Thi-Qar Medical Journal (TQMJ):Vol.(22),No.(2),2021
Web Site: https://jmed.utq.edu.iq **Email:** utjmed@utq.edu.iq
ISSN (Print):1992-9218, ISSN (Online):1992-9218

Percutaneous Nephrolithotomy Sequel and Complications: Comparative Study of Two Groups of Patients in Al Nasiriyah Urology Centre

Dr.Faqid Faraj Al-Musawi C.A.B.S, J.M.S.C
Department of Urology, Al-Hussain Teaching Hospital, Thi-Qar Health Directorate

Abstract:

Background: Urolithiasis is a very common renal diseases.The management of patients that suffering from urinary tract calculi may considered to be a health care difficult because of its prevalence and recurrence

Aim: To compare the PCNL efficiency and complications in two groups of patients, one group without history of previous renal stone surgery, and other group with recurrent renal stone after previous PCNL or open surgery .

Materials and methods: A cross-sectional study that extended between January of 2019 till the March of 2021, in Al Hussain Teaching Hospital , Thi-Qar governorate, involving 65 patients, when they underwent PNCL . 40 cases classified as primary PNCL (patient had no previous renal surgery), and the rest of the cases (25 cases) are classified as secondary PNCL. These total cases had been assessed for their age, gender, body mass index, stone criteria (in form of location, size, site, opacification) .The outcome also assessed in form of operative time, hospital stay, stone clearance, average hemoglobin drop, development of Pseudo aneurysm, pelvic injury, fever postoperatively and whether the patient require blood transfusion or no.

Results: Even though male constituting a largest number among study population of the two group, but there was no significant statistical difference their distribution according to the types , where p value less than 0. 05. As a clinical criteria regarding the distribution of the sites , locations of the stones and stone opacity according to the types of surgical intervention, there was no significant statistical difference.

As an acute and late complication, there was significant statistical difference in the blood transfusion and post-operative fever, it was undependable because of the small number of the cases exposed to such complication .Operative time was significally shorter in primary group ,also stone free rate was significantly better in primary PCNL.

Conclusions: PCNL is effective and safe surgery ,done without fear of failure or higher risk of complications .Previous renal surgery either open or PCNL not significantly affect outcome of surgery .

Key words: Thi-Qar, PCNL, Renal stones, ESWL, 2020

Introduction

The history of urinary stones almost begins and goes parallel with the history of civilization .The management of patients that suffering from urinary tract calculi may considered to be a health care difficult because of its prevalence and recurrence. Treatment of renal stone has advanced from open surgery to the minimal invasive surgical procedures. As the first report of the removal of renal stones via nephrostomy by Rupel and Brown in 1941 (1), there were significant improvements in techniques, experience and instruments.Fernastom and Johansson first reported percutaneous nephrolithotomy (PCNL) in 1976. Alken et al. introduced the renal ultrasonic lithotripsy and endoscope to more development of the technique. In spite of the flexible ureteroscopic stone removal and extracorporeal shock wave lithotripsy (ESWL) are widely used modalities for renal stones, PCNL is still required for certain cases affording to the size, position, shape, and composition of the stones (3). Recently European Association has considered PCNL as first option for large, multiple or inferior calyx stones (4). Open stone surgery has been replaced by PCNL because of its cost effectiveness, lower morbidity, shorter operative time and lower postoperative complications(5,6). Some patients with history of open stone surgery need PCNL because of renal stone recurrences (7, 8). Stone recurrence rate is up to 50% within 5-7 years (9). PCNL or open stone surgery origins scar tissue and other anatomical modifications in kidney which later may affect PCNL. Some studies have reported that open stone surgery can increase PCNL failure rate (10) while others show that previous open stone surgery does not affect PCNL outcome (11, 12). PCNL is recommended for cases with stones larger than 20mm2, cases with struvite or cystine stones, cases in which stone removal failed with ESWL, or cases accompanied by anatomical malformation (5, 13). However, PCNL does carry a risk of significant morbidity, with contemporary series describing a complication rate of 20.5% (14).
The aim of our study was to compare the two approaches of PCNL efficiency and complications in patients with and without history of open renal stone surgery, and also in patients following failure or recurrence following PCNL procedure.

Materials and methods:

A cross-sectional study that extended between January of 2019 till the March of 2021, in Al Hussain Teaching Hospital - Thi-Qar governorate, involving 67 patients, when they underwent PCNL . These patients were categorized into those who are not previously undergoing a renal surgery (primary group n= 40) and those who are not do such operation (secondary group n=25), all operation done by a single urosurgeon,
the study was approved by our institutional ethics committee. Written informed consent was taken from all patients for photographing، recording and also its use for scientific and medical education purposes. All patients were compared according the demographic profile of all the two groups.
Group-1 included primary patients with no history of open stone surgery or PCNL procedure (n=40).Group-2 included patients who had undergone one or more open stone surgery or PCNL before PCNL(n=25)
The indications for PCNL included a stone burden of greater than 20mm^2 in length or failure of 2 to 3 attempts of ESWL treatment with stone burden of 15-20 mm^2. Patients with (BMI >30, abnormal renal anatomy such as horse shoe or ectopic kidneys and a stone burden, were excluded from the study.
All patients were evaluated with blood counts, renal function test, urine exam, urine culture sensitivity coagulation profile، and ultrasonography.
An intravenous urography (IVU) was carried out in all to assess function and planning of the puncture. Urinary tract infections detected preoperatively were treated according to antibiotic sensitivity. Computed tomography

(CT) scan was performed in patients with history of open surgery. Patients with retro-renal colon in CT scan were candidate for open stone surgery. After general anesthesia, a 5 or 6 French (F) ureteral catheter was inserted and fixed to a Foley catheter. Patients were then turned into a prone position with special care for the pressure points. Trans-papillary puncture was made preferably away from the previous incision site if any, using a three part needle (Angiomed 1.3mm (17.5G) under fluoroscopy control after retrograde opacification of the pelvi-caliceal system via ureteral catheter. An angle tip Terumo® wire was then positioned in the upper ureter. The tract was then dilated initially using serial Teflon dilators up to 10 Fr, followed by placement of Alken's rod. The subsequent tract dilation was performed by serial metallic or Teflon dilators. After Amplatz sheath insertion, nephroscopy was performed and stones were fragmented by a pneumatic lithotripter and removed. Normal saline was used for continuous irrigation. If there was more than 20mm^2 residual stone that could not be accessed from the first tract, a second access was established. The fragmented calculi were removed using forceps or suction. On the Table, complete clearance was ensured by fluoroscopy and direct nephroscopy. An adequate size nephrostomy was placed at the end of the procedure. Nephrostomy was removed on the second postoperative day after perform nephrostogram.

Results:

Comparative study done to evaluate the 65 pateints underwent PNCL whether they was a primary or secondary in which 40 cases of primary PCNL, and 25 cases of secondary PCNL. These cases had been assessed for their age, gender, body mass index, stone criteria in form of location, size, site, opacification. The outcome also assessed in form of operative time, hospital stay, stone clearance, average hemoglobin drop, development of Pseudo aneurysm, pelvic injury, fever postoperatively and whether the patient require blood transfusion or no.

Even though male constituting a largest number among study population of the two groups, but there was no significant statistical difference their distribution according to the types of approaches, where

p value less than 0. 05 as shown in (figure 1).

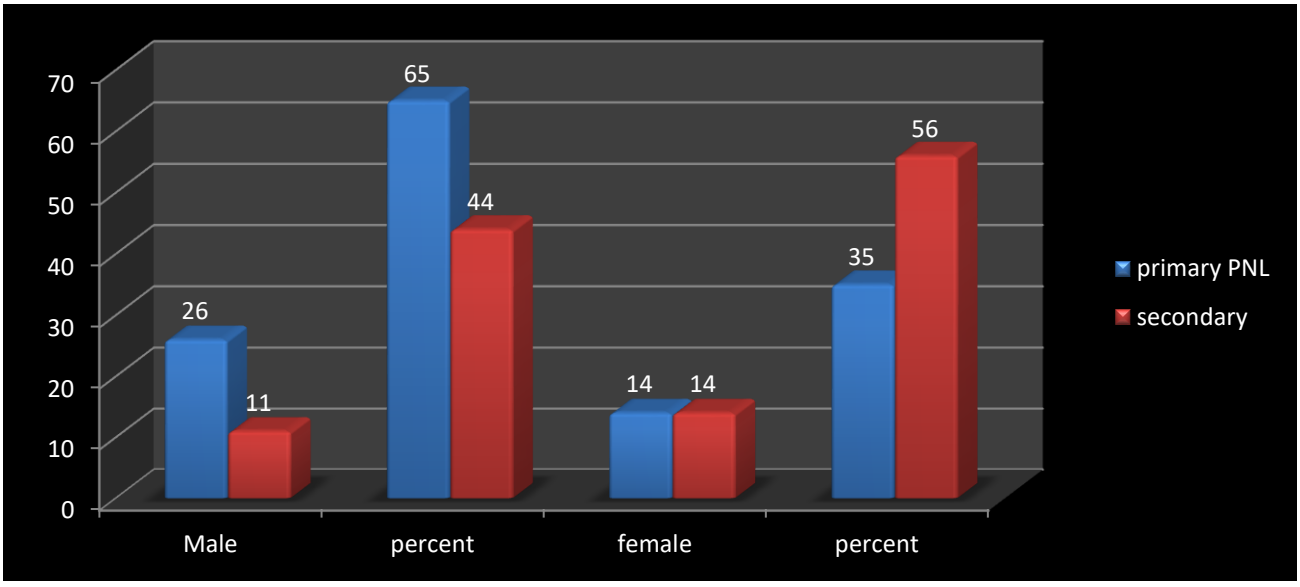

Figure one: sex distribution according to PNL types
Chi-square =2.767, p = 0.080

		N	Mean	Std. Deviation	F	Sig.
Age	Primary	40	43.1000	15.78510	0.803	0.374
	Secondary	25	39.7600	12.49427		
	Total	65	41.8154	14.59655		
BMI	Primary	40	22.6625	4.02618	1.414	0.239
	Secondary	25	23.8200	3.45169		
	Total	65	23.1077	3.82987		

As a clinical criteria regarding the distribution of the sites of stones, locations of the stones and stone opacity according to the types of surgical intervention, there was no significant statistical difference,

Table 2: Stone characters according to the types of surgery

		PNCL		Total	Chi-square
		Primary	Secondary		P value
Stone Site	Right	19	16	35	1.685[a]
		47.5%	64.0%	53.8%	.213
	Left	21	9	30	
		52.5%	36.0%	46.2%	
Stone Location	1.00	18	10	28	4.073
		45.0%	40.0%	43.1%	.585[b]
	2.00	0	1	1	
		0.0%	4.0%	1.5%	
	3.00	6	2	8	
		15.0%	8.0%	12.3%	
	4.00	1	1	2	
		2.5%	4.0%	3.1%	
	5.00	0	1	1	
		0.0%	4.0%	1.5%	
	6.00	15	10	25	
		37.5%	40.0%	38.5%	
Opacity	Translucent	18	8	26	2.463[a]
		45.0%	32.0%	40.0%	0.292
	Opaque	22	17	39	
		55.0%	64.0%	58.5%	

As a acute complication, there was significant statistical difference in the blood transfusion and post-operative fever, it was undependable because of the small number of the cases exposed to such complication and it's also proved by logistic regression analysis when done and which there was no such difference

Table 3: Complications according to the types of surgery

		PNCL		Total	Chi-square P value
		Primary	Secondary		
Blood transfusion	No	35	16	51	5.027[a]
		87.5%	64.0%	78.5%	.028
	yes	5	9	14	
		12.5%	36.0%	21.5%	
Post-operative fever	No	33	15	48	
		82.5%	60.0%	73.8%	4.033[a]
	Yes	7	10	17	.033
		17.5%	40.0%	26.2%	
pelvic injury	.No	33	21	54	.025[a]
		82.5%	84.0%	83.1%	.875
	Yes	7	4	11	
		17.5%	16.0%	16.9%	
Pseudo-aneurism	No	39	25	64	.635[a]
		97.5%	100.0%	98.5%	.426
	yes	1	0	1	
		2.5%	0.0%	1.5%	
Total		40	25	65	
		100.0%	100.0%	100.0%	

Discussion

Renal tract stone disease surgical management has progressed during the last two decades after the introduction of minimal invasive techniques, as PCNL and ESWL (15). PCNL has become a common procedure performed in patients with renal calculi (16). Later the recurrence rate for renal stones is high, these patients often need re-
-intervention .Many reports have demanded higher failure rates of PCNL in patients with prior open intervention (10,17) in Conversely Shah et al. and Margel et al. studies demonstrated that anatomical changes after open stone surgery like perinephric fibrosis, infundibulum stenosis, bowel displacement and incisional hernia may decrease PCNL success rate and increase its complications (18,19)

Current study explore that subsequent PCNL complications and results did not affected by previous open stone surgery or PCNL. Parallel to our findings, a number of studies showed that PCNL can be performed positively without risk of complications in patients with a history of previous open surgery or PCNL (19-21) as shown in table 2. The operative time mean in the present study was suggestively higher in groups with single or multiple previous stone surgeries or previous PCNL procedure that shown in table 1. Also Margel et al. and Tugcu et al. have expressed that operative time was longer in patients with history of previous open nephrolithotomy (19,20). The factors that may cause prolonged PCNL in patients after open surgery or PCNL are difficulties in tract dilatation in scarred collecting system and perinephric spaces، difficulties in stone fragment removal by grasping forceps and rigid nephroscopy in scarred kidney and cautious fixation of kidney in the retroperitoneum.

The rate of access attempts, secondary tract & auxiliary procedure and second-look PCNL was the same in all groups in our study. Sofikerim et al. and Kurtulus et al. reported as well as the same finding regarding the auxiliary procedures(12,21). Gupta and colleagues found that relook PCNL is higher in patients with prior open surgery(22). Similar to our results Margel et al. found that access attempts is higher in patients with previous open surgery (19) .Puncturing the calyx of interest over the non-operated scar site sorts the dilatations easy. Shah et al. preferred a supracostal approach،while Basiri et al. proposed a lower calyceal puncture to evade scar tissue (18,11). Margel et al. study, recommend indicating upper-polecaliceal puncture to avoid the scar tissue coming in the way of the puncture needle(19). However in our study we have certain to access the primary calyx contingent upon the stone burden regardless of its relation to scar tissue or ribs. In Sarhad Khan et al. study, febrile urinary tract infection was observed in 8 patients (4%) consequently who were treated with parental antibiotics [15].

Li MK and Lames S reported symptomatic urinary tract infection in 5.5-9.2%(23,24). In our study infection need antibiotics was seen in 10.7-13.6 % in the 2 Groups, which is marginally higher than other studies. We did not have any reports of septicemia or mortality secondary to infection. PCNL is generally accepted as a safe procedure.

Hemorrhage is the most common complication of this procedure. Excessive bleeding can occur during needle passage, nephrostomy or tract dilatation(25,27) .Similar to our study acute bleeding requiring transfusion has been reported in 3% to 12 %of cases (10,27,28) Opportunely, in our study and the Sarhad Khan et al. study no patient required selective nephrectomy or embolization (15).

The organs most injured through PCNL and stone removal are the lungs and pleura, with probable pneumothorax or hydrothorax(29,30). In our study there was an incidence of 2% to 6% in all the 2 Groups.

A serious complication of PCNL puncture may be bowel perforation. Juan et al. study had a few cases of colon perforation in PCNL (31) ,in our study there was no bowel injury in both groups so no different was noted in both primary and secondary group. Accordingly we commend a pre-operative CT scan so as to study the relationship between the adjacent viscera to the kidney after open surgery as recommended by Margel et al. and Kurtulus et al.(19,21).

Similar to other studies, also our study indicated that there are no differences between primary PCNL and secondary PCNL in terms of stone free rate (SFR) and hospitalization time (8,12,20) . Generally morbidity ranges from 7.5% to 18% which depend on the sample size and the incidence of complicated renal stone(32,33). Overall mortality of PCNL ranges from 0.5% to 1.1% and is mostly attributed to severe hemorrhage, urosepsis or pulmonary embolism (32,33)

Exact reporting of complications is an important component to critical appraisal and innovation in surgery and exactly in percutaneous nephrolithotomy (PCNL). An identical complication reporting methodology is needed to enable appropriate comparisons between institutions innovations in technique or time periods (34,35). The grading system of Clavien-Dindo had become accepted usually in urology and has assisted the study of PCNL complications (39)

Conclusions: : PCNL by expert single-surgeon is effective and safe surgery for treatment of renal stone disease ,done without fear of failure or higher risk of complications .Previous renal surgery wither open or PCNL not significantly affect outcomes of surgery . Bleeding in excessive form, or adjacent organs injury, less discomfort and complications, and increased stone free rate are advantages of PCNL. Prevention is important rather than treatment; thus, we must always make efforts to reduce operation time when performing PCNL.

References:

1- Rupel E, Brown R. Nephroscopy with removal of stones following nephrosotomy calculus anuria. J.Urol 82-84:177;1941 Percutaneous nephrolithotomy complications 268
2- Fernström I, Johansson B. Percutaneous pyelolithotomy. A new extraction technique. Scand J Urol Nephrol 9-10:207; 1976.
3- Alken P, Hutschenreiter G, Günther R, Marberger M. Percutaneous stone manipulation. J Urol. 1981;125:463-6.
4- Turk C, Knoll T, Petrik A,et al Guidlines on Urolithiasis. Chapter 6.4: section of procedure for active removal of kidney stones. Presented at: 26th European Association of Urology congress March. 2011; 18-22. Vienna, Austria.
5- Al-Kohlany KM, Shokeir AA, Mosbah A, Mohsen T, Shoma AM, Eraky I, et al. Treatment of complete staghorn stones: a prospective randomized comparison of open surgery versus percutaneous nephrolithotomy. J Urol. 2005;173:469-73.
6- Chandhoke PS. Cost-effectiveness of different treatment options for staghorn calculi. J Urol. 1996;156:1567-71.
7- Trinchieri A1, Ostini F,Nespoli R, Rovera F, Montanari E، Zanetti G. A prospective study of recurrence after a first renal stone. J Endourol. 2006;0:17-20.
8- Lojanapiwat B. Previous open nephrolithotomy: does it affect percutaneous nephrolithotomy techniques and outcome? J Endourol. 2006;20:17-20
9- Parmar MS. Kidney stones. BMJ. 2004;328:1420-4.
10- Jones DJ, Russell GL, Kellett MJ, Wickham JE. The changing practice of percutaneous stone surgery. Review of 1000 cases 1981-1988. Br J Urol. 1990;66:1-5.
11- Basiri A, Karrami H, Moghaddam SM, Shadpour P. Percutaneous nephrolithotomy in patients with or without a history of opennephrolithotomy. J Endourol. 2003;17:213-6.
12- Sofikerim M, Demirci D, Gülmez I, Karacagil M. Does previous open nephrolithotomy affect the outcome ofpercutaneous nephrolithotomy? J Endourol. 2007;21:401-3.
13- Preminger GM, Assimos DG, Lingeman JE, Nakada SY، Pearle MS, Wolf JS Jr; et al. Chapter 1: AUA guideline on management of staghorn calculi: diagnosis and treatment recommendations. J Urol. 2005;173:1991-2000.
14- Labate G, Modi P, Timoney A, Cormio L, Zhang X, Louie M, et al. The percutaneous nephrolithotomy global study: classification of complications. J Endourod 25-80:1275;2011
15- Khan S, Toori LA, Anwer K. The efficacy of percutaneous nephrolithotomy in renal and upper uretric calculi. Pak J Med Res 2005;44:89-91.
16- Srivastava A, Singh KJ, Suri A, Dubey D, Kumar A, Kapoor R, et al. Vascular complications after percutaneous nephrolithotomy: are there any predictive factors? Urology. 40-66:384;2005
17- Viville C. [Percutaneous nephrolithotomy. Personal experience in 100 cases]. J Urol (Paris). 1987;93:253-8.
18- Shah HN, Mahajan AP, Hegde SS, Bansal M. Tubeless percutaneous nephrolithotomy in patients with previous ipsilateral open renal surgery: a feasibility study with review of literature. J Endourol. 2008;22:19-24.
19- Margel D, Lifshitz DA, Kugel V, Dorfmann D, Lask D، Livne PM. Percutaneous nephrolithotomy in patients who previously underwent open nephrolithotomy. J Endourol2005c;19:1161-4.
20- Tugcu V, Su FE, Kalfazade N, Sahin S, Ozbay B, Tasci AI. Percutaneous nephrolithotomy (PCNL) in patients with previous open stone surgery. Int Urol Nephrol. 2005;40:881-4.
21- Kurtulus FO, Fazlioglu A, Tandogdu Z, Aydin M, Karaca S, Cek M. Percutaneous nephrolithotomy: primary patients versus patients with history of open renal surgery. J Endourol. 5-22;2671;2008
22- Gupta NP, Mishra S, Nayyar R, Seth A, Anand A. Comparative analysis of percutaneous nephrolithotomy in patients with and without a history of open stone surgery: single center experience. J Endourol. 2009;23:913-6.
23- Li MK, Wong MY, Toh KL, Ho GH, Foo KT. Percutaneous nephrolithotomy—results and clinical experience. Ann Acad Med Singapore. 1996;25:683-6.
24- Lahme S, Bichler KH, Strohmaier WL, Götz T. Minimally invasive PCNL in patients with renal pelvic and calyceal stones. Eur Urol. 2001;40:619-24.
25- Roth RA, Beckmann CF. Complications of extracorporeal shock-wave lithotripsy and percutaneous nephrolithotomy. Urol Clin North Am. 1988;15:155-66.
26- Lee WJ, Smith AD, Cubelli V, Badlani GH, Lewin B, Vernace F، et al. Complications of percutaneous nephrolithotomy. AJR Am J Roentgenol. 1987;148:177-80.
27- Patterson DE, Segura JW, LeRoy AJ, Benson RC Jr, May G. The etiology and treatment of delayed bleeding following percutaneous lithotripsy. J Urol. 1985;133:447-51.
28- el-Kenawy MR, el-Kappany HA, el-Diasty TA, Ghoneim MA. Percutaneous nephrolithotripsy for renal stones in over 1000 patients. Br J Urol. 1992;69:470-5.
29- Reddy PK, Hulbert JC, Lange PH, Clayman RV, Marcuzzi A،Lapointe S, et al. Percutaneous removal of renal and ureteral calculi: experience with 400 cases. J Urol. 1985;134:662-5.

30- Young AT, Hunter DW, Castaneda-Zuniga WR, HulbertJC, Lange P, Reddy P, et al. Percutaneous extraction of urinary calculi: use of the intercostal approach. Radiology8-154;633;1985
31- Juan YS, Huang CH, Chuang SM, Shen JT, Li CC, Wang CJ, et al. Colon perforation: a rare complication during percutaneous nephrolithotomy. Kaohsiung J Med Sci22-102;99;2006
32- Jemni M, Bacha K, Ben Hassine L, Karray MS, Ayed M.]Results of the treatment of renal lithiasis by percutaneous nephrolithotomy: apropos of 115 cases]. Prog Urol.9-60;52;1999
33- Sahin A, Atsü N, Erdem E, Oner S, Bilen C, Bakkaloğlu M, et al. Percutaneous nephrolithotomy in patients aged 60 years or older. J Endourol. 2001; 5:489-91.ibju | Percutaneous nephrolithotomy complications 269
34- S.V. Krishna reddy, Ahammad basha Shaik. Management of posterior urethral Injuries-0ur Experience. Journal of medical science and clinical research 2014;8:2090-2099.
35- S.V. Krishna reddy, Ahammad basha Shaik, K. Srinivas. Penile injuries: A 10 year Experience. Canadian urol association J 10-631;626;2019
36- Dindo D, Demartines N, Clavien PA. Classification of surgical complications: a new proposal with evaluation in a cohort of 6336 patients and results of a survey. Ann Surg 13-240;2005;2004

كفاءة ومضاعفات عمليات رفع حصى الكلى بالناظور عن طريق الجلد: دراسة مقارنة لمجموعتين من المرضى في مركز الناصرية لجراحة المسالك البولية

د. فاقد فرج الموسوي.C.A.B.S, J.M.S.C
قسم المسالك البولية، مستشفى الحسين التعليمي، دائرة صحة ذي قار

الخلاصة
الخلفية العلمية: حصى المسالك البولية هومن أمراض الكلى الشائعة جدا. معالجة المرضى الذين يعانون من حصى المسالك البولية تعتبر صعبة نوعا ما بسبب كثرة انتشارها ورجوعها بعد التداخل الجراحي
الهدف: لمقارنة كفاءة ومضاعفات عمليات استخراج حصى الكلى بالناظور لمجموعتين من المرضى، المجموعة الاولى دون تاريخ سابق لجراحة حصى الكلية والمجموعة الثانية لمرضى حصى كلوي متكرر بعد عملية مشابهة سابقة أو جراحة مفتوحة .
المواد والأساليب: دراسة مقطعية شاملة امتدت بين يناير 2019 وحتى مارس 2021، في مستشفى الحسين التعليمي بمحافظة ذي قار، وشملت 65 مريضا، .40مريض من الحالات مصنفة على أنها عمليات الأولية (المريض ليس لديه تاريخ سابق لجراحة حصى كلى سابقة)، وصنفت بقية الحالات (25 حالة) كحالات ثانوية(لديها تاريخ سابق لعملية مشابهة او جراحة مفتوحة) وقد تم تقييم هذه الحالات الإجمالية لسنهم وجنسهم ومؤشر كتلة الجسم ومعايير الحجر (في شكل الحجر موقعه وحجمه وتعتيمه). كما تم تقييم النتيجة من حيث وقت العمليات الجراحية ، والإقامة في المستشفى ، وإزالة حصى الكلى بالكامل ، ومتوسط هبوط نسبة الدم ، وحدوث تجويف وعائي كاذب ، وتمزق حوض الكلية، والحمى بعد الجراحة وما إذا كان المريض يحتاج إلى نقل الدم أم لا.
النتائج: على الرغم من أن الذكور يشكلون أكبر عدد بين سكان الدراسة من المجموعتين، ولكن لم يكن هناك فرق إحصائي كبير وفقا لأنواع الحصى، حيث قيمة p أقل من 0. 05. كمعيار سريري فيما يتعلق بتوزيع مواقع الحصى وتعتيم الحصى وفقا لأنواع التدخل الجراحي ، لم يكن هناك فرق إحصائي كبير.
كمضاعفات حادة ومتأخرة ، كان هناك فرق إحصائي كبير في نقل الدم والحمى بعد العملية الجراحية ، كان لا يمكن الاعتماد عليه بسبب العدد القليل من الحالات المدروسة لمثل هكذا المضاعفات. وكان وقت العملية أقصر في المجموعة الأولى ، كما كان معدل ازالة الحصى بالكامل أفضل بكثير في المجموعة الاولى .
الاستنتاجات: عمليات رفع حصى الكلى بالناظور هي من العمليات الجراحية الفعالة والامنة، يمكن القيام بها دون خوف من الفشل أو ارتفاع خطر حدوث مضاعفات . جراحة حصى الكلى السابقة المنظارية إو المفتوحة لا تؤثر بشكل كبير على نتيجة الجراحة .