

SONOGRAPHY GUIDED PERCUTANEOUS NEPHROSTOMY: SUCCESS RATES ACCORDING TO THE GRADE OF THE HYDRONEPHROSIS

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SUMMARY

Percutaneous nephrostomy (PCN) procedure can be performed with ultrasonography (US) or fluoroscopy. We undertook a retrospective analysis of 58 PCN's performed only by US guidance with the aim of evaluating the grade of hydronephrosis that is enough to establish the procedure without fluoroscopy. In 48 patients, 58 PCN procedures were performed using the Seldinger technique under US guidance. The procedure had a success rate of %50 in grade 1, %85 in grade 2 and %95 in grade 3 hydronephrosis. In patients with grade 2 and 3 hydronephrotic kidneys, PCN can be performed safely using only US guidance.

Key Words: Hydronephrosis, Percutaneous Nephrostomy, Ultrasound

ÖZET

Perkütan Nefrostomi Yerleştirilmesi

Perkütan nefrostomi katateri yerleştirilmesi (PCN) işlemi ultrasonografi (US) veya fluoroskopi eşliğinde uygulanabilir. Kliniğimizde sadece US kılavuzluğunda yapılan 58 PCN işlemini retrospektif olarak inceleyerek, işlemin fluoroskopi eşliğine gerek kalmadan yapılabilmesi için gerekli hidronefroz düzeyini belirlemeyi amaçladık. 48 hastaya 58 adet PCN işlemi, US eşliğinde Seldinger yöntemi ile uygulandı. Başarı oranları: grade 1 düzeyinde hidronefrozda %50, grade 2' de % 85, grade 3'te %95 idi. Sonuçlarımıza göre; grade 2 ve 3 düzeyinde hidronefrotik böbrekli hastalarda, PCN sadece US eşliğinde güvenli bir şekilde yapılabilir.

Anahtar Kelimeler: Hidronefroz, Perkütan Nefrostomi, Ultrasonografi

Percutaneous nephrostomy catheter (PCN) placement was initially described by Goodwin in 1955 (1). Its main indication is drainage of the obstructed collecting system (2). PCN is a procedure that is preferred for its low mortality and complication rates and for not requiring general anesthesia (2). While selection of the initial needle puncture site and entrance to the pelvicalyceal system (PCS) is generally done with ultrasonography (US) guidance, fluoroscopy has been preferred for guide wire and catheter manipulations (3). PCN with only US guidance has been reported in pregnant women and children to avoid radiation exposure (4-7).

As there are only a few reports in the literature about US guided PCN and none of them had

reported definitive criteria on patient selection, we retrospectively searched our US guided PCN series to find out the grade of hydronephrosis that allows satisfactorily PCN placement with only US guidance.

MATERIALS AND METHODS

During a two year period (2000- 2001), 58 PCN's on 48 patients (9 women, 39 men, age; 20-76 years, mean 52 years) were performed. Bilateral procedures were undertaken in 10 patients.

Indications were; obstruction due to urolithiasis or malignancy, ureteropelvic or ureterovesical stenosis and preoperative decompression of the dilated collecting system.

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We classified the grade of hydronephrosis as follows; mild PCS dilatation: grade 1, moderate PCS dilatation and normal parenchyma : grade 2, severe PCS dilatation with a large pelvis and significant calyceal dilatation and parenchymal thinning: grade 3 hydronephrosis (8, 9). Of the 58 kidneys, four were grade 1, 34 were grade 2 and 20 were grade 3 hydronephrotic.

SSA 250A Toshiba US system with 3.5 MHz sector transducer was used to guide the procedure. All PCN's were performed by the same radiologist and an assistant using the Seldinger technique, with sterile technique under local anesthesia. Patients were positioned lateral or prone- oblique and under US guidance, an 18 G needle is placed into a lower pole calyx. A J tip guidewire is introduced via the needle lumen into the renal pelvis and then the needle is removed. After the dilatation of the tract with three dilators, a 7 or 8 F catheter is introduced and the guidewire is removed. During the procedure, all maneuvers are continuously monitored with US. Correct catheter position is determined by free urine drainage or nephrostography when needed.

RESULTS

In four grade 1 hydronephrotic kidneys, there were two satisfactory catheter placement and the success rate is % 50. In 34 grade 2 hydronephrotic kidneys, we placed 29 catheters satisfactorily and the success rate is % 85. We placed 19 catheters in 20 patients with grade 3 hydronephrosis (% 95 success rate), and the overall success rate is % 86.

Major complications occurred in three patients (% 5). These were two perirenal hematoma and one postprocedure sepsis. In eight procedures (% 13.7) catheter dislodgement occurred and two cases (% 3.4) required catheter exchange because of blockage.

DISCUSSION

PCN placement is a safe and rapid procedure to drain obstructed collecting system (4). While in the earlier series intravenous contrast media and fluoroscopy have been used to visualize the PCS, now US is generally being used (10, 11). But after the entrance to the PCS with US guidance, fluoroscopy is preferred for visualizing the guidewire and catheter maneuvers (3).

PCN with C armed fluoroscopy assistance does not expose patient to high radiation doses but as radiation has no threshold dose, even the minimal exposure must be avoided if possible (12). US guided PCN has advantages of not including radiation and not requiring IV contrast media usage. There are only a few reports in the literature on US guided PCN using Seldinger technique (4,13). Gupta and associates reported a success rate of % 91.1 for 273 PCN's with US guidance, but did not defined hydronephrosis grades (4).

In our series, our success rate for grade 1 hydronephrotic kidneys were % 50. Despite poor visualization of the PCS, PCN were attempted because of emergency in these cases and this is the reason of the low case number. Two catheters were placed satisfactorily but in the other two patients, poor visualization caused by the insufficiently dilated calyces did not allow the needle to be accessed into the PCS.

Our success rate was % 85 in grade 2 hydronephrotic kidneys (34 /29). Of the five cases that could not be achieved satisfactory placement , in two, we could not obtain access to the PCS and in one case urine drainage was achieved after catheter placement but we detected at nephrostography that one of the side holes of the catheter was out of the PCS. These three cases were because of inadequacy of US guidance. In one case, the procedure was stopped because of intracalyceal hemorrhage and in one because of fibrotic tissue that did not allow needle maneuvers. These two attempts are a failure but not caused by US guidance and with these two accepted out of the study group, the real success rate of US guidance rises to % 91 in grade 2 hydronephrosis. But this is still under the % 96-100 reported success rates of fluoroscopy guided procedures (2, 14).

In the grade 3 hydronephrotic group, our success rate was % 95 (20/ 19). In only one case the procedure was stopped and this was because of dense fibrotic tissue and pain intolerance of the patient, not caused by US guidance. If we accept this case out of the study group, the success rate of US guidance rises to % 100 in grade 3 hydronephrosis and is in the same range with fluoroscopy guided procedures (14).

The potential complications of PCN are; sepsis, perirenal hematoma, urinoma formation, perforation of a viscus, pyopneumothorax or minor complications like dislodgement or obstruction of the catheter (15).The incidence of significant complications with fluoroscopy guided PCN has been estimated to be %1- 4 (16,17). In our series, there were two perirenal hematoma and one postprocedure sepsis and this % 5 incidence of significant complications are not significantly higher than fluoroscopy guided procedures. There were eight (% 13.7) catheter

dislodgement and two (% 3.4) catheter blockages that required exchange of catheter in our series and these rates are in correlation with reported %7- 14 minor complication rates of fluoroscopy guided procedures (2, 17, 18).

In conclusion, our results indicate that; US guided PCN has high success rates in grade 2 and especially in grade 3 hydronephrosis and must be the procedure of choice in selected, adequately visualized grade 2 and all grade 3 hydronephrotic kidneys.

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