Percutaneous nephrostomy for symptomatic hypermobile kidney: a single centre experience

Radosław Starownik[1], Tomasz Golabek[2], Krzysztof Bar[1], Kamil Muc[1], Paweł Płaza[1], Piotr Chlosta[2]

[1]Department of Urology and Urological Oncology, Medical University of Lublin, Lublin, Poland
[2]Department of Urology, Medical College Jagiellonian University, Krakow, Poland

Videosurgery Miniinv 2014; 9 (4): 501–504
DOI: 10.5114/wiitm.2014.44168

Abstract

Introduction: *Symptomatic hypermobile kidney is treated with nephropexy, a surgical procedure through which the floating kidney is fixed to the retroperitoneum. Although both open and endoscopic procedures have a high success rate, they can be associated with risk of complications, relatively long hospital stay and high cost.*
Aim: *We describe our percutaneous technique for fixing a hypermobile kidney and evaluate the efficacy of the percutaneous nephrostomy insertion in management of symptomatic nephroptosis.*
Material and methods: *Between January 2005 and December 2011, 11 patients diagnosed with a symptomatic right nephroptosis of at least 1 year duration were treated with a single point percutaneous nephrostomy technique. All data were retrieved from patients' medical records and then retrospectively analysed.*
Results: *Nephropexy through a single point percutaneous nephrostomy technique was successfully accomplished in 11 women. The mean operative time was 20 min. The intraoperative estimated blood loss was minimal in all cases. No major or minor intraoperative complications were noted. The average postoperative hospital stay was 2 days. Women returned to their usual activities 14 days following the surgery. Nine women had complete resolution of their pain, and 2 patients continued to complain of discomfort in their lumbar area. One patient was re-operated upon with satisfactory subjective and objective outcomes achieved. One patient refused re-operation.*
Conclusions: *Percutaneous nephropexy is simple, inexpensive and effective for treatment of symptomatic hypermobile kidney. It remains a valuable alternative to open, laparoscopic, and robotic methods for fixing a floating kidney.*

Key words: *nephropexy, percutaneous nephrostomy, floating kidney.*

Introduction

Hypermobile kidney, also known as a floating kidney, renal ptosis or nephroptosis, is a condition in which the kidney descends more than 2 vertebral bodies (or > 5 cm) during supine to upright position change [1]. The kidney is capable of returning to a normal anatomical site, which differentiates it from an ectopic organ. Although the hypermobile kidney was first described in the 16th century by Franciscus de Pedemantanus, the first successful nephropexy was performed in 1881 [2]. The procedure was refined and popularised by the American gynaecologist George Edebohls, who in 1893 published a series of 12 cases [3]. Since then nearly 200 different techniques of nephropexy have been described [4–8].

Although nephroptosis is a common condition, it remains, in the majority of cases, completely asymptomatic [3]. It is often incidentally diagnosed on radiological imaging for other reasons. However, up to 10–20% of affected patients may complain of flank or abdominal pain aggravated by long periods in an

Address for correspondence
Tomasz Golabek MD, PhD, Department of Urology, Medical College Jagiellonian University, 18 Grzegorzecka St, 31-531 Krakow, Poland, phone: +48 690 999 122, e-mail: elementare@op.pl

upright position which is reduced or relieved by lying down [1, 3].

Symptomatic nephroptosis is treated with nephropexy, a surgical procedure through which the floating kidney is fixed to the retroperitoneum. This intervention can be performed through both open and endoscopic approaches [3, 5–8]. Although both procedures have a high success rate, they can be associated with a non-negligible risk of complications, relatively long hospital stay and substantial cost. Percutaneous nephrostomy (PCN) is a minimally invasive technique, which allows for easy percutaneous access to the kidney, insertion of a tube into the ptotic organ and its subsequent stabilization [3, 9]. This then results in the development of fibrotic tissue leading to the resolution of symptoms, and normalisation of urinalysis, at the expense of minimal scarring [10–12]. Moreover, it simultaneously allows for the removal of renal stones [13, 14].

Aim

We describe our own percutaneous technique of fixing the hypermobile kidney, and we evaluate the efficacy of the percutaneous nephrostomy insertion in management of symptomatic nephroptosis.

Material and methods

This retrospective study was approved by the Departmental Review Board and all the procedures have been carried out in accordance with the Helsinki Declaration of 1975, as revised in 1983. Eleven women (age 18–56 years, mean 36.8 years) diagnosed with right nephroptosis were treated with a single point percutaneous nephrostomy technique in the Department of Urology and Uro-oncology at the Medical University of Lublin, Poland between 2005 and 2011. The body mass index averaged 18.42 kg/m^2 (range: 17.01–19.37 kg/m^2). All patients had symptomatic right hypermobile kidney for at least 1 year duration. Preoperative intravenous pyelography (IVP), performed in the supine and upright positions, revealed a kidney descent of more than 5 cm. Moreover, in 5 women, up to 1 cm large calcified deposits within the pelvicalyceal collecting system were identified on IVP.

All patients underwent an elective nephropexy with percutaneous nephrostomy. The procedures were performed under spinal anaesthesia. The ureteric catheter was introduced into the ureter and the contrast medium (Ultravist) was then administered. The patients were placed in the prone position on the X-ray table. Under direct X-ray guidance the collecting system was incised in the lower calyx. The nephroscope was then introduced via a routine approach. All previously identified renal calculi, if present, were found and removed. Next, the kidney was pushed to the maximal upward position, and an 18 F nephrostomy tube was inserted into the upper calyx. Following the procedure, as soon as a clear urine outflow was obtained and no pain was reported, the nephrostomy tube was closed and left in situ for about 4 weeks and then removed. Low-dose trimethoprim prophylaxis was administered daily until the nephrostomy tube was taken out and a single intravenous dose of gentamycin was given prior to the nephrostomy drain removal. The follow-up IVP and ultrasound examination of the urinary tract were performed 3 months following the procedure.

Results

Nephropexy through a single point percutaneous nephrostomy technique was successfully accomplished in 11 women. The nephrostomy scar, with a mean length of 8 mm, healed in all patients with an excellent aesthetic outcome. The mean operative time was 20 min (range: 15–45 min). The intraoperative estimated blood loss was minimal in all cases. No major or minor intraoperative complications were noted. The average postoperative hospital stay was 2 days (range: 1–4 days). No urinary tract infections in the immediate postoperative period, while the nephrostomy tube was left *in situ*, and after nephrostomy tube removal, were noted. The mean follow-up was 12 months (range: 3–36 months). Women returned to their usual activities 14 days (range: 10–28 days) following the surgery. Nine women had complete resolution of the pain, and 2 patients continued to complain of lumbar discomfort.

The follow-up ultrasound examination of the urinary tract showed no signs of obstruction or stones within the collecting system. The repeated IVP confirmed complete resolution of nephroptosis in 9 women, while unchanged findings, similar to those prior to surgery, were found in 2 cases. One patient was re-operated with satisfactory subjective (symptom-free) and objective (IVP confirmed) outcomes achieved. One patient refused re-operation. She is regularly followed up and currently remains pain free, with only occasionally abnormal urinalysis results

which, in case of associated dysuria, are successfully treated with anti-inflammatory medications.

Discussion

The exact cause of nephroptosis remains unknown. Symptomatic patients, however, exhibit a few common features [1]. Typically, patients with nephroptosis are represented by thin females [1–3]. It has been hypothesized, therefore, that the absence of perirenal fat and fascial support could lead to the downward translocation of the kidney. In addition, patients with nephroptosis often present with a longer-than-normal renal vascular pedicle, which allows for renal displacement in the sagittal and frontal axes [15]. Treatment of nephropexy is reserved for symptomatic patients only [3, 12]. The surgery can be performed through either an open or endoscopic approach [3]. In addition, transperitoneal laparoscopic-robotic-assisted technique has also been described [4–8]. Although approximately 200 techniques of nephropexy have been reported, and the majority of the procedures have a high success rate, they can be associated with a significant risk of complications, relatively long hospital stay and a significant cost [3, 4].

In our case series, 11 women underwent a single point percutaneous nephrostomy nephropexy for symptomatic hypermobile kidney. The procedure was successful in 9 patients, and was associated with minimal discomfort, as well as a short hospital stay. No major or minor intraoperative complications were observed. Moreover, in 5 women it allowed for synchronous and complete removal of renal stones. Various authors have reported their experience with percutaneous nephrostomy techniques [10, 12, 13, 16]. A two-point percutaneous method was described by Elashry which involved placing a nephrostomy tube for 14 days [12]. The average operative time was 22 min and the mean hospital stay was 3 days. There were no intraoperative complications, and there was an overall 85% success rate. Interestingly, a similar technique with simultaneous nephrolithotomy and endopyelotomy during a single session, with the same outcome, has been previously reported [13].

The single point percutaneous technique has been described mostly in relation to planned percutaneous nephrolithotomy in a floating kidney, and it has been associated with a high success rate [10]. Similarly, our success rate was high (81% for single session and 90% for two-session treatments). Although the applied percutaneous technique of kidney immobilisation at a more cephalad position, and the consequent relief of urinary obstruction associated with nephroptosis, caused nephrostomy-related discomfort, it was of minimal significance to our patients, and none of the women perceived it as a major drawback of the treatment. Two patients failed percutaneous nephropexy at the first attempt. In our opinion, there were likely two reasons for this. Firstly, the kidney was placed too low before the nephrostomy was attempted, and secondly, the nephrostomy was kept in situ for too short a time. Those patients were offered a second PCN. The repeated single point percutaneous technique was successful in one woman, while the other refused further invasive treatment.

Although we have observed no complications during and following a single point percutaneous nephrostomy nephropexy procedure for symptomatic hypermobile kidney, several studies have reported a number of peri- and postoperative morbidities associated with radiologically guided percutaneous nephrostomy insertion for the treatment of both dilated and non-dilated kidney collecting system conditions [17–19]. The most serious complication of PCN insertion is sepsis [17]. Its frequency of 1.3% has been reported in patients without kidney stones and dramatically increased in those with pyonephrosis [20]. To prevent septic episodes we administered peri-procedural antibiotic prophylaxis (a single intravenous dose of gentamicin) to our patients. Moreover, to further reduce the risk of postoperative urinary tract infection, a low dose of trimethoprim prophylaxis was given daily until a nephrostomy tube was taken out and a single intravenous dose of gentamycin was given prior to nephrostomy drain removal.

Bleeding is the most common local complication of PCN insertion. Although in most cases blood loss is minor, blood transfusion may be required in up to 4% of patients undergoing standard nephrostomy insertion and up to 27% in cases of nephrolithotomy, where larger instruments are used [17, 19]. Coagulopathy has been identified as an important factor affecting the severity and frequency of bleeding requiring blood transfusion, with lower rates (2%) of transfusion-dependent blood loss occurring in non-coagulopathic patients [20]. None of our patients had a history of coagulopathy disorder and

all women had a normal coagulation screen prior to the PCN procedure. In our study, we observed minor intraoperative blood loss (approximately 30 ml) and no bleeding following surgery. The low degree of bleeding in our patients can also be attributed to the broad experience of urologists performing percutaneous nephrostomy insertion, as well as the fact that in most of our cases we used instruments smaller than 30 F.

Bowel transgression and pneumothorax are rare, yet serious complications of the PCN procedure. Retrorenal colon has been identified as a risk factor for intestinal injury, whereas complex endo-urological procedures requiring access to the upper calyx of the normally placed kidney increase the risk of pleural injury [17, 20]. None of our patients have suffered these complications. We ruled out the presence of retrorenal intestine using an ultrasound examination performed immediately prior to the PCN insertion procedure. As the aim of our treatment was to fix a ptotic kidney, we approached the lower calyx and did not need to use the intercostal access, reducing, therefore, the risk of pleural injury.

One of the most important advantages of the percutaneous procedure is its simplicity, and also the ability to remove kidney stones during the same session. This makes the treatment minimally invasive and gives excellent long-term outcomes. The follow-up observations are very reassuring, and, therefore, this method remains, in our department, the preferred treatment option of symptomatic patients with floating kidney.

Conclusions

Percutaneous nephropexy is a simple, inexpensive and effective method of treatment for symptomatic hypermobile kidney. In addition to excellent kidney immobilization, this minimally invasive method allowed for simultaneous complete removal of renal stones. Percutaneous nephropexy remains, therefore, an important alternative to open, laparoscopic, and robotic methods for fixing a hypermobile kidney.

References

1. Wein A, Kavoussi L, Novick A, et al. Laparoscopic surgery of the kidney. In: Campbell-Walsh urology. 10th ed. Saunders, Philadelphia 2011; 1645-7.
2. Barber NJ, Thompson PM. Nephroptosis and nephropexy: hung up on the past? Eur Urol 2004; 46: 428-33.
3. Srirangam SJ, Pollard AJ, Adeyoju AA, O'Reilly PH. Nephroptosis: seriously misunderstood? BJU Int 2009; 103: 296-300.
4. Gatti L, Antonelli A, Peroni A, et al. Sliding-clip robotic nephropexy. Urologia 2012; 79 Suppl 19: e50-2.
5. El-Moula MG, Izaki H, Kishimoto T, et al. Laparoscopic nephropexy. J Lapoendosc Adv S 2008; 18: 230-6.
6. Boylu U, Lee BR, Thomas R. Robotic-assisted laparoscopic pyeloplasty and nephropexy for ureteropelvic junction obstruction and nephroptosis. J Lapoendosc Adv S 2009; 19: 379-82.
7. Baldassarre E, Marcangeli P, Vigano M, et al. Robotic nephropexy in case of symptomatic nephroptosis. Archivio Italiana di Urologia e Andrologia 2011; 83: 160-2.
8. Bansal D, Defoor WR Jr, Noh PH. Pediatric robotic assisted laparoscopic nephropexy: case study. Springerplus 2013; 2: 321.
9. Kumar V, Keeley FX Jr. Percutaneous nephrolithotomy: why do we use rigid dilators? J Endourol 2008; 22: 1877-9.
10. Thomas R, Monga M. A simple technique for nephropexy: percutaneous nephrostomy tube placement. Br J Urol 1997; 80 (Suppl 2): 159.
11. Szekely J, Bagheri F, Villanyi K, et al. Percutaneous nephropexy with U-tube nephrostomy: long-term follow-up of an alternative technique for treatment of symptomatic nephroptosis. Urology 2006; 68 (Suppl. 5A): 227.
12. Elashry OM, Nakada SY, McDougall EM, Clayman RV. Laparoscopic nephropexy: Washington University experience. J Urol 1995; 154: 1655-9.
13. Hoenig D, Hemal AK, Shalhav AL, Clayman RV. Percutaneous nephrostolithotomy, endopyelotomy and nephropexy in a single session. J Urol 1998; 160: 826-7.
14. Kupajski M, Tkocz M, Ziaja D. Modern management of stone disease in patients with a solitary kidney. Videosurgery Miniinv 2012; 7: 1-7.
15. Winfield H. Nephroptosis. In: The 5-minute urology consult. Vol. 1. Lippincott Williams and Wilkins, Philadelphia 2000; 368-9.
16. Khan AM, Holman E, Tóth C. Percutaneous nephropexy. Scand J Urol Nephrol 2000; 34: 157-61.
17. Hausegger KA, Portugaller HR. Percutaneous nephrostomy and antegrade ureteral stenting: technique-indications-complications. Eur Radiol 2006; 16: 2016-30.
18. Basiri A, Mehrabi S, Kianian H, Javaherforooshzadeh A. Blind puncture in comparison with fluoroscopic guidance in percutaneous nephrolithotomy: a randomized controlled trial. Urol J 2007; 4: 79-83.
19. Montvilas P, Solvig J, Johansen TE. Single-centre review of radiologically guided percutaneous nephrostomy using "mixed" technique: success and complication rates. Eur J Radiol 2011; 80: 553-8.
20. Farrell TA, Hicks ME. A review of radiologically guided percutaneous nephrostomies in 303 patients. J Vasc Interv Radiol 1997; 8: 769-74.

Received: 3.01.2014, **accepted:** 7.04.2014.