Case report

Management of complete ureteral avulsion in ureteroscopy

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A B S T R A C T

Ureteral avulsion is an uncommon yet severe complication of ureteroscopy. Among 8336 patients who received ureteroscopic procedures in our hospital from December 2001 to December 2011, we encountered two cases of ureteral avulsion. The first of these experienced disruption at the ureteropelvic junction due to extraction of the tubular ureter from the urethra, which was corrected by immediate open surgery to reposition and anastomose the ureter. The second patient sustained a proximal ureteral disruption following retrieval of the ureteroscope, which was wedged in the narrow lumen of the proximal ureter, and led to simultaneous extraction of the distal ureter. Immediate surgical intervention was performed to maintain ureteral continuity. Mild hydronephrosis was observed in kidneys that were ipsilateral to the ureteral avulsion in both patients. However, no physical discomfort or loss of renal function was indicated after 12 months.

1. Introduction

Ureteral avulsion during ureteroscopy is a challenging condition for urologists, and it generally occurs in 0.06–0.45% of patients. Inappropriate management of ureteral avulsion often leads to undesirable complications such as obstructive uropathy, retroperitoneal urinoma, urine leakage, and eventual nephrectomy. We report two patients with complete ureteral avulsion due to ureteroscopic procedures, whose major complications were largely avoided by timely surgical interventions.

2. Case reports

2.1. Case 1

A 53-year-old female experienced pain in the upper left abdominal quadrant. She sought initial medical attention from the gastrointestinal outpatient department. Urologists were consulted following observation of mild left hydronephrosis during renal sonography. Although kidney-ureter-bladder film revealed no stone density, diagnostic ureteroscopy was performed to examine left obstructive uropathy, and a narrow lumen of the left proximal ureter was encountered. Advance of the semirigid ureteroscope (diameter: Fr 7.5/6.0) through the stricture segment of the ureter following the placement of a 0.38-mm guidewire was attempted. Resistance was felt during retrieval of the ureteroscope, which became wedged in the narrow lumen of the proximal ureter. Total disruption of the ureteropelvic junction was discovered as the ureter was brought out of the urethral meatus with the ureteroscope (Fig. 1). Immediate end-to-end ureteral anastomosis was performed over the spatulated ends using the conventional abdominal approach, and the double-J catheter was removed after 6 months. After 12 months, intravenous urography (IVU) showed left hydronephrosis (Fig. 2). However, due to the asymptomatic nature of the hydronephrosis, further treatment was not pursued and subsequent follow up by visits to the outpatient office was deemed sufficient.

2.2. Case 2

Due to an excessive tumor mass, preoperative placement of a ureteral double-J catheter was requested for a 54-year-old male diagnosed with sigmoid colon cancer and a single liver metastasis on January 2010. Under general anesthesia, the semirigid ureteroscope (diameter: Fr 7.5/6.0) was advanced to the proximal ureter, and resistance was felt as the ureteroscope was tightly wedged in the ureteral lumen. Even after extraction maneuvers, a 10-cm long tubular structure clung firmly to the surface of the instrument and came out of the body with the ureteroscope. Immediate surgical
repair of the torn ureter was performed using the abdominal approach and the malignant colon tumor was excised. However, the damage sustained by the dislodged ureter section was too extensive for reattachment, and the length of the remaining ureter was too short to be implanted into the urinary bladder in situ. Therefore, retroperitoneal transureteroureterostomy with bilateral placement of a double-J catheter was elected (Fig. 3). Twelve months after surgery, sonography showed hydronephrosis in the kidney ipsilateral to the injured ureter (Fig. 4A and B), but no loss of renal function was observed. Thus, subsequent quarterly follow up by visits to the outpatient office was considered sufficient.

3. Discussion

Ureteroscopy is widely used for the treatment of urolithiasis, for the management of ureteral malignancy, and for the diagnosis of unclear hydronephrosis. Various levels of hematuria, ureteral mucosal injury, ureteral wall perforation, and ureteral avulsion following ureteroscopic procedures are associated with inappropriate use of ureteroscopy. Among these complications, ureteral avulsion is the most severe and challenging condition to manage and occurs in 0.06–0.45% of cases. One of the most frequently reported causes of complete ureter avulsion was stone manipulation with a basket. However, the immediate cause of ureter avulsion in the above cases was narrowing of the ureteral lumen. Thus, surgical indications must be carefully chosen to avoid serious complications such as ureteral avulsion. In addition, surgical manipulation should be as gentle as possible to avoid malpractice.

Maintenance of continuity of the urinary tract is of critical importance during the handling of ureteral avulsions. However, even after successful surgical interventions to amend avulsed ureters, complications often follow, and inevitably lead to significant compromise of renal function. The optimal management of ureteral avulsion is determined according to factors relating to age.
and general physical condition of patients, degrees of tearing along the ureter, functions of the affected kidneys, and the lengths of the remaining ureters. Various surgical approaches have been proposed for the management of such conditions, and in the absence of segmental defects of the ureter, ureteropelvic anastomosis, end-to-end ureteral anastomosis, and ureteroneocystostomy are among the most commonly adapted techniques. However, the management of ureteral defects requires more complicated procedures such as ileal interposition, appendix interposition, transureteroureterostomy, Boari flap, and ileal interposition, which approach requires no additional surgical manipulations to uninvolved organs.

During surgical management of proximally avulsed ureters, the success of repositioning is reportedly inversely proportional to the duration of blood supply interruption. Thus, prolonged delays during repositioning of the ureter may inadvertently lead to inflammation-mediated necrosis and fibrosis along the retroperitoneal area that surrounds the displaced ureter. Moreover, these conditions can further deprive tissue matrices that facilitate the repair of the repositioned ureter. Su et al. reported the repair of an avulsed ureter with immediate repositioning and omentum wrapping. We also present the feasibility of ureteral repair following brief devascularization, and observed the maintenance of viability of the ureter during brief mild ischemia, and preservation of function following the reestablishment of blood supply. However, the effects of brief ischemia on these tissues require more detailed investigation in clinical and animal studies. Nonetheless, in the present cases, continuity of injured ureters was confirmed by IVU at a 12-month follow up. Although hydronephrosis was observed in both patients, renal function was preserved without subsequent complications.

The optimal management approach for proximal ureteral avulsion with segmental ureteral defects remains inconclusive. The simplicity of surgical management and the favorable outcomes in the present cases support transureteroureterostomy as a treatment option. Moreover, unlike autotransplantation of the kidney, Boari flap, and ileal interposition, this approach requires no additional surgical manipulations to uninvolved organs.

4. Conclusion

Although ureteral avulsion is an undesirable urological condition, it appears that the key to effective management of avulsed ureters is the rapid establishment of continuity to the affected ureter. To this end, percutaneous drainage is an effective approach, but the postsurgical prognosis and the resulting impact on the quality of life preclude its use as a first line option for the management of ureteral avulsion. As an alternative, the present approach is aggressive compared with percutaneous drainage, however immediate and direct repair produces favorable outcomes following ureteral avulsion.

Conflicts of interest

The authors declare that they have no financial or non-financial conflicts of interest related to the subject matter or materials discussed in the manuscript.

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