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Original Article

Choosing the appropriate size of Amplatz sheath during percutaneous nephrolithotomy- a novel method

Perkütan nefrolitotomi sırasında uygun kalibrede Amplatz kılıfının seçimi-yeni bir yöntem

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ABSTRACT

Objective: To choose appropriate size Amplatz sheath during percutaneous nephrolithotomy (PCNL) based on retrograde pyelogram.

Material and methods: We performed standard PCNL in prone position in 20 patients. All these patients had placement of appropriate size of Amplatz sheath based on retrograde pyelogram images. All patients had nephrostomy tubes postoperatively. The preoperative and postoperative renal parameters, hemoglobin, mean operating time and mean hospitalisation stay were measured.

Results: There was no significant difference between the pre-operative and postoperative hemoglobin and creatinine levels. Median operating time was 60.5 mins (45 to 98 mins). The median hospitalisation stay was 4.6 days (3 to 7 days). There was no intraoperative pelvic wall or infundibular injury.

Conclusion: Choosing correct size of Amplatz sheath lowers the incidence of kidney hemorrhage and renal function impairment.

Keywords: Amplatz; infundibular diameter; nephrostomy; PCNL; retrograde pyelogram.

ÖZ

Amaç: Perkütan nefrolitotomi (PNL) sırasında kullanılmak üzere retrograd piyelograma dayanarak uygun kalibrede Amplatz kılıfı seçmek.

Gereç ve yöntemler: Yirmi hastaya yüzükoyun yatar pozisyonda standart PNL uyguladık. Bu hastaların tümüne retrograd piyelogram görüntülerine bakarak uygun kalibrede Amplatz kılıfı yerleştirildi. Hastaların hepsinde postoperatif dönemde nefrostomi tüpleri mevcuttu. Preoperatif ve postoperatif parametreler, hemoglobin düzeyleri, ortalama ameliyat süresi ve hastanede yatış süresi ölçülmüştü.

Bulgular: Preoperatif ve postoperatif hemoglobin ve kreatinin düzeyleri arasında herhangi bir anlamlı farklılık yoktu. Ortalama ameliyat süresi 60,5 dakika (45-98 dakika); ortalama hastanede yatış süresi 4,6 gün (3-7 gün) idi. İntraoperatif pelvis duvarı veya infundibulum hasarı yoktu.

Sonuç: Doğru kalibrede Amplatz kılıf seçimi böbrek kanaması ve böbrek fonksiyon bozukluğu insidansını düşürmektedir.

Anahtar sözcükler: Amplatz; infundibüler çap; nephrostomy; PNL; retrograd piyelogram.

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Introduction

The art of percutaneous nephrolithotomy (PCNL) has evolved over years in terms of technique and technology to improve the outcome, tide over the difficulties during the procedure and prevent complications.[1-3] The procedure has seen many advances in terms of miniaturisation, reducing radiation exposure and positioning. But, still it is not devoid of complications. In recent years, PCNL is performed with smaller sized Amplatz sheaths to avoid complications, and reduce morbidities. There is little evidence in the literature as to the selection of appropriate size Amplatz sheath to be used during PCNL.

Table 1. Some demographic characteristics of the patients

Data	Values
Mean age in years (Range)	44.5 (22-58)
Sex	
Male	16
Female	04
Median stone size (range) in cm	2.56 (2-4)
Targeted Calyx	
Middle	5
Inferior	15
Laterality	
Right	09
Left	11

Table 2. Results

Data	Number of cases
Amplatz sheath size	
28Fr	06
26Fr	07
24Fr	04
22Fr	03
Mean operative time (mins)	74±22.3 (range, 45-135)
Hemoglobin (Hb) levels	
Preoperative	12.2±0.8 g/dL
Postoperative	11.8±0.6 g/dL
Median hospital stay	3.4 days (3-7 days)

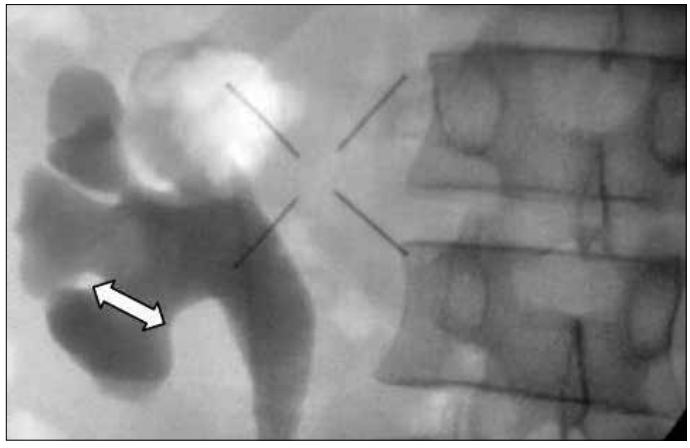

Figure 1. Infundibular diameter (arrow)

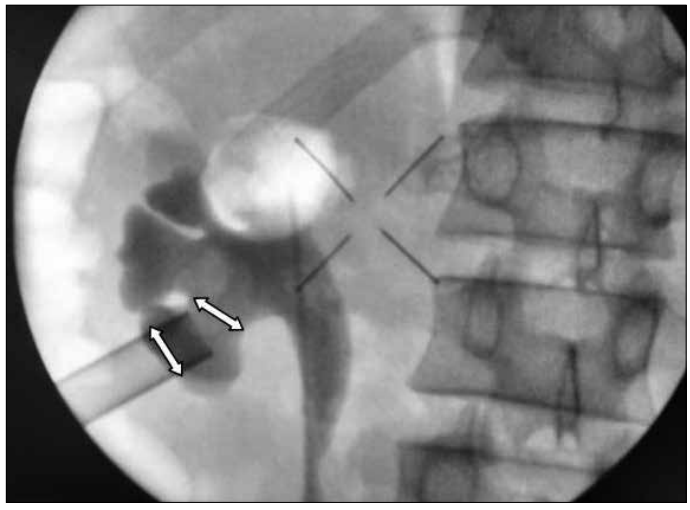

Figure 2. 28Fr Amplatz match

The present study discusses a technique which helps in determining the correct size Amplatz sheath to be used during the PCNL procedure.

Material and methods

This study was conducted between April 2015 and August 2015 in a tertiary care hospital where multiple number of patients with stone disease attend our department. We included 20 patients with pure renal pelvic calculi in our protocol, as this was our preliminary study. The mean stone size, preoperative blood and urine parameters and other patient demographics are given in Table 1. All patients underwent standard prone PCNL with stent and nephrostomy placement under general anaesthesia.

During placement of ureteric catheter, a retrograde pyelogram (RGP) was done by instilling 10-15 mL of contrast material through catheter slowly under low pressure. The size of the desired calyceal infundibulum was noted. The infundibular diameter is the shortest distance between the edges of the fluoroscopic infundibular image nearer to the pelvis (Figure 1). Then serially starting from smaller to bigger size, Amplatz sheaths were placed over the back of the patient and fluoroscopic match was obtained between the infundibular diameter and appropriate Amplatz sheath. The size of the correct size Amplatz sheath was noted (Figure 2).

Initial access to the desired calyx was performed under the guidance of fluoroscopy. The access tract was serially dilated over a guidewire up to the predetermined Amplatz size by RGP and then appropriate sized Amplatz sheath was placed. Nephroscopy was done to confirm the entry and stone was disintegrated with pneumatic lithoclast. Antegrade 5Fr DJ stenting was done. Nephrostomy tube chosen was 2Fr lesser than the size of the Amplatz sheath used. We kept the nephrostomy tube closed or open only if warranted (fever, pain and sepsis). The nephrosto-

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my tube was removed after 24 hrs if fever, bleeding or evidence of sepsis was not observed. Catheter was removed the next day. The renal parameters and hemoglobin levels were checked after 6 hours postoperatively.

Statistical analysis
The comparison of mean values of continuous variables was done using the Student's t-test. If the p value was <0.05, the result was considered statistically significant.

Results

Median age of the patients was 44.5 yrs (range, 22-58 yrs) and median stone diameter was 2.56 cm (range, 2-5 cm). Mean operative time was 74±22.3 mins (range, 45-135 mins). All patients had a single access tract either via middle or inferior calyx. Of the 20 patients, 28Fr (n=20), 26 Fr (n=6), 24 Fr (n=4), and 22 Fr (n=3) Amplatz sheaths were used for indicated number of patients.

The mean preoperative and postoperative hemoglobin (Hb) levels in all 20 patients who underwent the procedure was 12.2±0.8 g/dL and 11.8±0.6 g/dL, respectively. There was no statistically significant difference between the pre-op and post-op hemoglobin values (p>0.3).

There was no urothelial injury to infundibulum or pelvis. The median hospital stay was 3.4 days (3-7 days). One patient developed sepsis but totally recovered in 7 days. Two patients had minimal hematuria via Foley catheter for >24 hrs without any need for blood transfusion and their hemoglobin levels did not drop significantly (Table 2).

Discussion

One of the dreaded complications of PCNL is postprocedural bleeding. It depends on many factors like accurate localization of the access site, dilatation, size of Amplatz sheath, size of stone and the presence of infection. There have been many studies describing the exit strategies for PCNL to reduce postoperative pain, leak and hospital stay. But there are not many studies regarding entry strategy.

Desai et al.[4] conducted a study comparing tubeless, conventional large bore and small bore nephrostomy drainage and concluded that tubeless technique is associated with less morbidity. But they did not describe the size of the tract and the method of choosing Amplatz sheath. Previous studies mainly discussed PCNL postoperative outcomes, complications, bleeding, and renal impairment. The present novelty in PCNL is "tubeless" which has shown reduced complication rates.[5-8]

On the other hand, studies in the literature have shown that placement of a nephrostomy tube is mandatory.[1,3] Karakose et al.[9] have done a study comparing smaller Amplatz sheath versus larger Amplatz sheath and have shown that complications are less with Amplatz sheaths of smaller size. But they have not shown how to choose an Amplatz sheath for a particular case. So to the best of our knowledge this is the first study of its kind.

In our present study, the size of the Amplatz sheath was chosen based on infundibular diameter and no case was overdilated beyond this diameter. Since all the pyelograms were obtained in supine position, the calyces seen on image intensifier represent posterior calyces. We have not seen infundibular injury or any significant bleeding in our cases.

Another point to be noted is that the inherent elasticity and expandability of the calyses, at least to some extent, will compensate for the minor mismatch during fluoroscopy-guided measurement of Amplatz sheath.

There can be an argument saying that by choosing small nephroscope the tract can be kept small and complications can be avoided. But with a large stone burden, use of a small nephroscope can unnecessarily consume more operating time, anesthesia time and increase the chance of septic complications.

Moreover from our method one can avoid a calyx with narrow infundibulum and choose alternate site of entry which is appropriate for the clearance of the stone burden. We consider small sample size and nonrandomised nature of the study as our limitations.

In conclusion, it is well known that smaller size Amplatz sheaths reduce bleeding, renal impairment rates, and postoperative discomfort when compared to larger sized-Amplatz sheaths. We recommend that the size of Amplatz whether small or large be determined with our technique of using retrograde pyelograms. Further prospective study comparing standard PCNL and our method is required to reinforce our statement.

Ethics Committee Approval: Authors declared that the research was conducted according to the principles of the World Medical Association Declaration of Helsinki "Ethical Principles for Medical Research Involving Human Subjects", (amended in October 2013).

Informed Consent: Informed consent was obtained from all individual participants included in the study.

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References

1. Cormio L, Preminger G, Saussine C, Buchholz NP, Zhang X, Walfridsson H, et al. Nephrostomy in percutaneous nephrolithotomy (PCNL): does nephrostomy tube size matter? Results from The Global PCNL Study from The Clinical Research Office Endourology Society. World J Urol 2013;31:1563-8. [CrossRef]
2. Fernström I, Johansson B. Percutaneous pyelolithotomy. A new ex-traction technique. Scand J Urol Nephrol 1976;10:257-9. [CrossRef]
3. De Sio M, Autorino R, Quattrone C, Giugliano F, Balsamo R, D'Armiento M. Choosing the nephrostomy size after percutaneous nephrolithotmy. World J Urol 2011;29:707-11. [CrossRef]
4. Desai MR, Kukreja RA, Desai MM, Mhaskar SS, Wani KA, Patel SH, et al. A prospective randomized comparison of type of nephrostomy drainage following percutaneous nephrostolithotomy: large bore versus small bore versus tubeless. J Urol 2004;172:565-7. [CrossRef]
5. Shah HN, Sodha HS, Khandkar AA, Kharodawala S, Hegde SS, Bansal MB. A randomized trial evaluating type of nephrostomy drainage after percutaneous nephrolithotomy: small bore v tubeless. J Endourol 2008;22:1433-9. [CrossRef]
6. Crook TJ, Lockyer CR, Keoghane SR, Walmsley BH. A randomized controlled trial of nephrostomy placement versus tubeless percutaneous nephrolithotomy. J Urol 2008;180:612-4. [CrossRef]
7. Limb J, Bellman GC. Tubeless percutaneous renal surgery: review of first 112 patients. Urology 2002;59:527-31. [CrossRef]
8. Crook TJ, Lockyer CR, Keoghane SR, Walmsley BH. Totally tubeless percutaneous nephrolithotomy. J Endourol 2008;22:267-71. [CrossRef]
9. Karakose A, Aydogdu O, Atesci YZ. Does the use of smaller Amplatz sheath size reduce complication rates in percutaneous nephrolithotomy? Urol J 2014;11:1752-6.