2002 tumor, node, and metastasis (TNM) staging guidelines.

Surgical Procedure and Postoperative Management

Under general anesthesia, the patients were placed in the supine position with their legs open. LRP was performed using five ports. The retroperitoneal space was directly entered through a small subumbilical incision and dilated using an endoscopic balloon dissection system (PDB™Balloon, Covidien Japan, Tokyo, Japan). The camera trocar was placed, and abdominal pressure was maintained at 10 mmHg. The other four ports were placed as shown in Figure 1. The patients were then placed in a 15° Trendelenburg position. Adhesiolysis around the kidney allograft was performed carefully to avoid damage to the transplanted ureter. RP was then performed in accordance with the well-described technique of endoscopic extraperitoneal RP [1,2]. After releasing the prostate from its surrounding fatty tissue, the endopelvic fascia was sharply incised. The puboprostatic ligaments were divided, and the dorsal venous plexus was

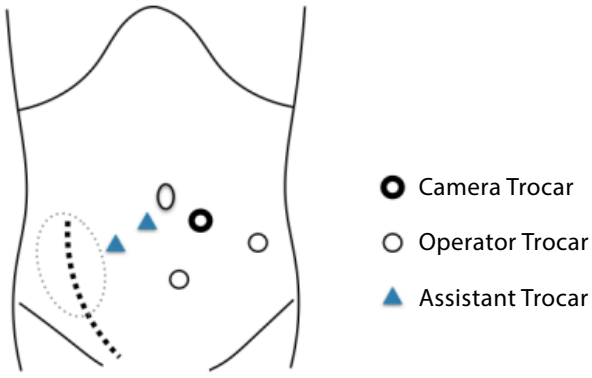

Figure 1: The 12 mm opticaltrocar is inserted using mini-laparotomy technique. Four other trocars are placed under direct vision control so as to avoid allograft kidney; a 10mm trocar in the left iliac fossa, another 10mm trocar in the midline between optical trocar and pubic bone and two 5 mm trocars are in the right iliac fossa.

ligated using 2-0 Polysorb™ on an SH needle (Covidien Japan, Tokyo, Japan) or an Endo-GIA™ Universal Stapler (Covidien Japan, Tokyo, Japan). The bladder neck was incised using monopolar and bipolar electrocautery. After the bladder neck was completely dissected and the anterior layer of Denonvilliers' fascia was incised, the vas deferens and seminal vesicles were identified bilaterally. Both vasa deferentia were dissected, and the seminal vesicles were mobilized. After incision of the posterior layer of Denonvilliers' fascia, the prostatic pedicles were identified and sharply transected. Nerve-sparing surgery was performed from an intra- or interfascial approach when indicated. Following complete mobilization of the prostate, the urethra was divided using cold scissors. Once dissection of the prostatic apex was completed, the prostate was retrieved with Endo Catch™ (Covidien Japan, Tokyo, Japan) and temporarily placed next to the camera trocar. Following posterior musculofascial reconstruction, a watertight urethrovesical anastomosis was performed with a running suture using 3-0 PDS II (Ethicon, Inc, West Summerville, NJ, USA) or 3-0 V-Loc™ with a 17-mm needle (Covidien Japan, Tokyo, Japan). The first suture was placed at the 3 o'clock position. After completion of the entire anastomosis, an 18 F Foley catheter was inserted. The watertight anastomosis was confirmed by filling the bladder with 100 mL sterile saline. Finally, a 15 F vacuum drain was placed in the pelvis. At the end of the procedure, the specimen was removed through the camera port wound. Immunosuppressive drugs were restarted on postoperative day (POD) 1. The drain was removed between POD 2 and POD 5, when the drain discharge became <50 mL per day. The Foley catheter was removed and a voiding cystogram was performed on PODs 6–14.

Case Reports

Case 1

A 52-year-old man with end-stage kidney disease caused by diabetic nephropathy underwent ABO-incompatible living donor kidney transplantation in 2007. The donor was his wife, and her kidney was transplanted to his right iliac fossa. Laparoscopic splenectomy was performed simultaneously as desensitization therapy. The patient's postoperative course was uneventful and the function of the allograft was stable, with a serum creatinine level of 0.81 mg/dL. The patient's maintenance immunosuppressive protocol consisted of tacrolimus, mycophenolatemofetil, and methylprednisolone. An annual health check revealed a prostate-specific antigen (PSA) level of 16.0 ng/mL in December 2007. Ultrasound-guided needle biopsy revealed left-sided adenocarcinoma of the prostate (Gleason score 4 + 3). The estimated prostate volume was 25 mL. The patient underwent retroperitoneal LRP with left obturator lymph node dissection. The procedure was completed successfully. The overall operative time was 316 minutes. The prostatectomy and anastomosis required 190 and 100 minutes, respectively. The estimated blood loss was 100 mL. There were no perioperative complications. On POD 6, a voiding cystogram revealed leakage of the contrast medium around the site of the anastomosis. The Foley catheter was reinserted. On POD 8, the patient developed a high fever. Computed tomography revealed a pelvic abscess around the anastomotic site and free air in the transplanted ureter. Emergency laparotomy was performed on the same day. The patient subsequently recovered without complications, and he was discharged on POD 22. Histopathology revealed prostatic adenocarcinoma in the left lobe with extracapsular extension at the apex and a Gleason score of 4+5. The PSA nadir was 0.031, but PSA failure was observed four months later. The patient received salvage external beam radiation therapy (total dose, 64.8 Gy). Following radiation therapy, the patient made steady progress. His PSA level is currently <0.01 ng/mL, and his serum creatinine level is 0.7 mg/dL. Throughout the patient's progress, we reduced his immunosuppressants and did not change the drugs.

Case 2

A 52-year-old man presented to our hospital for a second kidney transplant. He had received his first kidney transplant in 1997. The function of the graft decreased nine years later, and the patient began peritoneal dialysis therapy. Pretransplant cancer screening revealed a PSA level of 6.01 ng/mL. Prostate needle biopsy revealed left-sided adenocarcinoma of the prostate (Gleason score 4+4). The estimated prostate volume was 41 mL. The patient underwent retroperitoneal unilateral nerve-sparing LRP and left obturator lymph node dissection. The overall operative time was 180 min. The estimated blood loss was 30 mL. The patient commenced hemodialysis on POD 2. The Foley catheter was removed on POD 4. The patient was discharged on POD 6 and resumed his continuous ambulatory peritoneal dialysis regimen two weeks after discharge. He underwent successful living donor kidney transplantation three years later. At the time of his most recent follow-up, the patient had no evidence of PSA relapse.

Case 3

A 63-year-old man presented with pollakiuria and urinary incontinence. He had undergone successful kidney transplantation in November 1998 with a living related donor renal allograft to his right iliac fossa. The allograft function was stable with a serum creatinine level of 1.54 mg/dL. The maintenance immunosuppressive protocol was same as that of the patient in Case 1. Fourteen years after the kidney transplantation, digital rectal examination revealed a moderately enlarged prostate, and the patient's PSA level was 14.4 ng/mL. A prostate needle biopsy revealed bilateral adenocarcinoma (Gleason score 4 + 4). The patient underwent retroperitoneal LRP and left obturator lymph node dissection in August 2013. The operative procedure was the same as in Cases 1 and 2. The total operative time was 215 min, and the estimated blood loss was 34 mL.The patient's postoperative course was uneventful. However, on POD 7, a voiding cystogram revealed anastomotic leakage. The anastomosis site leakage required 30 days to heal. On follow-up, PSA relapse was found to have occurred 15 months after the prostatectomy. The patient received salvage radiation therapy. Following radiation therapy, the patient has displayed no evidence of recurrence. We reduced the immunosuppressants postoperatively but did not change the drugs.

Discussion

The incidence of PCa is increasing year by year in Japan. PCa is the top in male cancer at estimated morbidity in 2015. KTRs comprise a

population usually considered at high risk for malignancies, with an estimated incidence that is 4–20-fold higher than that in the general population [3]. However, it has been reported that the standardized incidence ratio of PCa in KTRs is not very much higher than that in the general population. The reported prevalence of PCa in renal transplant patients ranges from 0.72 to 1% [4,5].

There are a variety of treatment options for localized PCa, including RP, radiation therapy, and active surveillance. Local treatment of PCa in renal transplant recipients is challenging, however, because they have renal allografts in the iliac fossa, which were anastomosed to the iliac vessels and the anterolateral wall of the urinary bladder. Active surveillance appears inappropriate because KTRs are at higher risk of disease progression than the general population. External beam radiation therapy can possibly cause ureteral obstruction, which might enhance the risk of graft dysfunction. The doses delivered to the ureteroneocystostomy have been calculated to range from <20 Gy to >45 Gy depending on bladder repletion [6]. RP is the gold standard in terms of therapeutic options for the management of localized PCa in the non-KTR population, but it carries a risk of injury to the renal graft, ureter, and bladder in renal transplant recipients.

Retropubic RP has been performed in selected renal transplant patients, and good results have been achieved in many centers. Perineal prostatectomy has also been reported to be successful [7]. The latter has the advantage of avoiding direct manipulation of the renal allograft or allograft ureter. LRP has advantages in that the magnified view enables precise dissection, control of blood loss, and early patient recovery. The first case of LRP was reported by Shah et al. in a 50-year-old renal transplant patient with localized PCa [8]. They advocated a transperitoneal approach because it avoids the adhesions present in the retroperitoneal space surrounding the graft. There are several reports regarding LRP in kidney allograft recipients. Most of the authors state that it is a technically feasible and safe procedure without major complications and with no different surgical challenges compared to the standard LRP. In contrast, Robert et al. reported that there was a higher rate of rectal injury in KTRs than in other patients, and iliac vein thrombosis resulted in graft loss [9]. Urethrovesical anastomosis can be more difficult because the renal allograft can interfere with the movements of the instruments. Furthermore, lymph node dissection on the ipsilateral side of the transplanted kidney is nearly impossible. This is another limitation from the point of view of cancer control. In our patients, we adopted an extraperitoneal approach. The extraperitoneal approach has several advantages. It does not require either a steep Trendelenburg position or high-pressure pneumoperitoneum, which could affect renal allograft circulation during the operation. This approach could also preserve peritoneal function and avert the development of gastrointestinal complications. However, although the extraperitoneal approach is ideal for patient safety, this procedure is more technically challenging than the transperitonealapproach. Although anastomosis leakage was frequently observed in our series, it was probably caused by delays in wound healing associated with immunosuppressive therapy, as opposed to being a technical problem.

Robot-assisted RP (RARP) appears to be the ideal surgical option for localized PCa in renal transplant recipients because of its high flexibility in instrument operation [10]. Jhaveri et al. reported the first case of RARP [11]. Since 2012, the Japanese health insurance system has covered RARP, and more than 200 RARPs have been performed, including a few procedures that were performed in KTRs in our institutes. The specific details of RARP are reported elsewhere.

In conclusion, although LRP is more technically challenging in KTRs than in non-transplant patients, it remains a treatment option for localized PCa in patients after kidney transplantation.

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