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Case Report

Utility of cystoscope sheath in percutaneous nephrolithotomy- a case report

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ABSTRACT

Retrieval of high-volume renal stone fragments in percutaneous nephrolithotomy (PCNL) using graspers and baskets can lead to inadvertent renal mucosal trauma and prolonged operative times. We report a case of large right renal pelvic calculus measuring approximately 5.6×4.2×4 cm, which after fragmentation posed a challenge for fragment retrieval to ensure complete stone clearance. We used flush irrigation and suction through a 17 Fr cystoscope sheath inserted into the 30 Fr Amplatz for successful retrieval of the high volume of tiny stone fragments. To our surprise, just after two cycles of flush-irrigation and suction in a duration of approximately 30 seconds, we could achieve complete stone clearance. This technique of utilizing a small caliber cystoscope sheath through a large caliber Amplatz in PCNL could help in selected cases for efficient and safe retrieval of high-volume tiny stone fragments by minimizing renal mucosal trauma, operative times and ensuring complete stone clearance.

Keywords: Cytoscope, Percutaneous nephrolithotomy, Stone clearance

INTRODUCTION

Stone fragment retrieval in percutaneous nephrolithotomy (PCNL) is commonly done with the help of Graspers, snares, or baskets. The maneuver of repeated insertion of Graspers/baskets in high volume stone fragments during PCNL poses the risk of inadvertent mucosal trauma along with the risk of inadvertent removal of Amplatz sheath.[1] Also, longer operative times due to the tedious process of retrieving high volume small stone fragments is a major risk factor for occurrence of postoperative fever.[2,3]

In this case report, we document a case with high volume stone fragments which were retrieved using flush-irrigation suction through a 17 Fr cystoscope sheath introduced into the 30 Fr Amplatz during PCNL, leading to shorter operative time and ensuring complete stone clearance, without causing any significant perioperative morbidity.

CASE REPORT

A 34-year-old female presented with right sided intermittent colicky pain abdomen, NCCT KUB showed a right renal calculus measuring approximately 5.6×4.2×4 cm occupying the renal pelvis (Figures 1 and 2). Patient was planned for right PCNL after discussion of the available treatment options and obtaining informed consent. Retrograde pyelography was done, and a 6 Fr balloon tip ureteric catheter secured. With the patient in prone position, through an infracostal inferior calyceal puncture, a 30 Fr Amplatz was secured. On nephroscopy using a 26 Fr nephroscope, a single, large, hard stone was seen in the right renal pelvis, fragmented with pneumatic lithotripter into multiple fragments. Large fragments were retrieved using a tri-prong grasper. A large volume of tiny fragments in the renal pelvis post lithotripsy were retrieved using flush irrigation and suction through a 17 Fr cystoscope sheath with attached Toomey syringe inserted into the Amplatz (Figure 3a and b). After just two cycles

of flush-irrigation and suction over a duration of approximately 30 seconds, complete stone clearance was confirmed on table via fluoroscopy in conjunction with nephroscopy. 6 Fr DJ stent was deployed. The overall operative time recorded was 60 minutes. Postoperative period was uneventful, and the patient was discharged on POD-2. Follow up check X-ray (Figure 4) after 4 weeks showed no residual fragments.

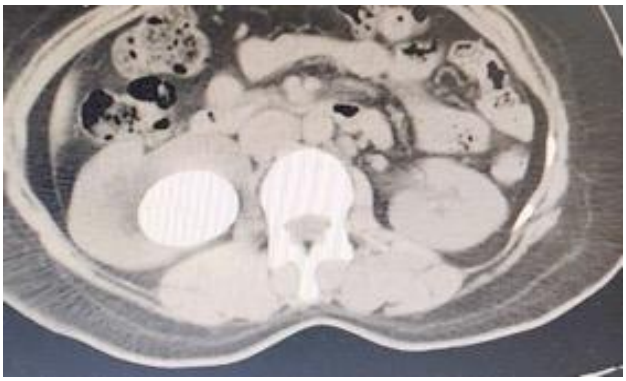

Figure 1: Preoperative CT KUB axial section.

Figure 2: Preoperative X-ray KUB.

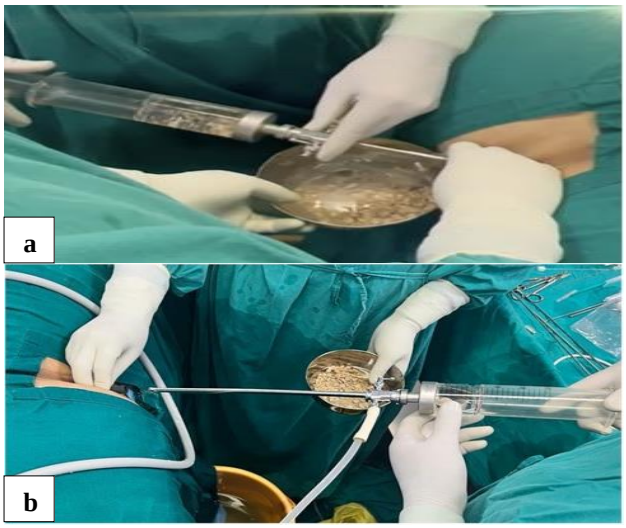

Figure 3: (a) Fragment retrieval via cystoscope sheath and attached Toomey syringe, and (b) fragment retrieval via cystoscope sheath and attached Toomey syringe.

Figure 4: X-ray KUB at 4 weeks post-op.

DISCUSSION

PCNL is the preferred procedure for renal calculi >2 cm.[4-9] The step that follows lithotripsy in PCNL is the retrieval of stone fragments. Stone retrieval aims at complete stone clearance while minimizing mucosal trauma and keeping the operative time as minimum as possible. Often multiple punctures are advised to ensure no residual fragments in patients with high stone load and also avoid excessive/inappropriate torque of the nephroscope in the process of stone retrieval, as it can lead to tearing of the renal parenchyma and bleeding complications.[10,11] The maneuver of repeated insertion of Graspers/snares for retrieval of fragments in patients with high stone load poses the risk of inadvertent mucosal trauma along with the risk of inadvertent removal of Amplatz sheath adding to the morbidity of the procedure.[1] Longer operating times in PCNL, as seen in high stone load patients wherein fragment retrieval is attempted through a single puncture access with traditional methods of graspers or snares, is associated with an increased occurrence of excessive bleeding and infectious complications.[1]

Our patient had a stone load of about 5.6×4.2×4 cm, which after lithotripsy in PCNL, becomes a tedious and time-consuming procedure which is attributed mainly to the phase of stone retrieval to ensure complete stone clearance. To prevent prolonged operative times, we used the novel technique of flush irrigation and suction at low pressures with a 17 Fr cystoscope sheath inserted into the 30 Fr Amplatz, which ensured a comparatively faster fragment retrieval without compromising on complete stone clearance, as it was a totally renal pelvic stone with a well dilated pelvicalyceal system. Fragment migration into the ureter was prevented by the presence of a balloon tip ureteric catheter in place. Postoperative period was uneventful, and the patient was discharged on POD 2 without any complications. Follow up imaging after a period of 4 weeks also did not show any residual fragments.

Studies have shown that intra renal pressures are affected by the endoscope: access sheath ratio with lower pressures recorded when a narrow caliber endoscope is used through a large caliber access sheath.[13] Based on this concept, we utilized a 17 Fr cystoscope through a 30 Fr Amplatz for an ultra-short duration of time thereby avoiding the

complications associated with high intrarenal pressures such as pyelorenal back-flow and collecting system rupture which lead to SIRS, sepsis and other infective complications, manifesting postoperatively.[14]

The distal end of cystoscope sheath is bulbous dorsally and smooth with an oblique beak, which helps in atraumatic introduction of the scope.[15] This also reduces the risk of inadvertent renal mucosal injury on introduction of the sheath into the Amplatz and during the process of suctioning. Suction in endourology has been traditionally combined with ultrasound and ballistic devices during PCNL to evacuate stone fragments more rapidly.[16] In the recent years, several centers have developed PCNL sheaths or nephroscopes equipped with suctioning mechanisms. Suctioning during endoscopic lithotripsy offers higher SFR, less post-infectious complications, and faster stone disintegration time.[17] In our case, we utilized this concept through the application of gentle suction with the help of a handheld Toomey syringe attached to the cystoscope sheath when introduced into the Amplatz. This can in turn prove to be cost-effective and be applied in centers where the automated suction apparatus is not available.

CONCLUSION

The technique of utilizing flush irrigation and suction by a small caliber cystoscope sheath through a large caliber Amplatz in PCNL can help in selected cases for efficient and safe retrieval of high-volume small stone fragments by minimizing inadvertent renal mucosal trauma and operative times whilst also ensuring high stone free rates. The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published, and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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