

# COMPARATIVE STUDY OF SINGLE STEP VERSUS SEQUENTIAL DILATION IN PERCUTANEOUS NEPHROLITHOTOMY FOR RECURRENT STAGHORN STONES

Hussein Mamdouh Abd El-Dayem, Omar Farid El-Gebaly, Mostafa Saed Taha, Sinzinkayo Gabriel

Department of Genitourinary Surgery, Faculty of Medicine, Alexandria University

## Introduction

Staghorn stones occur more frequently in case of struvite (magnesium ammonium phosphate), which linked to recurring urinary tract infections by urease-producing microorganisms. Percutaneous Nephrolithotomy (PCNL) remains the primary suggested treatment option of staghorn recurrent stones. Three standard dilation instruments are available: Amplatz fascial dilators, metal telescopic dilators, and balloon dilators. Serial dilation with the Amplatz set or metal telescopic dilators both require longer fluoroscopy and operating time. One-shot dilation has been shown to be safe and effective even in patients with a history of open renal surgery with decreased fluoroscopy and operative time. The main goals with either approach would be a complete stone free rate with the least amount of morbidity.

## Aim of the work

The aim of this work was to compare single step dilation and sequential Alken metal renal dilation during percutaneous nephrolithotomy for management of recurrent staghorn renal stones.

## Patients and Methods

This prospective study was conducted from January 2022 to May 2023 on 100 adult patients who presented to the department of Genitourinary Surgery at Alexandria Main University Hospital with recurrent staghorn renal stones and were eligible for PCNL treatment. Patients were randomly assigned by simple randomization method to group A (50 patients: single-step renal dilatation) and group B (50 patients: serial metal Alken renal dilatation). Intra- and post-operative data were recorded with primary study endpoints: “operative time and fluoroscopy exposure time” and secondary endpoints: “complications (need for blood transfusion, Hb drop, etc.) and hospital stay.

## Results

The operating time was significantly lower in the single step group than in sequential metal Alken dilation group ( $44.90 \pm 11.26$  vs  $79.28 \pm 35.02$ ) min., ( $p < 0.001$ ). The fluoroscopy exposure time was significantly lower in group A than group in group B ( $1.93 \pm 1.07$  vs  $3.47 \pm 2.19$ ) min., ( $p < 0.001$ ). The intraoperative bleeding was significantly higher in group B than in group A ( $p = 0.008$ ), but the difference was not significant according to the need for blood transfusion ( $p = 0.065$ ).; only 3 patients needed blood transfusion in group A while 9 patients in group B needed blood transfusion. The decrease of Hb at day 1 postoperative was comparable between group A and B ( $1.31 \pm 1.01$  vs  $1.28 \pm 0.94$ ) g/dl, ( $p = 0.414$ ). The difference was significant regarding both postoperative pain according to VAS ( $p = 0.034$ ) and postoperative complications according to Clavien-Dando grading system ( $^{MC}p = 0.006$ ). Stone free status on day 1 was significantly different between group A and B (92% vs 72%), ( $p = 0.009$ ). Patients of group A had a significant shorter postoperative recovery time than patients of group B ( $p < 0.001$ ).

Table 1: Comparison between the two studied groups according to intra-operative data and post-operative data

	Group A (n=50)		Group B (n=50)		Test of sig.	P
	No.	%	No.	%		
Intra-operative data						
-Intraoperative bleeding						
Yes	8	16.0	20	40.0	$\chi^2 = 7.143^*$	0.008*
No	42	84.0	30	60.0		
-Blood transfusion						
Yes	3	6.0	9	18.0	$\chi^2 = 3.409$	0.065
No	47	94.0	41	82.0		
- Number of tracts						
One	40	80.0	27	54.0	$\chi^2 = 7.644^*$	0.006*
More	10	20.0	23	46.0		
-HB drop						
Mean $\pm$ SD.	1.31 $\pm$ 1.01		1.28 $\pm$ 0.94		U=427.50	0.414

Table 2: Comparison between the two studied groups according to operative time and fluoroscopy time

Intra-operative data	Group A (n=50)	Group B (n=50)	U	P
Operative time (min.)				
Min. – Max.	40.0 – 66.0	50.0 – 169.0	260.500*	<0.001*
Median (IQR)	43.0 (40.0 – 55.0)	77.50 (56.0 – 95.0)		
Fluoroscopy time (min.)				
Min. – Max.	0.34 – 5.40	1.02 – 10.39	681.50*	<0.001*
Median (IQR)	1.55 (1.24–2.42)	3.33 (1.42–4.55)		

Table 3: Comparison between the two studied groups according to post-operative data

Post-operative data	Group A (n=50)		Group B (n=50)		$\chi^2$	P
	No.	%	No.	%		
Stone free rate						
Yes	46	92.0	36	72.0	6.775*	0.009*
No	4	8.0	14	28.0		
VAS						
No pain	33	66.0	20	40.0	6.785*	0.034*
Mild	13	26.0	23	46.0		
Moderate	4	8.0	7	14.0		

## Conclusion

Both single step and sequential metal Alken renal dilation are feasible and effective modalities for management of recurrent staghorn stones during PCNL with more slight associated morbidities in single step group than serial metal Alken renal dilation group. Single step renal dilation should be recommended to experienced surgeon in PCNL procedure.