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Case report

Second-look Percutaneous Nephrolithotomy: Access to the Tract with Direct Vision and Fluoroscopic Guidance

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HIGHLIGHTS

- Percutaneous nephrolithotomy is the treatment of choice for patients suffering from complex kidney stones.Second-look nephroscopy is one of the methods for removing residual stone fragments after PCNL.
- The Second-look nephroscopy was done with direct tract ureteroscopy and simultaneous fluoroscopy.

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ABSTRACT

Introduction
Percutaneous nephrolithotomy (PCNL) is the preferred treatment for large kidney stones. Second-look nephroscopy is one of the methods for removing residual stone fragments after PCNL. During second-look nephroscopy, we pass a guidewire through the previously established nephrostomy tract, which was impossible in this case. Thus, we performed the procedure with direct tract ureteroscopy and simultaneous fluoroscopy.

Case presentation
A 45-year-old man with full staghorn calculi was the case of this study. We performed PCNL surgery on him, but because of tachycardia and a fall in the patients' blood pressure, we terminated the surgery after 3 hours. Because of the high possibility of remaining stones, we inserted a Foley 16 catheter as a nephrostomy. In the performed computerized tomography (CT) scan two days after the surgery, a significant volume of stone residue was observed. Four days after surgery, the patient was transferred to the operating room after the improvement of clinical status and hematuria resolved. The procedure was done when the patient was in the prone position and under general anesthesia. After cutting the nephrostomy tube, the attempt to insert the wire was not successful. So, we removed the nephrostomy tube. After retrograde injection of the contrast agent and fluoroscopy, we observed the contrasting agent passage through the nephrostomy tract to the skin surface. We found the main tract with simultaneous ureteroscopy and fluoroscopy. then insert guidewire in the renal pelvis and nephroscopy through wire.

Conclusions
With the help of ureteroscopy and direct vision and fluoroscopy, we found the previous tract, entered the pyelocaliceal system, and embedded the guidewire. Thus, we performed nephroscopy from the same tract site without the need to get re-access.

Keywords: Percutaneous Nephrolithotomy; Second-look Nephroscopy; Kidney Stones; Nephrostomy

Introduction

PCNL is the treatment of choice for patients suffering from large and complex kidney stones. This method which has several advantages over open stone surgery was introduced in the 1980s and its development in the following years lead to higher efficacy and lower morbidity (1). Although nephrostomy tube (NT) is placed after the PCNL procedure by most of the institutes, the

tubeless method has also been studied (2).While PCNL is usually efficient in large kidney stone removal one of the significant limitations of this technique is the need for a second procedure due to residual fragments. Flexible nephroscopy may eliminate the possibility of residual stones. There are different options to remove these fragments, including shockwave lithotripsy (3), retrograde internal surgery (4), and second-look PCNL (5). Determining whether a patient needs a secondary procedure is based on the findings during the surgery or the information collected from the post-operative images. CT scan is the most sensitive diagnostic method for detecting stone residue (6).

According to the images, if the stone residual was found in the kidney, we perform the second-look nephroscopy. In this procedure we pass the collecting system percutaneously through the tract which has been established during the PCNL procedure, to remove the remaining stones. This process is performed before patient discharge or as an outpatient if the nephrostomy has not yet been removed. The procedure can be performed with local, general, or spinal anesthesia (7). Some of the researchers recommend second-look nephroscopy for all patients after PCNL, stating that about 17% of these patients have residual fragments after PCNL (8), but the general recommendation is to perform the procedure for those patients who have undergone post-surgical evaluation with positive results (9).

As hematuria impaired visibility, it is best to postpone the second-look procedure until complete recovery of hematuria. After a thorough evaluation before surgery, the patient will be in the prone position, and we begin the procedure by cutting the nephrostomy tube about 3-4 cm from the skin level. The nephrostomy tube is completely prepped. After this, a 0.035 dual Duranter guide wire (Sensor, Boston, Natick, MA) is inserted through the nephrostomy tract and become coiled in the collection system. Following this step, the nephrostomy tube is removed. The dilator and amplatz are then passed through the guidewire at the same time (10).

Case presentation

In our department, PCNL is usually performed as tubeless, but when there is a need for a second-look procedure (due to high volume of stone, excessive surgical time, impaired vision due to systemic hematuria, and patient conditions), we insert an open-ended 16 Fr Foley catheter as nephrostomy. If the post-surgical CT scan indicates a significant volume of stone residues, a second look procedure is inevitable. Thus, in the same time interval, after hematuria recovery, and improvement of patients' general condition, we perform the second look nephroscopy. The patient enters to the study after signing the informed consent and the case report is based on the CARE checklist. In this case, the surgery was performed on a 45-year-old man with full staghorn calculi. After about 3 hours of surgery because of tachycardia and fall in the patients' blood pressure, surgery was terminated. Because of the impaired vision due to severe hematuria, the possibility of remaining fragments was high. So, Foley 16 f was inserted, but we mistakenly forgot to open one end of it. In the post-op CT scan two days after the surgery, a significant volume of stone residue was observed. Four days after surgery, the patient was transferred to the operating room after the improvement of clinical status and hematuria removal. The procedure was done in the prone position and under general anesthesia. After cutting the nephrostomy tube, the attempt to insert the wire was not successful. So, we removed the nephrostomy tube. After retrograde injection of the contrast agent and fluoroscopy, we observed the contrasting agent passage through the nephrostomy tract to the skin surface. With the help of ureteroscopy and direct vision (Figure1) and fluoroscopy (Figure 2), we found the previous tract, entered the pyelocaliseal system, and embedded the guidewire. Thus, we performed nephroscopy from the previously established tract without the need to get re-access.

Results

The patient was stone-free after the second procedure. The first procedure time was 3 hours and the second procedure time was 50 minutes. mean hemoglobin level at first admission was 14.5, that fall to 8.7 at the end of procedure and patient revive transfusion. On the second loop surgery, the hemoglobin level was 10.3 and is stable at the end of the procedure.

Discussion

While PCNL has a high success rate in large stone removal, usually residual stones are left at the site which requires a secondary removal procedure. While some scholars (11) state that routine second-look nephroscopy is not necessary, maybe due to perform routine flexible

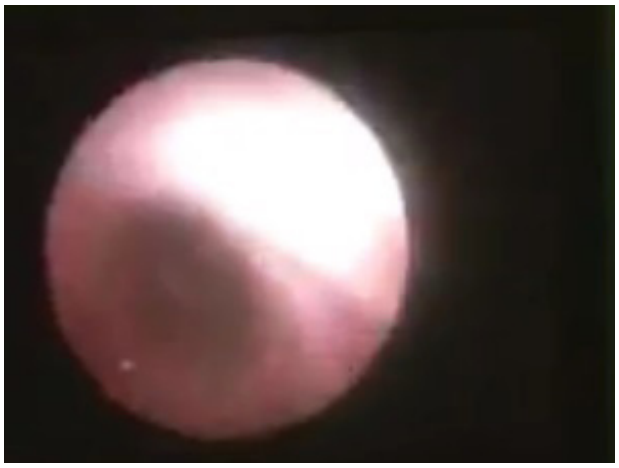

Figure 1. Ureteroscopy of the tract

Figure 2. a, b, c: Fluoroscopy steps for tract examination with ureteroscopy

nephroscopy, yet it is the most attractive option in some centers like our center due to the limitation of flexible nephroscopy, to remove residual fragments. The primary reason for this statement is the ease of access to the collecting system due to the pre-established tract (5, 12-15). According to the data collected by Shahrour et al., while only 51% of the patients undergone PCNL were stone-free, after the second-look procedure, this number increased to 76% (14). In another study conducted on children, performing a second-look procedure after the initial PCNL resulted in an 87% of the stone-free rate (12). Although there was a considerable effort to reduce the number of second-look nephroscopy, it is not possible to eliminate it because of the remaining possibility of residual fragments in cases of severe hematuria or retained contrast (7).

Conclusions

Accurate determination of significant residual stone fragments after PCNL has some challenges. Fluoroscopy and direct visualization are two aids that help the surgeon to detect the complete removal of stone during the surgery. In this case study, we showed that simultaneous fluoroscopy and endoscopy is an excellent way to find the previously established tract in cases where second look nephroscopy is required, or tubeless PCNL was performed. This phenomenon is valid as long as the second procedure is performed not long after the initial PCNL.

Authors' contributions

All authors had an equal contribution.

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Conflict of interest

The authors declare that there are no conflicts of interest regarding the publication of this manuscript.

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Ethical statement

All authors ensured our manuscript reporting adheres to CARE guidelines for reporting of case reports.

Data availability

Data will be provided by the corresponding author on request.

Abbreviations

CT	Computerized tomography
PCNL	Percutaneous nephrolithotomy

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