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Accompanied Percutanous Nephrolithotomy (PCNL) And Flexible Ureterorenoscopy (FURS) Treatment 0f 20 Cases Of Stage Horn Stones At Tripoli, Libya

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Abstract:
Kidney stones *are a common condition, affecting approximately 10% of adults over their lifetime. The global incidence is rising, largely due to increasing rates of obesity and diabetes. Three primary techniques are used for the removal of lower pole kidney stones: extracorporeal shockwave lithotripsy (ESWL), percutaneous nephrolithotomy (PCNL) and flexible ureterorenoscopy (FURS) with laser lithotripsy. Although PCNL is highly effective, it carries certain risks, including bleeding that may require angioembolization, urinoma formation and, in rare cases, organ injury. On the other hand, FURS allows urologists to access and treat lower calyx stones and complex renal stones through a natural orifice, improving stone clearance due to advancements in laser lithotripsy and endoscopic basket technology. This study aims to evaluate the effectiveness and safety of PCNL and FURS in managing staghorn stones. Conducted at Ghout Shaal Hospital, Masara Clinic and Ishbilia Clinic in Libya, the research includes 20 cases collected between January 2022 and December 2024.*
The age of the patients varies from 15 to 25. In PCNL the age 15 to 25 is 10%, 26 to 50 is 25% and greater than 50 is 15%. Similarly in FURS the age 15 to 25 is 5%, 26 to 50 is 35% and greater than 50 is 10%. The sex male is 30% in PCNL and 35% in FURS and female 20% in PCNL and 15% in FURS. The stone diameter varies from 10mm to 30mm, in PCNL ≤ 10 mm is 25%, 11-20mm is 15% and 21-30mm is 10%. In FURS ≤ 10 mm is 25%, 11-20mm is 20% and 21-30mm is 05%. operation tine in hours may be differ from 30 minutes to 3 hours. In PCNL < 1hour is 25%, 1 to 2 hours is 15% and 2 to 3 hours is 10%. In FURS < 1 hour is 35%, 1 to 2 hours is 10% and 2 to 3hours is 5%. Hospitalization time is 1 day to 3 days. In PCNL less than 1 day is 30%, 2 days is 15% and 3 days is 5%, similarly in FURS less than 1 day is 35%, 2 days is 10% and 3 days is 10%. Stone free rate in 1st session 35% in PCNL and 20% in FURS, 2nd session 10% in PCNL and 15% in FURS, 3rd session 5% in PCNL and 5% in FURS. The complications may include fever, pain, mild Hematuria, urinary tract infections and ureteral stricture.

Keywords: *PCNL (Percutaneous Nephrolithotomy), FURS (Flexible Ureteroscopy), Stone free rate, Libya.*

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I. Introduction:

Percutaneous nephrolithotomy (PCNL) is the preferred treatment for both partial and complete staghorn renal stones, with the European Association of Urology (EAU) 2021 guidelines recommending PCNL or retrograde intrarenal surgery (RIRS) for kidney stones larger than 20 mm [(1)]. Staghorn stones are large, branching formations that occupy part or all of the renal pelvis and calyces, classified as complete or partial based on their extent. Studies comparing stone clearance rates between flexible ureteroscopy (fURS) and PCNL for complex kidney stones indicate that PCNL is more effective for stones exceeding 2 cm. A newer surgical approach, endoscopic combined intrarenal surgery (ECIRS), integrates both techniques and has shown improved outcomes for complex renal stones without ureteral involvement [(2, 3)]. In elderly patients, treatment options include shock-wave lithotripsy (SWL), flexible ureterorenoscopy (FURS), variations of PCNL (standard, mini-, and micro-PNL) and, in some cases, laparoscopic or open surgery. Technological advancements have led to the development of thinner ureteroscopes and nephroscopes, making FURS and PCNL viable alternatives to SWL [(4)].

Comparative studies on standard and modified PCNL techniques have reported similar stone-free rates and comparable or even lower complication rates. Additionally, as flexible renoscopes have become slimmer and laser technology has advanced, FURS has emerged as a leading alternative for kidney stones smaller than 2 cm [(5)]. Research has highlighted FURS as having a lower complication rate than PCNL while achieving a stone-free rate exceeding 80%. Although European Urology Guidelines recommend PCNL for stones larger than 2 cm and

FURS or SWL for those under 2 cm [6], FURS is increasingly used safely and effectively for larger stones, particularly in elderly patients with comorbidities, where experienced clinicians often favor it**.**

II. Methodology:

Study Place:

This retrospective study was conducted in the Ghout Shaal hospital, Masara clinic and Ishbilia clinic, Libya with 20 cases.

Study Period:

The study period was determined from January 2022 to December 2024.

Data collected:

Demographic information, including name, date of birth, BMI and gender, was collected from the hospital's electronic database. The study reviewed the medical records of hospitalized patients, focusing on admission notes, progress notes, surgical reports and discharge summaries. Key data included the admission date, timing of surgery, discharge date, duration of stone presence, type of procedure performed, and any complications encountered. Preoperative urinary CT scans were utilized to evaluate stone hardness, size and the presence of hydronephrosis. The absence of stones was confirmed through a follow-up urinary CT scan conducted three months post-surgery. Surgical success was defined as complete stone clearance. Complications were systematically categorized, with sepsis identified as an abnormal systemic response to infection. This condition involves an excessive inflammatory reaction, followed by immune suppression and potential multi-organ failure.

Surgical Procedures:

i. FURS

In flexible ureteroscopy (FURS), a small, flexible ureteroscope (approximately 3 mm in diameter) is introduced through the urethra, bladder, and ureter to access the kidney and provide a close-up view of the stone. In this procedure, an Olympus URF-V2 flexible ureteroscope (Olympus Medical System, Tokyo, Japan) was utilized, with a Dornier Medilas H Solvo 35 Holmium laser (Dornier MedTech, Munich, Germany) serving as the energy source. A laser fiber, typically 200 or 273 µm in diameter, was inserted through the ureteroscope's working channel to fragment the kidney stone using laser energy. Smaller stone fragments (approximately 2 mm) were left to pass naturally through the urine, while larger fragments were extracted using a wire basket device inserted through the ureteroscope. Residual fragments are typically expelled within a week following the procedure. The surgery is performed under general anesthesia and generally requires an overnight hospital stay. At the end of the procedure, a temporary double-J ureteral stent may be placed to prevent ureteral obstruction due to post-surgical swelling. Patients are usually discharged the following day if they remain clinically stable.

ii. PCNL

Percutaneous nephrolithotomy (PCNL) is a surgical procedure designed to remove kidney stones through a direct approach. The procedure begins with a 10 mm incision in the skin overlying the kidney, followed by the insertion of a needle into the kidney's collecting system under fluoroscopic guidance. To aid in needle placement, contrast fluid may be introduced into the collecting system via a ureteral stent, ensuring precise navigation through the skin into the kidney. Imaging techniques, such as computed tomography of the kidneys, ureters, and bladder (CT KUB), help optimize access for successful stone removal. When treating stones in the lower pole of the kidney, the needle is typically directed toward the lower section of the collecting system. Once the needle is correctly positioned, a flexible guidewire is advanced into the collecting system to facilitate dilation of the access tract. This dilation allows for the insertion of a hollow rigid sheath, creating a 10 mm-wide passage between the skin and the kidney's urine-collecting structures. A nephroscope, a rigid metal telescope, is then introduced through this channel to visualize the stone. Depending on its size, the stone may either be extracted intact using graspers or fragmented using energy-based tools such as an ultrasonic probe or a pneumatic device. The procedure, performed under general anesthesia, typically lasts between one and three hours, with patients usually requiring a hospital stay of a few days. Drainage tubes are generally removed within 24 to 48 hours without the need for additional anesthesia.

Statistical analysis:

IBM SPSS statistics software version 22 (IBM Corp, Armonk, NY, USA) was employed to analyze the data. Frequencies and percentages were calculated for qualitative variables. The significance of the dat is as $P \leq 0.05$.

III. Result And Discussion:

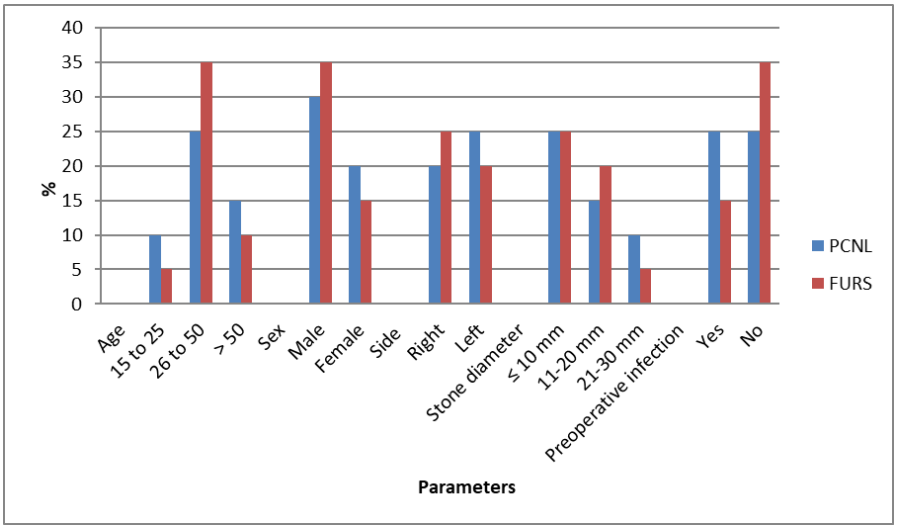
According to the definition in Campbell's urology and related literature, staghorn stones are defined as large and branched stones that occupy part or all of the collecting system. They can be partial or complete, depending on the level of occupation of the renal pelvis and renal calyces. That is, staghorn stones occupy the renal pelvis as well as at least two calyces of the kidney. The study was conducted in the Ghout shaal hospital, Masara clinic, Ishbilia clinic, Libya with 20 cases during the study period January 2022 to December 2024.

Table 1: Characteristics of patients underwent treatment in hospital.

S.No.	Parameters	PCNL		FURS		P- Value
		No.	%	No.	%	
1	**Age**					
	15 to 25	2	10	1	05	
	26 to 50	5	25	7	35	
	> 50	3	15	2	10	
2	**Sex**					
	Male	6	30	7	35	
	Female	4	20	3	15	
3	**Side**					0.00581
	Right	4	20	5	25	
	Left	5	25	4	20	
4	**Stone diameter**					
	≤ 10 mm	5	25	5	25	
	11-20 mm	3	15	4	20	
	21-30 mm	2	10	1	05	
5	**Preoperative infection**					
	Yes	5	25	3	15	
	No	5	25	7	35	

(% calculated from 20 cases)

Table 1 is tabulated with characteristics of patients; the age of the patients varies from 15 to 25. In PCNL the age 15 to 25 is 10%, 26 to 50 is 25% and greater than 50 is 15%. Similarly in FURS the age 15 to 25 is 5%, 26 to 50 is 35% and greater than 50 is 10%. The sex male is 30% in PCNL and 35% in FURS and female 20% in PCNL and 15% in FURS. The stone diameter varies from 10mm to 30mm, in PCNL ≤ 10 mm is 25%, 11-20mm is 15% and 21-30mm is 10%. In FURS ≤ 10 mm is 25%, 11-20mm is 20% and 21-30mm is 05%. The P-Value is 0.00581.



Graph 1: Characteristics of patients underwent treatment in hospital.

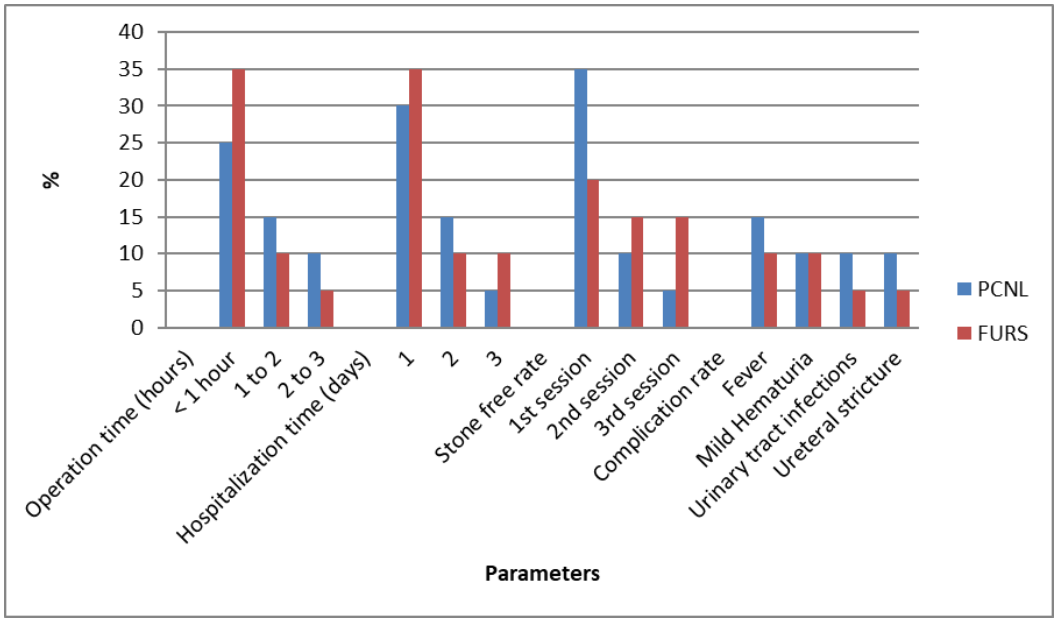
Table 2: Outcomes in the PCNL and FURS

S.No.	Parameters	PCNL		FURS		P- Value
		No.	%	No.	%	
1	**Operation time (hours)**					
	< 1 hour	5	25	7	35	
	1 to 2	3	15	2	10	
	2 to 3	2	10	1	05	
2	**Hospitalization time (days)**					

	1	6	30	7	35	
	2	3	15	2	10	
	3	1	05	2	10	0.0863
3	**Stone free rate**					
	1st session	7	35	4	20	
	2nd session	2	10	3	15	
	3rd session	1	05	3	15	
4	**Complication rate**					
	Fever	3	15	2	10	
	Mild Hematuria	2	10	2	10	
	Urinary tract infections	2	10	1	05	
	Ureteral stricture	2	10	1	05	

(% calculated from 20 cases)

Table 2 is tabulated with outcomes of PCNL and FURS method, comparing the operation tine in hours may be differ from 30 minutes to 3 hours. In PCNL < 1hour is 25%, 1 to 2 hours is 15% and 2 to 3 hours is 10%. In FURS < 1 hour is 35%, 1 to 2 hours is 10% and 2 to 3hours is 5%. Hospitalization time is 1 day to 3 days. In PCNL less than 1 day is 30%, 2 days is 15% and 3 days is 5%, similarly in FURS less than 1 day is 35%, 2 days is 10% and 3 days is 10%. Stone free rate in 1st session 35% in PCNL and 20% in FURS, 2nd session 10% in PCNL and 15% in FURS, 3rd session 5% in PCNL and 5% in FURS. The complications may include fever, pain, mild Hematuria, urinary tract infections and ureteral stricture. The P-Value is 0.0863 respectively.



Graph 2: Outcomes in the PCNL and FURS

IV. Conclusion:

Staghorn stones present a significant challenge for urologists. Unlike ureteral stones, they tend to cause more severe pain, are more frequently observed in females, and often follow a slow-progressing clinical course. While percutaneous nephrolithotomy (PCNL) remains a primary treatment, its limitations in achieving complete stone clearance have led to the development of modified techniques and, in some cases, the continued use of open surgery. However, patient safety remains the foremost concern for surgeons [7, 8].

In conclusion, medical research indicates that percutaneous nephrolithotomy (PCNL) generally achieves a higher stone-free rate compared to flexible ureteroscopy (FURS), making it more effective for complete stone removal in a single procedure. However, FURS remains a viable option for smaller stones or cases where a less invasive approach is preferred, though it may require multiple sessions to achieve comparable outcomes.

References:

[1] Zewu Z,Cui Y, Feng Z, Yang L And Chen H (2019) Comparison Of Retrograde Flexible Ureteroscopy And Percutaneous Nephrolithotomy In Treating Intermediate Size Renal Stones (2–3 Cm): A Meta-Analysis And Systematic Review. Int. Braz. J. Urol, 45(1):10–22.

[2] Mcclinton S, Starr K, Thomas R, Maclennan G, Lam T, Hernandez R, Pickard R, Anson K, Clark T And Maclennan S (2020) The Clinical And Cost-Effectiveness Of Surgical Interventions For Stones In The Lower Pole Of The Kidney: The Percutaneous

Nephrolithotomy, Flexible Ureterorenoscopy And Extracorporeal Shockwave Lithotripsy For Lower Pole Kidney Stones Randomized Controlled Trial (Pure RCT) Protocol. Trials, 21(1):479

[3] Pieras E, Tubau V, Brugarolas X, Ferrutxe J And Pizá P (2017) Comparative Analysis Between Percutaneous Nephrolithotomy And Flexible Ureteroscopy In Kidney Stones Of 2–3 Cm. Actas Urol. Esp, 41(3)194–199.

[4] Erdoğan A, Keskin E And Altun A (2020) Percutaneous Nephrolithotomy Versus Flexible Ureteroscopy In Terms Of Cost-Effectiveness In Patients With 10–30 Mm Renal Stones. Urologia, 87(1):41–46.

[5] Chen HQ, Chen ZY, Zeng F, Li Y, Yang ZQ, He C And He Y (2018) Comparative Study Of The Treatment Of 20–30 Mm Renal Stones With Miniaturized Percutaneous Nephrolithotomy And Flexible Ureterorenoscopy In Obese Patients. World J. Urol, 36(8):1309–1314.

[6] Lv G, Zhang Z, Du F, Qi W, Zhong M, Zhou Y, Zhou C, Li Y And Zhang D (2022) Comparison Of Flexible Ureteroscopy And Mini-Percutaneous Nephrolithotomy In The Treatment For Multiple Nephrolithiasis. Front. Surg, 9(9):1004432.

[7] Cracco CM And Scoffone CM (2020) Endoscopic Combined Intrarenal Surgery (ECIRS)—Tips And Tricks To Improve Outcomes: A Systematic Review. Turk. J. Urol, 46(1):S46–S57.

[8] Turk C, Petrik A, Sarica K, Seitz C, Skolarikos A, Straub M And Knoll T (2016) EAU Guidelines On Interventional Treatment For Urolithiasis. Eur. Urol, 69(3):475–482.