DOI: https://doi.org/10.53350/pjmhs22169731

ORIGINAL ARTICLE

Stone Clearance Rate in Patients Treated with Percutaneous Nephrolithotomy versus Open Surgery for the Management of Staghorn Renal Calculi

MUHAMMAD AKHTAR[1], MUHAMMAD SAAD ULLAH[2], MUHAMMAD HAMZA KHAN LODHI[3], NADIM ASLAM[4], ZEESHAN ZAFAR[5], QAZI HUSSAIN RAZA[6], MM KHAN[7]

[1]*Assistant Professor of Urology, Multan Medical and Dental Collage Multan & Ibn-e- Sina Hospital & Research Institute, Multan.*
[2]*Urology Intern, Multan Medical & Dental College and Ibn-e-Siena Hospital & Research Institute, Multan.*
[3]*Urology Intern, Multan Medical & Dental College and Ibn-e-Siena Hospital & Research Institute, Multan.*
[4]*Assistanr Ptofessor of Anatomy, Multan Medical & Dental College and Ibn-e-Siena Hospital & Research Institute, Multan.*
[5]*Urology Intern, Multan Medical & Dental College and Ibn-e-Siena Hospital & Research Institute, Multan.*
[6]*Medical Officer , Children's Hospital and the Institute of Child Health Multan*
[7]*Professor NM&DC*
Correspondence to: Dr. Muhammad Akhtar, Email: drakhtarmalik@gmail.com Cell: 0300-9633251

ABSTRACT

Objective: To compare the stone clearance rate in patients treated with percutaneous nephrolithotomy (PCNL) versus open surgery for the management of staghorn renal calculi.

Materials and Methods: In this comparative study, a total number of 200 patients who presented in urology department of Ibn e Sina Hospital and Research Institute Multan with the diagnosis of staghorn stones were included. The study duration was October-2021 to January-2022. Group I: Patients underwent PCNL and Group II patients underwent open surgery for removal of stones. Stone clearance was two weeks of primary procedure.

Results: Mean age was 45.53±10. 37 years in PCNL group versus 44.36±10.80 years in open surgery group (p-value 0.44). There were 64% male patients in PCNL group and 62% male patients in open surgery group (p-value 0.77). There were 19% patients who had bilateral stone in PCNL group and 23% in open surgery group (p-value 0.48). Complete staghorn stones were diagnosed in 70% patients in PCNL and in 73% patients in open surgery group (p-value 0.64).Stone clearance rate was 76% patients in PCNL group and 62% patients in open surgery group (p-value 0.032).

Conclusion: In patients who have staghorn stones, percutaneous nephrolithotomy (PCNL) is preferable to open surgery in terms of the rate of stone clearance.

Keywords: Open surgery, Staghorn stones, percutaneous nephrolithotomy.

INTRODUCTION

Urolithiasis is a common kidney disease that effects nearly 2-9% of world population.[1,2] In Pakistan, urinary calculi are a major problem and are the commonest kidney ailment.[3] Staghorn calculus is a stone that fills the renal pelvis and calicies, a complete staghorn calculus is the cast of entire renal pelvis and calicies.[4] These are further classified into partial staghorn stone and complete staghorn stones. Staghorn calculi constitute about 15% of all renal calculi in Pakistan and 12.5% in the modern world.[3,5]

With the improvements in technology of minimal-invasive techniques, these techniques have gained widespread acceptance for managing staghorn calculi.[6] Extra-corporeal shock wave lithotripsy and PCNL are common methods of minimal invasive treatment for staghorn calculi. PCNL is a preferred 1st line treatment in the management of staghorn calculi.[7,8] Open surgery is another invasive method to treat staghorn calculi. With the availability of equipment for non-invasive techniques, and experience of operating surgeons the need for open surgery has been reduced to about 10% to 5.4% in modern countries and 14.0% in the developing countries.[9]

In Pakistan, open surgery is still in use on a large scale for the treatment of staghorn calculi along with PCNL. So we planned to conduct this study to see the clearance rate of staghorn calculi in patients treated with open surgery versus PCNL in our local population. This study will also provide framework to other urologists to select a better option to achieve high stone clearance rate by using PCNL in patients of staghorn renal calculi. This will reduce morbidity in patients with staghorn calculi. Because PCNL is a much saver procedure as compared to open surgery and is associated with shorter hospital stay.

METHODS

This comparative study comprising of 200 patients was conducted in urology unit of Ibn e Sina Hospital and Research Institute Multan with the diagnosis of staghorn stones. The study duration was October-2021 to January-2022. Patients with diagnosis of staghorn stones of age 18-60 years were included. While patients planned for repeated procedures or with untreated urinary tract infections (UTI) were excluded.

An informed consent was taken from all patients. Patients were divided into two groups using lottery method. Group I: Patients underwent PCNL for the treatment of staghorn calculi and Group II patients underwent open surgery for treatment of staghorn calculi.

Stone clearance was determined after 2 weeks of primary procedure using the X-ray KUB.

Data analysis was performed using SPSS v25. Chi-square test was applied to compare stone clearance rate between the groups taking p-value ≤ 0.05 as significant.

RESULTS

The mean age was 45.53±10. 37 years in PCNL group and 44.36±10.80 years in open surgery group (p-value 0.44). There were 64% male patients in PCNL group and 62% male patients in open surgery group (p-value 0.77). There were 19% patients having bilateral stone in PCNL group and 23% in open surgery group (p-value 0.48). Complete staghorn stones were diagnosed in 70% patients in PCNL group and in 73% patients in open surgery group (p-value 0.64) [Table 1].

Complete stone clearance was achieved in 76% patients in PCNL group and in 62% patients in open surgery group (p-value 0.032) [Table 2].

Table 1. Baseline Patient's Characteristics.

	PCNL	Open Surgery	P-value
Years (Years)	45.53±10.73	44.36±10.80	0.44
Gender			
Male / Female	64 / 36	62 / 38	0.77
Stone Laterality			
Unilateral / Bilateral	81 / 19	77 / 23	0.48
Type of Stone			
Complete Staghorn/Partial Staghorn	70 / 30	73 / 27	0.64

Table 2. Comparison of Stone Clearance.

Stone Clearance	PCNL	Open Surgery	P-value
Yes	76 (76%)	62 (62%)	0.032
No	24 (24%)	38 (38%)	

DISCUSSION

When dealing with patients who have patients who have complex stones or exceptionally large stone burdens, there are specific clinical circumstances where open surgery is still an indication for treatment. Either by utilizing PNL by itself or in conjunction with SWL, one can now approach staghorn stones in a secure and fruitful manner. This is true whether one chooses to use SWL alone or in addition to PNL. This is something that can be stated without any shadow of a doubt at all. In the treatment of this type of stone illness, however, it is likely that open surgery will continue to play a role, particularly in kidneys that have a collecting system that has been dilated.[10,11] The proportion of patients in our study who required open surgery due to the presence of multiple stones (62.1%), is comparable to the proportion of patients in Paik and Resnick's study who required open surgery due to the presence of multiple stones (55%). More than half of these cases of difficult stones were treated with the anatrophic nephrolithotomy procedure. All of these cases had staghorn calculi that were either totally formed or virtually entirely formed.[12]

Since the middle of the 1980s, urologists have had success treating patients with massive renal calculi, including full staghorn stones, by employing procedures that are less invasive. It is generally agreed that PCNL with or without selective lithotripsy (SWL) or open surgery are the two primary therapeutic choices for big complex staghorn stones.[13]

Research by Khalaf et al. found that 5.8% of patients in their case series needed open stone removal in addition to repair of an anatomical abnormality in the kidney. UPJ blockage and calyceal diverticulum are two examples of renal anatomical anomalies. In most cases, percutaneous and/or endoscopic approaches, in conjunction with simultaneous stone removal, can solve these issues. When PNL was not an option due to the patient's age (less than 5 years old), the existence of a crossing vessel, or the size (dilated) of the renal pelvis, we resorted to open surgery to relieve the obstruction in the ureteropelvic junction.[14]

In our study, stone clearance rate was 76% in PCNL group and 62% in open surgery group. Other authors find similar stone-free rates of 69% and 91% after discharge in open surgery patients.[15] These rates climbed to 98% and 95%, respectively, at the conclusion of the follow-up period in patients who had undergone open surgery. After three years of follow-up, Paik et al. reported a stone-free rate of 93 percent overall in the patient population. 104 It is important to highlight that the number of patients involved in these trials is on the lower end, which results in a higher percentage of stone-free patients.[16]

Khaled et al. discovered that patients in the open surgical treatment group had a stone clearance rate of 49%, whereas patients in the PCNL group had a clearance rate of 66.0%.[9] On the other hand, one study came to the conclusion that the stone clearance rate is much higher in open surgery when compared to PCNL. The stone clearance rate was found to be 78.6% in open surgery and 71.4% in PCNL.[17]

El-Nahas et al. came to the conclusion that the results of PCNL are superior to those of open surgery, although this was only true when the procedure was carried out by the hands of skilled urologists.[18]

The scientific literature provides conflicting information indicating whether approach is superior to the other. This research came to the conclusion that PCNL is a preferable approach than open surgery for the management of staghorn calculi.

CONCLUSION

In patients who have staghorn stones, percutaneous nephrolithotomy (PCNL) is preferable to open surgery in terms of the rate of stone clearance.

REFERENCES

1. Scales CD, Smith AC, Hanley JM, Saigal CS, Project UDiA. Prevalence of kidney stones in the United States. Eur Urol. 2012;62(1):160-5.
2. Edvardsson VO, Indridason OS, Haraldsson G, Kjartansson O, Palsson R. Temporal trends in the incidence of kidney stone disease. Kidney Int. 2013;83(1):146-52.
3. Arif F, Aziz M, Arif H, Aziz M. Role of open surgery in the management of staghorn calculus. Ann King Edward Med Uni. 2016;10(4).
4. Philippou P, Moraitis K, Masood J, Junaid I, Buchholz N. The management of bladder lithiasis in the modern era of endourology. Urology. 2012;79(5):980-6.
5. Talati J, Khan F, Drago H, Lall E, Khan NZ, Talati A, Noordzij J. Epidemiology of urolithiasis in Pakistan. InThe Management of Lithiasis 1997 (pp. 21-33). Springer Netherlands.
6. Desai M. Endoscopic management of stones in children. CurrOpin Urol. 2005;15(2):107-12.
7. Hussain M, Rizvi SAH, Askari H, Sultan G, Lal M, Ali B, et al. Management of stone disease: 17 years experience of a stone clinic in a developing country. J Pak Med Assoc. 2009;59(12):843-46.
8. Rosa M, Usai P, Miano R, Kim FJ, Agrò EF, Bove P, et al. Recent finding and new technologies in nephrolithiasis: a review of the recent literature. BMC Urol. 2013;13(1):1-8.
9. 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(2):469-73.
10. 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(2):469-73.
11. Honeck P, Wendt-Nordahl G, Krombach P, Bach T, Häcker A, Alken P, et al. Does open stone surgery still play a role in the treatment of urolithiasis? Data of a primary urolithiasis center. J Endourol. 2009;23(7):1209-12.
12. Rizvi SA, Naqvi SA, Hussain Z, Hashmi A, Hussain M, Zafar MN, et al. Management of pediatric urolithiasis in Pakistan: experience with 1,440 children. J Urol. 2003;169(2):634-7.
13. Sy FY, Wong MY, Foo KT. Current indications for open stone surgery in Singapore. Ann Acad Med Singapore. 2009;28(2):241-4.
14. Khalaf I, Salih E, El-Mallah E, Farghal S, Abdel-Raouf A. The outcome of open renal stone surgery calls for limitation of its use: A single institution experience. Afr J Urol. 2013;19(2):58-65.
15. Brannen GE, Bush WH, Correa RJ, Gibbons RP, Elder JS. Kidney stone removal: percutaneous versus surgical lithotomy. J Urol. 1985;133(1):6-11.
16. Paik ML, Wainstein MA, Spirnak JP, Hampel N, Resnick MI. Current indications for open stone surgery in the treatment of renal and ureteral calculi. J Urol. 2008;159(2):374-9.
17. El-Nahas AR, Shokeir AA, Shoma AM, Eraky I, Sarhan OM, Hafez AT, et al. Percutaneous nephrolithotomy versus open surgery for treatment of staghorn stones in pediatric patients. Canadian Urol Assoc J. 2014;8(11-12):E906-9.
18. El-Nahas AR, Eraky I, Shokeir AA, Shoma AM, El-Assmy AM, El-Tabey NA, El-Kappany HA, El-Kenawy MR. Percutaneous nephrolithotomy for treating staghorn stones: 10years of experience of a tertiary-care centre. Arab J Urol. 2012;10(3):324-9. 12.