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Outcomes of Tubeless Mini Percutaneous Nephrolithotomy: An Early Experience in Hospital Tengku Ampuan Afzan, Kuantan, Pahang.

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I. Introduction

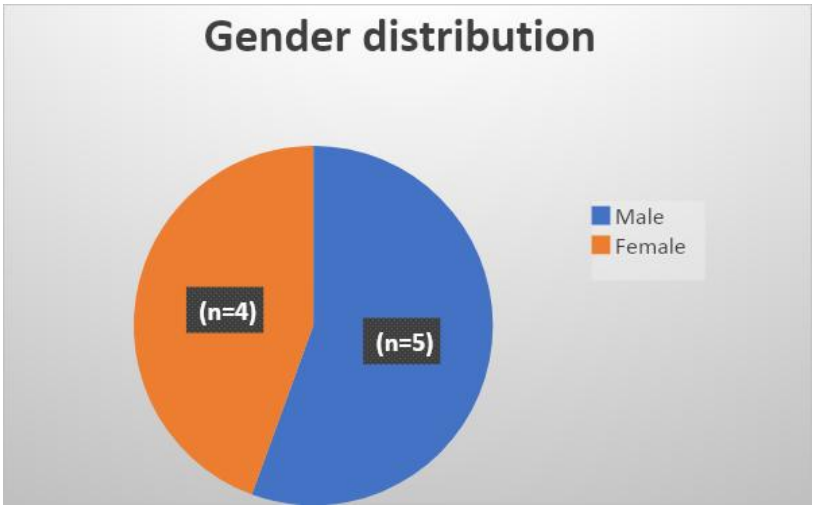
Miniaturization of the standard percutaneous lithotomy (PCNL) scope leads to the development of a mini PCNL procedure. Mini PCNL has gained popularity of late with the hope of reducing morbidity from standard PCNL. [1] This study is aimed to look at the outcomes of patients that underwent tubeless mini PCNL for the treatment of renal stones in our center.

II. Materials And Methods

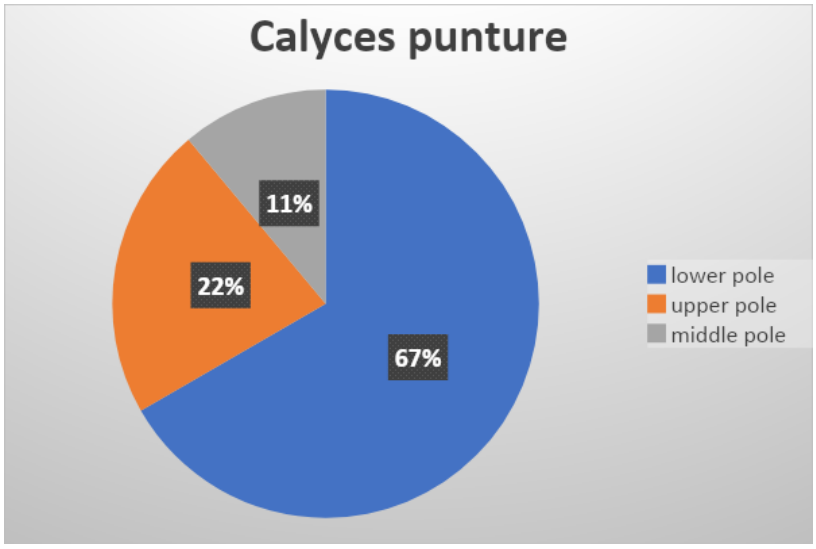
Data of a total of 9 patients who underwent mini PCNL over 15 months period (December 2019–February 2020) in our center were reviewed retrospectively. The selection criteria for mini PCNL are stone size 1.5cm to 3 cm in size. The number of patients for mini PCNL in our center is not as many compared to standard PCNL cases during the same period of time as we encountered patients with a larger stone burden (i.e. stone more than 2 cm, staghorn calculus). Dilatation for all the cases was performed under fluoroscopy guidance in prone position, size 16Fr metal dilator and sheath were used for all cases. Stone clearance was achieved by using laser lithotripsy. All 9 cases (100%) were tubeless mini PCNL. Only 1 case noted no stone but the presence of nephrocalcinosis after puncture and dilatation. The main outcome parameters that were analyzed were displayed in the form of charts and tables (Webb, 2016).

III. Results

In this retrospective study, mini-pcnl operations were performed successfully in all patients. All cases were followed up to 6 months post-operative period. A total of 56% of research samples was male and the remaining 44% of research respondents were female. The 9 patients had also different ages which range between 11 to 63.5 years.



Patient Demographics And Pre-Operative Data	
Outcome	N (%)
Gender	5 Male + 4 Female
Age	11-63.5 yrs age
Stone size	
<20mm	6 (67)
>20mm	3 (37)
Mean stone size (cm)	1.94
Stone location	
Proximal ureter	0 (0)
Renal pelvis	2 (22)
Lower pole	6 (67)
Mid pole	1 (11)
Upper pole	0 (0)



Intraoperative Data	
Outcome	N (%)
Total operation time (from RPG till the end – mean minutes)	164.0 min
Total pcnl time (from puncture till the end -mean minutes)	88.9 min
Laser time (mean minutes)	35.6 min
Laser power (mean watt)	8
Access site	
Infracostal	8 (89)
Supracostal	1 (11)
Nature of stone	
Simple	6 (67)
Complex	2 (22)
Nephrocalcinosis	1 (11)
Tubeless PCNL	9 (100)

The mean stone size was 1.94 cm. Infracostal access with lower pole puncture was the most preferred site in view of maority of stone location was at lower pole of kidney.

The mean operative time was 88.9 minutes with laser time of 35.6 min for mean stone size of 1.94 cm. None of the cases required any perioperative blood transfusion as average blood loss was only 1g/dl.

Postoperative data	
Outcome	N (%)
Hb level drop postoperative (mean)	1 g/dl
Pain score (1 to 10)	2.38
Analgesia requirement	
Paracetamol	3 (33)
Tramadol	1 (11)
Paracetamol + Tramadol	5 (56)
Clavien dindo complications	
Minor (Clavien I-II) complications	8 (78)
Major (Clavien III-V) complications	1 (11)
The total length of postoperative day (mean days)	2.5
Stone free rate after 3 months	7 (78)
Stone free rate after additional therapy	9 (100)
Additional procedures (ESWL)	2 (22)

According to the research data, a scale with 1-10 levels was used to measure pain score. The majority of patients selected 2 as pain scores with majority only requiring oral paracetamol and tramadol as analgesia.

In terms of post-op complications, Clavien- Dindo Classification was used. 7 patients were in Grade 1 (use of post-operative analgesics) and 2 patients were classified into Grade 2 (due to escalation of antibiotics). No major complications were recorded.

Our patients also had a mean hospital stay post-surgery of 2.5 days. Complete stone clearance was achieved in 7 out of 9 cases after reassessment with ultrasound 3 months post-operation. Another 2 cases had residual stones which required Extracorporeal Shock Wave lithotripsy(ESWL) as outpatient to achieve complete stone clearance.

IV. Discussion

Standard percutaneous nephrolithotomy (PCNL) has become a well-established treatment for stones in the kidney and upper ureter. PCNL has the advantage of achieving high stone-free rate (SFR), but it is also a more invasive procedure.

PCNL was first described by Fernström and Johansson in 1976[2] , and has since become an established treatment modality in the management of renal stones that are larger than 2 cm. [3] PCNL has the advantage of achieving high stone-free rate (SFR) when compared to other treatment modalities, but it is relatively invasive. Risks associated with PCNL include postoperative sepsis (2%), fever (10%–16%), and perforation of adjacent organs (0.4%). In particular, blood transfusion (3%–6%) and significant bleeding (8%) are not uncommon complications after PCNL, with potentially devastating consequences. [3]

To reduce risk of bleeding, the use of smaller PCNL tract size has recently been advocated to decrease renal parenchymal trauma. In 1998, Jackman et al. first developed a specifically designed minimally invasive PCNL (mini-PCNL) device for children. [4] In 2001, a specially designed miniaturized nephroscope for mini-PCNL in adults was first coined by Lahme et al. in Germany. [5] Mini PCNL is essentially a modified PCNL technique using a miniaturized scope through a smaller, 18 F or less, nephrostomy tract. The procedure is also referred to as “mini perc” or “mini-PCNL”. Since then, the “mini-PCNL” technique has developed rapidly and become increasingly popular worldwide.

From a technical standpoint, using a smaller-size percutaneous tract than the PCNL, the MPCNL would have the potential advantages of decreased trauma to renal parenchyma. On the other hand, smaller tract might hinder the fragmentation and extraction of stones. [6]

Our retrospective study has demonstrated that mini PCNL was a safe and effective procedure and resulted in less bleeding, no blood transfusion, less pain and fewer post-operative complications, shorter hospitalization and higher stone free rate for stone < 2cm.

V. Conclusion

Preliminary result in our center shows that tubeless mini PCNL is a safe and effective procedure to treat renal stone of suitable size. Excellent stone clearance was achieved with less morbidity as demonstrated in our study. With the ongoing data collection and larger sample size, we will be able to produce more robust data in the future.

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