Transient urine leakage following cryoablation: case report

Byung Kwan Park
Department of Radiology, Samsung Medical Center, Sungkyunkwan University School of Medicine, Seoul, Korea

ABSTRACT
Urinary complications are uncommon after percutaneous cryoablation for the treatment of small cell carcinoma. This minimally invasive treatment results in less urothelial damage than other thermal ablation techniques. However, urine leakage can occur from the cryoablation track on which the applicator is placed during the procedure. However, only a small number of studies have investigated the clinical outcomes of post-cryoablation urinary complications. Recently, we encountered a case of urine leakage following computed tomography-guided cryoablation. The purpose of this case report is to describe the causes, findings, and management of post-cryoablation urine leakage.

Keywords: Carcinoma, renal cell; Cryosurgery; Urine leakage

INTRODUCTION
Thermal ablation is recommended as an alternative treatment for renal cell carcinoma (RCC) in patients who are at a higher risk of postoperative morbidity or mortality [1,2]. Such minimally invasive treatments include radiofrequency ablation (RFA), cryoablation, microwave ablation (MWA), laser ablation, and high intensity focused ultrasound [1,2]. Of these, RFA, cryoablation, and MWA are currently employed to treat small cell carcinoma. Cryoablation maintains tumor tissues at very low temperatures, whereas RFA and MWA elevate the temperature of the tumor tissue by agitating ions or water molecules [1,2]. Cryoablation has several advantages over RFA or MWA, including less pain, clearer ablation, and sculpting of the ablation zones [1,2].

In addition, cryoablation results in less urothelial damage than RFA or MWA [3]. Urinary complications include strictures caused by thermal damage or leakage from mechanical damage. To date, few investigations have addressed urine leakage; thus, the clinical outcomes of this complication are not well known. The purpose of this case report is to describe the causes, findings, and management of post-cryoablation urine leakage.

CASE REPORT
A 63-year-old woman underwent left radical nephrectomy for left RCC 13 years ago and open cryoablation for right RCC 7 years ago. She was transferred to undergo thermal ablation to treat
a solid right renal mass which measured 2.5 cm in diameter and was located endophytically on computed tomography (CT) imaging (Fig. 1A). It was histologically confirmed by CT-guided biopsy. Cryoablation was performed to minimize thermal injury to the urothelium in the right collecting system. Interventional procedures were guided using a large-bore CT scanner. General anesthesia was administered because the patient needed to lie on the CT table for 3 hours or more, even though it was not painful. Three 14-gauge applicators were placed within the tumor to create a large ice ball covering a 1 cm wide safety margin, as well as the right RCC (Fig. 1B). During the procedure, acute hematoma and gross hematuria due to urothelial damage were detected; however, there was no ureteropelvic stricture (Fig. 1B). A small amount of urine leaked from the ablation tract where the applicator was placed (Fig. 1C). One day after cryoablation, unenhanced abdominal CT, which was performed because of right flank pain, revealed persistent urine leakage and increased perirenal urinoma compared with the cryoablation CT scan (Fig. 1D). Retrograde pyelography performed 2 days after cryoablation no longer revealed a right renal fistula (Fig. 1E). However, an internal catheter was inserted into the right ureter to reduce right flank pain and avoid recurrent urine leakage. The patient was discharged 3 days after cryoablation. Two weeks later, the patient did not complain of any signs or symptoms during the first follow-up visit.

DISCUSSION

Thermal ablation cannot prevent heat or freezing damage to
the urothelium when treating an endophytic RCC. Therefore, cryoablation is preferred over RFA or MWA because it causes less urothelial damage. Sung et al. [3] and Makki et al. [4] reported that cryoablation can injure the urothelium in an animal model, but the degree of urothelial damage is reversible. Many clinical studies have demonstrated that percutaneous cryoablation is less harmful to the urothelium in most clinical cases [5,6]. Consequently, the incidence of ureteropelvic junction strictures is lower with cryoablation. However, the incidence and outcomes of urine leakage after thermal ablation are not well known. Post-RFA or -MWA urine leakage is likely to become permanent and is frequently treated with nephrectomy if they cannot drain percutaneously in many cases [7,8]. In contrast, post-cryoablation urine leakage has rarely been reported in ileal conduits [9]. It is assumed that this complication is not permanent, but transient, even though it occurs following cryoablation. Unlike with RFA or MWA, the fistula tract is likely to close shortly after cryoablation. Moreover, Ward et al. [10] reported that cryoablation can treat urine leakage resulting from partial nephrectomy by ablating the fistula from the collecting system. In our case, the amount of urinoma increased on post-cryoablation day 1 because a hematoma intermittently obstructed the ureter, leading to a persistent fistula tract. This disappeared on retrograde pyelography performed 2 days after cryoablation. From this perspective, urine leakage is not a significant complication following cryoablation. However, whether post-cryoablation urine leakage is a transient complication remains unclear. Therefore, further investigation is necessary to determine long-term outcomes in a larger study population.

In conclusion, urine leakage can occur when endophytic RCC is treated with percutaneous cryoablation. This complication may spontaneously resolve without the need for nephrectomy.

CONFLICTS OF INTEREST

No potential conflict of interest relevant to this article was reported.

ORCID

Byung Kwan Park https://orcid.org/0000-0002-4114-8859

AUTHOR CONTRIBUTIONS

Conception or design: BKP.
Acquisition, analysis, or interpretation of data: BKP.
Drafting the work or revising: BKP.
Final approval of the manuscript: BKP.

REFERENCES