

## PERCUTANEOUS NEPHROLITHOTOMY IN COMPLEX RENAL STONES EVALUATION OF SINGLE STEP AMPLATZ VERSUS BALLOON DILATATION

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### ABSTRACT:

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**Background:** Percutaneous Nephrolithotomy as a management for complex renal stone, ways of nephroscope tract dilatation using single Amplatz dilator 30Fr vs Balloon dilatation regarding efficacy and cost reduction.

**Aim of the work:** To evaluate the efficacy of Percutaneous Nephrolithotomy as a primary modality of treatment for complex renal stones, feasibility and safety of single step dilatation using Amplatz dilator versus Balloon dilatation in the Percutaneous Nephrolithotomy access.

**Patient and Methods:** This is a prospective study conducted on patients for whom percutaneous nephrolithotomy (PCNL) was done for the management of renal complex stones. The study was conducted at the Urology Department, Al Demerdash Hospitals, Ain Shams University and Nasser Institute Hospital during the period between 2016 and 2020.

**Results:** In our study regarding PCNL tract dilatation, we found that there was no statistical difference between single step 30-Fr Amplatz dilatation and Balloon dilatation; in operative time, early postoperative complications, stone free rate and hemoglobin decrease pre-post operative.

**Conclusion:** The use of single step Amplatz dilator 30-Fr for dilating renal access tract in PCNL is a time saving procedure, being safe, subjectively economical and an effective technique to gain renal access. We found no specific complication with this technique, and the morbidity rated were comparable with other modalities.

**Keywords:** Percutaneous Nephrolithotomy, Single Step Amplatz Dilator 30Fr, Balloon Dilatation.

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### INTRODUCTION

Percutaneous Nephrolithotomy has become the optimal management for complex renal stones because of its advantages including minimal invasive technique, rapid recovery and higher stone clearance. However, this procedure is associated with several complications such as fever, urinary

tract infection, renal colic, septicemia and bleeding<sup>(1-3)</sup>.

Since the introduction of PCNL for treating renal stones there have been marked improvements in the techniques and instruments that have resulted in using PCNL for treating complex and staghorn stones. In 1983 Clayman et al, reported the feasibility and safety of PCNL for treating

staghorn stones. Currently it is the treatment of choice for patients with large, complex and staghorn renal stones. The goals of treatment of a staghorn stone are complete stone clearance with minimal morbidity<sup>(4)</sup>.

Among the developments in surgical endourology techniques in the past three decades, percutaneous nephrolithotomy (PCNL) has become a standard treatment strategy with minimal invasiveness for the treatment of large renal stones. Conventionally, creating the nephrostomy tract is a fundamental process in this technique. At present, there are four major dilation methods for PCNL: Fascial Amplatz dilation (AD), metal telescopic Alken type dilation (MTD), balloon dilation (BD) and one-shot dilation (OSD). BD is generally considered as the most modern and safest technique. It has advantages of reduced complication rates and shorter durations of X-ray exposure, but its application is limited due to high cost. AD and MTD are inexpensive, but longer durations of application and X-ray exposure are required. The OSD technique, which was first proposed by Frattini et al, may achieve the same effects compared with the other three dilation methods<sup>(5)</sup>.

The Balloon Dilatation which is regarded as the gold standard, although it has advantages as short duration, tamponing of the tract with no risk of forward perforation, but its routine usage has been limited due to its high cost especially in centers and hospitals with limited resources<sup>(6)</sup>.

The Single Step Amplatz Dilatation which described for the first time in 2008 by Frattini and colleagues comparing it with the Multiple Telescopic Dilatation and the Balloon Dilatation based on the total radiation exposure and the fluoroscopy time during the dilation procedure<sup>(7)</sup>. Here we aim to compare it with the Balloon Dilatation in the duration, blood loss, success to failure and the complications.

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## **AIM OF THE WORK:**

To evaluate the efficacy of Percutaneous Nephrolithotomy as a primary modality of treatment for complex renal stones, feasibility and safety of single step dilatation using Amplatz dilator versus Balloon dilatation in the Percutaneous Nephrolithotomy access.

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## **PATIENTS AND METHODS:**

### **Study Design and Patients:**

This is a prospective study conducted on patients for whom percutaneous nephrolithotomy (PCNL) was done for the management of renal complex stones. The study was conducted at the Urology Department, Al Demerdash Hospitals, Ain Shams University and Nasser Institute Hospital during the period between 2016 and 2020. All cases undergoing PCNL for renal stones were included in our study.

In this prospective study 100 patients were subjected to Percutaneous Nephrolithotomy for renal stones management with no exclusion criteria divided into two groups randomly distributed.

### **Study methods:**

#### **Patient preoperative workup:**

All patients subjected to History taking, quality of life assessment and renal stone management past history, physical examination, laboratory tests including urine analysis, renal function tests, complete blood picture and bleeding profile.

Radiological investigations were Plain X ray on the urinary tract, Ultrasound on the abdomen and pelvis and CT urography.

#### **Operative procedure:**

Written informed consent obtained from the 100 patients with renal stones undergoing elective Percutaneous Nephro-

lithotomy. All patients will be given Broad spectrum antibiotics.

A first group of fifty cases was named SSAD Single Step dilatation using an Amplatz dilator, the Amplatz dilator is 30Fr and Amplatz sheath 30Fr.

And a second group of fifty cases was named BD Balloon Dilatation, using a Balloon Dilatory and Amplatz sheath 30Fr.

Cystoscopy was done with insertion of an open-tip ureteric catheter, followed by renal puncture in the prone position and insertion of guidewire. The lumbodorsal fascia was punctured and split under fluoroscopy. In SSAD group the central Alken dilator was advanced over the guidewire and this was followed by directly inserting the 30-F Amplatz dilator, with the surgeon applying constant pressure and slowly advancing the dilator and then the access sheath under fluoroscopy. While, in BD group Balloon was inserted on guidewire followed by the access sheath under fluoroscopy. We then used a 27-F nephroscope with a ballistic energy source for stone disintegration.

Lithotripsy performed using a rigid nephroscope and laser will be used to fragment the stones. The fragments will be removed by washing through the sheath.

Table (1): The mean age distribution

		Total no. = 100
Age	Mean ± SD	40.84 ± 8.53
	Range	20 – 60

Gender distribution of patients is illustrated in this table.

Table (2): Gender distribution

		Total no. = 100
Gender	Female	25 (25.0%)
	Male	75 (75.0%)

**Preoperative evaluation:**

**Presenting symptoms:**

The main presenting symptom was loin pain in 88 patients (88%). The loin pain was

Data for both groups evaluated such as access time, tract dilatation time and success to failure.

The choice of the type of the anesthesia whether general or spinal anesthesia was left to the anesthetist and anesthetic agents were administered at anesthetist discretion.

**Postoperative evaluation:**

Data for all patients postoperative were collected such as CBC, X-ray, CT urography for stone clearance and the complications.

**RESULTS**

In our prospective randomized study patients were classified into two groups, 50 patients per each according to the type of the renal access dilatation:

- Group named SSAD Single Step dilatation using an Amplatz dilator, the Amplatz dilator is 30Fr and Amplatz sheath 30Fr.
- And a second group named BD Balloon Dilatation, using a Balloon Dilatory and Amplatz sheath 30Fr.

Age distribution of patients is illustrated in this table.

associated with other symptoms. These symptoms were in the form of dysuria 76 patients (76%), hematuria 39 patients (39%), fever 6 patients (6%), neausea and vomiting 20 patients (20%).

Table (3): Presenting symptoms percentage

Symptoms	Total no. = 100
Loin Pain	88 (88.0%)
Dysuria	76 (76.0%)
Hematuria	39 (39.0%)
Fever	6 (6.0%)
Nausea & Vomiting	20 (20.0%)

Urine analysis:

Urine analysis showed suspected active UTI in 14 patients (14%), hence urine culture and sensitivity were done. Patients

showed positive growth so antibiotics whether oral or parenteral were given according to the culture results two weeks prior to surgery.

Table (4): Urine analysis findings.

Urine analysis		Total no. = 100
Aspect	Slightly turbid	86 (86.0%)
	Turbid	14 (14.0%)
Pus cells	Median (IQR)	3 (3 – 4)
	Range	2 – 10
RBCs	Median (IQR)	15 (9 – 38)
	Range	3 – 80

Table (5): This table shows no statistically significant difference between both groups in urine analysis findings

		SSAD group	BD group	Test value	P-value	Sig.
		No. = 50	No. = 50			
Aspect	Slightly turbid	45 (90.0%)	41 (82.0%)	1.329*	0.249	NS
	Turbid	5 (10.0%)	9 (18.0%)			
Puscells	Median (IQR)	3 (3 – 4)	3 (3 – 4)	-0.530≠	0.596	NS
	Range	2 – 8	2 – 10			
RBCs	Median (IQR)	25 (9 – 40)	15 (9 – 35)	-0.359≠	0.719	NS
	Range	4 – 80	3 – 80			

P-value > 0.05: Non significant; P-value < 0.05: Significant

\*: Chi-square test; ≠: Mann-Whitney test

Serum creatinine:

The serum creatinine of the studied patients range was 0.4-1.4 mg/dl.

Radiological investigations:

In this study radiological investigations used were Plain X ray on the urinary tract, Ultrasound on the abdomen and pelvis and CT urography. The HN, site and radiological appearance of stones were recorded.

○ Site of the Stones:

In 62 patients (62%) stones were located in middle and lower pelvi-calyceal, and in 38patients (38%) stones were located in upper and mid pelvi-calyceal.

○ State of the upper urinary tract (UUT):

The state of the UUT was assessed by abdominal ultrasonography and CTU. Mild hydronephrosis (HN) was presented in 27 patients (27%), moderate hydronephrosis was presented in 12 patients (12%), and a normal pelvicalyceal system without dilatation was encountered in 61 patients (61%).

Table (6): Site of Stones and state of pelvicalyceal system

Ultrasound/ CT scan		Total no. = 100
Stone	Mid-lower	62 (62.0%)
	Mid-upper	38 (38.0%)
HN	NAD	61 (61.0%)
	Mild	27 (27.0%)
	Moderate	12 (12.0%)

Table (7): This table shows no statistically significant difference between both groups in stones site and state of pelvicalyceal system.

		SSAD group	BD group	Test value	P-value	Sig.
		No. = 50	No. = 50			
Stone	Mid-lower	29 (58.0%)	33 (66.0%)	0.679*	0.410	NS
	Mid-upper	21 (42.0%)	17 (34.0%)			
HN	NAD	30 (60.0%)	31 (62.0%)	0.053*	0.974	NS
	Mild	14 (28.0%)	13 (26.0%)			
	Moderate	6 (12.0%)	6 (12.0%)			

P-value > 0.05: Non significant; P-value < 0.05: Significant \*: Chi-square test

**Size of the Stones:**

According to the radiological size of the stones they were variable in size, some stones size was 3-4 cm, other stones size was more than 4 cm.

**Operative data:**

**Ureteric stent:**

Ureteral catheter was fixed in all 100 patients (100%), it was removed at the day of discharge with the urethral catheter. The ureteral catheter was applied to inject the

contrast up through the upper urinary tract during the PCNL, as well as to allow additional drainage from the collecting system after stone removal and to keep on ureteral patency through avoiding ureteral obstruction by postoperative edema due to manipulation of the ureter during the PCNL.

**Number of puncture access used:**

In our study, single access was done in 83 patients (83%). While two accesses were done in 17 patients (17%).

Table (8): Number of Puncture access percentage

Number of puncture access	No. of patients	Percentage
Single	83	83%
Two	17	17%
Total	100	100%

Table (9): This table shows no statistically significant difference between both groups in number of puncture access.

		SSAD group	BD group	Test value	P-value	Sig.
		No. = 50	No. = 50			
Number of puncture access	1	41 (82.0%)	42 (84.0%)	0.071*	0.790	NS
	2	9 (18.0%)	8 (16.0%)			

P-value > 0.05: Non significant; P-value < 0.05: Significant \*: Chi-square test

**Operative time and tract dilation time:**

The operative time ranged from 90 to 120 minutes with a mean of  $102.98 \pm 9.46$ . Mean operative time for group SSAD was (mean  $\pm$   $103.62 \pm 9.73$ ) and (mean  $\pm$  SD

$102.34 \pm 9.24$ ) for group BD. The difference in the mean operative time between both groups was not statistically significant.

Mean time of establishing puncture access, tract creation and dilation was  $1.70 \pm$

0.30 minutes in group SSAD. While it was 1.60 ± 0.28 minutes in group BD. The difference in the mean time for tract creation and dilation between both groups was statistically insignificant.

Table (10): Mean operative time and tract dilation time of studied cases

Operative time		Total no. = 100
Operative time (min.)	Mean ± SD	102.98 ± 9.46
	Range	90 – 120
Tract dilation time (min.)	Mean ± SD	1.65 ± 0.29
	Range	1.1 – 2.2

Table (11): This table shows no statistically significant difference between both groups in operative time and tract dilation time.

		SSAD group No. = 50	BD group No. = 50	Test value	P-value	Sig.
Operative time (min.)	Mean ± SD	103.62 ± 9.73	102.34 ± 9.24	0.674•	0.502	NS
	Range	90 – 120	90 – 120			
Tract dilation time (min.)	Mean ± SD	1.70 ± 0.30	1.60 ± 0.28	1.789•	0.077	NS
	Range	1.1 – 2.2	1.1 – 2			

P-value > 0.05: Non significant; P-value < 0.05: Significant •: Independent t-test

**Postoperative data:**

Hemoglobin level:

Mean hemoglobin level (Hb g/dl) Mean±SD preoperative was 12.51±1.07, while postoperative was 11.83 ± 1.10, so mean Hb g/dl level drop was -0.68 ± 0.17.

Group SSAD mean Hb g/dl preoperative was 12.18±0.98, while postoperative was 11.53±1.07, and mean difference was -0.65 ± 0.21

Group BD mean Hb g/dl preoperative was 12.83 ± 1.06, while postoperative was 12.13 ± 1.06, and mean difference was -0.70 ± 0.11

Mean difference in hemoglobin level (Hb g/dl) in group SSAD was -0.65 ± 0.21, while was -0.70 ± 0.11 in group BD, this mean difference in hemoglobin level between both groups was not statistically significant in difference.

Table (12): Mean Hb level pre and postoperative

HB pre	Mean ± SD	12.51 ± 1.07
	Range	10.5 – 14.3
HB post	Mean ± SD	11.83 ± 1.10
	Range	9.7 – 13.6

Table (13): Mean difference in Hb level pre and postoperative

HB	Pre	Post	Mean difference	Test value	P-value	Sig
Mean ± SD	12.51 ± 1.07	11.83 ± 1.10	-0.68 ± 0.17	-39.895••	0.000	HS
Range	10.5 – 14.3	9.7 – 13.6				

P-value > 0.05: Non significant; P-value < 0.05: Significant ••: Paired t-test

The difference in the mean Hb g/dl level drop between group SSAD and group BD was statistically insignificant (P-value 0.139)

Table (14): This table shows no statistically significant difference between both groups regarding mean difference of Hb level pre and post operative

		SSAD group	BD group	Test value	P-value	Sig.
		No. = 50	No. = 50			
HB pre	Mean ± SD	12.18 ± 0.98	12.83 ± 1.06	-3.172•	0.002	HS
	Range	10.5 – 14.1	10.5 – 14.3			
HB post	Mean ± SD	11.53 ± 1.07	12.13 ± 1.06	-2.800•	0.006	HS
	Range	9.7 – 13.4	9.8 – 13.6			
Paired t-test	t	-21.569	-46.862			
	P-value	0.000 (HS)	0.000 (HS)			
Mean difference	Mean ± SD	-0.65 ± 0.21	-0.70 ± 0.11	-1.491	0.139	NS

P-value > 0.05: Non significant; P-value < 0.05: Significant •: Independent t-test

Stone free status:

The overall stone free rate was 89% while cases with residual stone postoperative was 11%. Stone free rate for group SSAD

was 45 (90.0%) and 44 (88.0%) for group BD and this difference is not statistically significant.

Table (15): Stone free rate

Post operative		Total no. = 100
Stone free	Insignificant	89 (89.0%)
	Residual	11 (11.0%)

Table (16): This table shows no statistically significant difference between both groups in stone free rate

		SSAD group	BD group	Test value	P-value	Sig.
		No. = 50	No. = 50			
Stone free	Insignificant	45 (90.0%)	44 (88.0%)	0.102*	0.749	NS
	Residual	5 (10.0%)	6 (12.0%)			

P-value > 0.05: Non significant; P-value < 0.05: Significant \*: Chi-square test; •:Independent t-test

Postoperative complications:

There were no major complications occur in our study such as bowel injury, renal pelvic perforation, hydro or pneumothorax, hepatic or splenic injury in both group.

Our aim of this study is to perform a single step renal access dilatation (SSAD) during percutaneous nephrolithotomy (PCNL) by using directly a 30-Fr Amplatz dilator over a central Alken dilator, comparing it to Balloon renal access dilatation (BD) in a trial to reduce the operative duration, financial cost and blood loss during renal dilatation.

**DISCUSSION:**

In this study patients were classified into two groups, according to the type of renal access dilatation, each group 50 patients: Group SSAD (Single Step Amplatz Dilatation) 30-Fr Amplatz dilator over central Alken. Group BD (Balloon Dilatation) Balloon access dilatation.

In our study all procedures (PCNL) were done in prone position. Percutaneous renal access was obtained by urologist was guided by fluoroscopy. Proper access is a prerequisite for complete clearance of renal calculi by PCNL. The ideal tract is one that provides the shortest and straightest access to all calculi.

The choice of puncture site depended on the site of stones after instillation of contrast material. In our study, the most used access was for mid-lower calyceal stones in 62 patients (62%), while in 38 Patients (38%) mid-upper calyceal stones access was done. One puncture access was done in 83 patients (83%). While two punctures accesses were done in 17 patients (17%).

In our study, age of the patients ranged from 20 to 60 years with mean age  $40.84 \pm 8.53$  (Mean  $\pm$  S.D).

The mean operative time in our study was  $102.98 \pm 9.46$  (Mean  $\pm$  S.D), at Nour et al. it was (124.9-100.9). While, Muhammad Farhan et al reported mean operative time (89.6-101.2)<sup>(8, 9)</sup>.

Mean operative time in SSAD group was  $103.62 \pm 9.73$  while in BD group was  $102.34 \pm 9.24$ . Thus the difference in mean operative time between both group was statistically insignificant (P=0.502) P-value > 0.05 consider non-significant.

The duration for access tract dilation difference was insignificant between SSAD and BD groups (P=0.077) P-value > 0.05 consider non-significant. Mean of access tract dilation time in SSAD was  $1.70 \pm 0.30$ , while in BD was  $1.60 \pm 0.28$ .

In our study mean hemoglobin drop postoperative was insignificantly different between both groups (P=0.139) P-value > 0.05 consider non-significant. Mean Hemoglobin drop after surgery was  $(-0.65 \pm 0.21)$  in SSAD and  $(-0.70 \pm 0.11)$  in BD.

In our study the overall stone-free rate was 89 (89.0%). While, in Minghua et al was (77.1-79.4%). And, in Hani H. Nour et al was (92-91%)<sup>(9&10)</sup>.

Early common postoperative complications were reported in patients in the form of: postoperative fever was managed by antibiotics and antipyretics, while hematuria was managed conservatively. There were no major complications occur in our study such

as bowel injury, renal pelvic perforation, hydro or pneumothorax, hepatic or splenic injury in both group.

Postoperative evaluation at one to three month by renal ultrasonography, X-ray and CTU revealed clinically significant residual stone fragments in 11 patients (11%).

Regarding to postoperative drainage, ureteral catheter was fixed in all 100 patients (100%), it was removed at the day of discharge with urethral catheter. The ureteral catheter was applied to allow additional drainage from the collecting system after stone removal and to keep on the ureteral patency.

Tract creation and dilatation are fundamental steps in percutaneous renal surgery and are required for three traditional types of dilation, including MTD, Amplatz dilation AD (Amplatz dilation) and BD. OSD (single step dilatation) was first introduced by Frattini et al, several studies have investigated the safety and effectiveness of single step dilatation compared with those of other methods. Numerous randomized clinical trails on these methods have been reported and a previous meta-analysis has been published by Cao et al. Of note, this previous meta-analysis included only four RCTs and analyzed three combinations of tract dilation methods without comparing the associated complications. Therefore, an integrated analysis of the four tract dilation techniques was required<sup>(5)</sup>.

A meta-analysis by Wu et al, revealed that OSD (single step dilatation) was safe and effective for almost every adult patient. Significant differences were reported in X-ray exposure time and access time between MTD and single step dilatation. The hemoglobin decrease, transfusion rate and hemorrhage rate in the MTD and single step dilatation groups were also compared, as hemorrhage was characterized by blood drain within the nephrostomy tube, intermittent or continuous hematuria or gross hematuria with

or without a decrease in hemoglobin and rarely required blood transfusion, and these three variables were linked but different. single step dilatation was determined to significantly decrease the transfusion rate, hemorrhage rate and the extent of hemoglobin decrease compared with those of MTD. These results support the results of previous studies. In addition, no statistically significant differences were observed between the two groups regarding the stone-free rate<sup>(5)</sup>.

### **Hemoglobin decrease:**

A total of eight articles compared MTD with single step dilatation. The data were pooled for analysis with fixed-effect models ( $P=0.65$ ;  $I^2=0\%$ ). A significant reduction in hemoglobin was determined for the MTD group compared with that in the single step dilatation group. In addition, two studies compared BD and AD. The heterogeneity of hemoglobin decrease was low ( $P=0.17$ ;  $I^2=46\%$ ) and there was a significantly smaller decrease in hemoglobin in the BD group compared with that in the AD group. The heterogeneity of hemoglobin decrease was high ( $P<0.03$ ;  $I^2=79\%$ ) between MTD and AD. Similar hemoglobin decrease was determined between these groups. The heterogeneity of hemoglobin decrease was high ( $P<0.03$ ;  $I^2=79\%$ ) and no statistically significant difference was determined in hemoglobin decrease between BD and single step dilatation<sup>(5)</sup>.

Wu et al meta-analysis revealed that, as compared with MTD, single step dilatation was associated with a lower rate of complications, including damage to the collecting system and hemorrhage. These results indicated that the single step dilatation technique may be widely used<sup>(5)</sup>.

A number of studies reported that BD had reduced X-ray exposure time and hemoglobin decrease compared with AD and MTD, as the inflated balloon provides constant pressure and tamponades the small injured vessels. In

addition, BD was previously proposed to be more likely to fail in patients who underwent kidney surgery. This may be due to the low axial force in BD and the lack of constant dilation. Kijvikai and de la Rosette reported that BD was not suitable for complete staghorn calculus. The space between these stones and the collecting system may be inadequate and the tapered end of the dilator may create a small tract into the collecting system or split the calix<sup>(5)</sup>.

In Wu et al meta-analysis, single step dilatation was determined to be a safer method in almost every adult patient, including those who underwent renal surgery previously, compared to AD and MTD. However, single step dilatation has a considerable risk of serious complications if the surgeon is inexperienced. Therefore, Wu et al proposed that surgeons with technical expertise in single step dilatation should perform this procedure. By contrast, BD is an expensive procedure and unsuitable for patients with a history of renal surgery. However, Wu et al advised that additional randomized clinical trials are required to determine the best method for PCNL<sup>(5)</sup>.

Our study was unique in comparing the single step only renal access dilatation by single step 30-Fr Amplatz dilatation or Balloon dilatation. We found that there was no statistical difference between the two methods in operative time, early postoperative complications, stone free rate and hemoglobin decrease pre-post operative. Except for the economic issue the Amplatz dilator is much more economic and many times cheaper than the single used Balloon dilator which is a very important factor for any financial issue considering the patient, the surgeon, the hospital and even the whole country economic supply for the health properties.

### **Conclusion**

Percutaneous Nephrolithotomy is the mainstay in treatment of complex renal

stones. It must be done by experienced endourologist in an operative theater with all facilities for stone management. Balloon dilatation and single step Amplatz 30-Fr dilatation are all effective and safe in Percutaneous Nephrolithotomy renal tract access. Compared with balloon dilatation, single step Amplatz 30-Fr dilation is a better choice, as it is more feasible and has no statistical significant difference with balloon dilation in renal access creation time, stone free rate and blood loss. The use of single step Amplatz dilator 30-Fr for dilating renal access tract in PCNL is a time saving procedure, being safe, subjectively economical and an effective technique to gain renal access. We found no specific complication with this technique, and the morbidity rated were comparable with other modalities. We recommend its use for patients undergoing PCNL.

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## عملية استخراج حصوة الكلى بمنظار الكلى من خلال الجلد في جموع حصوات الكلى

تقييم التوسيع بموسع امبلاتز واحد مقارنة بالتوسيع بالبالونة

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**المقدمة:** عملية استخراج حصوة الكلى بمنظار الكلى عن طريق الجلد أصبحت الطريقة المثلى في علاج استخراج جموع حصوات الكلى بسبب مزاياه كثيرة بما في ذلك الحد الأدنى من تقنية الغازية، والانتعاش السريع والتخليص الحصوات العالي. ومع ذلك يرتبط هذا الإجراء مع العديد من المضاعفات مثل الحمى، التهاب المسالك البولية، والمغص الكلوي، وتسمم الدم والنزيف. والتوسيع بالبالون الذي يعتبر معيار الذهب، على الرغم من أنها لديها مزايا على النحو مدة قصيرة، الضغط على النزف من الجهاز مع أي خطر من ثقب إلى الأمام، ولكن تم استخدامه روتينيا محدودة بسبب تكلفتها العالية وخصوصا في المراكز والمستشفيات ذات الموارد المحدودة. في خطوة واحدة Amplatz التوسيع التي وصفت لأول مرة في عام ٢٠٠٨ من قبل فراتيني وزملاؤه مقارنتها مع متعددة متداخلة التوسيع والتوسيع بالبالون على أساس التعرض للإشعاع الكلي والوقت التنظير خلال عملية تمدد. هنا نحن نهدف لمقارنتها مع التوسيع بالبالون في مدة، وفقدان الدم، والنجاح إلى الفشل والمضاعفات.

**الهدف من العمل:** لتقييم فعالية عملية استخراج حصوات الكلى بمنظار الكلى عن طريق الجلد كطريقة أساسية لعلاج حصى الكلى المعقدة، والجدوى وسلامة واحد خطوة توسيع باستخدام Amplatz الموسع مقابل توسيع بالون في الوصول عن طريق الجلد استخراج حصاة الكلى.

**المرضى وأساليب الدراسة:** هذه دراسة استباقية أجريت على المرضى الذين أجريت لهم عملية استئصال حصوات الكلى عن طريق الجلد (PCNL) لعلاج حصوات الكلى المعقدة. أجريت الدراسة في قسم المسالك البولية ومستشفيات الدمرداش وجامعة عين شمس ومستشفى معهد ناصر خلال الفترة بين عامي ٢٠١٦ و ٢٠٢٠. وقد تم تضمين جميع الحالات التي تخضع لـ PCNL لحصوات الكلى في دراستنا.

**النتائج:** كان متوسط وقت العملية في مجموعة SSAD  $103.62 \pm 9.73$  بينما في مجموعة BD كان  $102.34 \pm 9.24$ . وبالتالي فإن الاختلاف في متوسط وقت العملية بين المجموعتين كان غير ذي دلالة إحصائية ( $P = 0.502$ ) ( $P > 0.05$  value) تعتبر غير مهمة. في دراستنا كان المعدل الإجمالي الخالي من الحصوات ٨٩ (٨٩٪).

كانت مدة اختلاف توسيع مسار الوصول ضئيلة بين مجموعتين SSAD و BD ( $P = 0.077$ ) ( $P > 0.05$ ) value) تعتبر غير مهمة. كان متوسط وقت توسيع مسار الوصول في SSAD  $1.70 \pm 0.30$ ، بينما كان في BD  $1.60 \pm 0.28$ . في دراستنا يعني أن انخفاض الهيموغلوبين بعد الجراحة كان مختلفاً بشكل طفيف بين المجموعتين ( $P = 0.139$ ) ( $P > 0.05$  value) تعتبر غير مهمة. كان متوسط انخفاض الهيموغلوبين بعد الجراحة ( $-0.65 \pm 0.21$ ) في SSAD و ( $-0.70 \pm 0.11$ ) في BD.

**الاستنتاج:** التوسيع بالبالون والتوسيع الأحادي خطوة Amplatz 30-Fr كلها فعالة وآمنة في الوصول إلى المسالك الكلوية عن طريق الجلد. بالمقارنة مع التوسيع بالبالون، يعد تمدد Amplatz 30-Fr خطوة واحدة خياراً أفضل، لأنه أكثر جدوى وليس له فرق إحصائي كبير مع تمدد البالون في وقت تكوين الوصول الكلوي، ومعدل خلو الحصوات وفقدان الدم. يعد استخدام موسع Amplatz 30-Fr أحادي الخطوة لتوسيع مجرى الوصول الكلوي في PCNL إجراءً موفقاً للوقت، كونه آمناً واقتصادياً بشكل شخصي وأسلوب فعال للوصول إلى الكلى. لم نعثر على أي مضاعفات محددة مع هذه التقنية، وكانت معدلات الاعتلال المصنفة قابلة للمقارنة مع الطرائق الأخرى.