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ORIGINAL RESEARCH

Analysis and comparison of the various surgical procedures for the treatment of large renal and pelvic stones

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ABSTRACT

Background: Laparoscopic pyelolithotomy is an excellent treatment option for large stones that have formed in the renal pelvis. The purpose of this research was to evaluate and contrast the effectiveness of laparoscopic pyelolithotomy and open surgery in the removal of big renal pelvic stones.

Materials and methods: This prospective research of comparison was carried out in department of General Surgery and department of Urology at Narayan Medical College and Hospital, Sasaram, India, in time period from 2013 to 2021. Patients were randomly assigned to one of two groups using a computer programme that produced random numbers. Patients in group A were given laparoscopic pyelolithotomy, whereas patients in group B had open pyelolithotomy. Using version 22 of the SPSS programme, the data were gathered and analysed.

Results: The average age of the 74 patients who satisfied the inclusion criteria was 39.18 years, and the ratio of men to females was 1.96. 66.21 percent of the patients were male. Open pyelolithotomy was performed on 41 patients (55.41%) whereas laparoscopic pyelolithotomy was performed on 33 individuals (44.59%). The difference in the mean operating time between open surgery (78.13 minutes) and laparoscopic surgery (117.66 minutes) was statistically significant (p 0.05). In the group that had laparoscopic pyelolithotomy, the average amount of blood that was lost was 62.12 millilitres, whereas the amount that was lost in the open group was 92.07 millilitres (p =0.009). The difference between the open and laparoscopic groups in terms of the length of time patients spent in the hospital was statistically significant (p = 0.02). At the end of one month, we found a 100% stone-free rate in patients who had had either laparoscopic or open surgery. Over the course of the trial, not a single one of our patients passed away.

Conclusion: A possible alternative to standard open pyelolithotomy and other endourological treatments, laparoscopic pyelolithotomy has shown good outcomes in recent years. In spite of the complexity of the procedure, it has a high rate of success in removing stones and a low postoperative morbidity rate.

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Introduction

Over the course of the last three decades, the surgical treatment of kidney stones has evolved from open surgery to less invasive treatment techniques. Formerly, open surgery was the only option. Laparoscopy, flexible ureteroscopy, percutaneous nephrolithotomy, and shock wave lithotripsy (SWL) are the noninvasive procedures that were employed in order to minimise postoperative morbidity and enhance the result of surgical procedures. When it comes to treating stones that are less than 1.5 centimetres,extracorporeal shock wave lithotripsy(ESWL) and Percutaneous Lithotripsy (PCNL) are preferred options. Ureteroscopy allows the stones to be seen in their entirety, fragmented, and then passed out of the body via the urethra. 1 Percutaneous nephrolithotomy is an alternative to endoscopic stone removal in cases when the latter cannot be performed due to the size of the stone or another factor. Although while minimally invasive endourological methods have helped to lessen the need for open surgery, these techniques are not successful at avoiding recurrence, and as a result, additional surgical procedures will need to be performed. 2–4 The calculus known as staghorn is very infectious, and in order to prevent further episodes, all of the stones need to be extracted. This is where open surgery or laparoscopic surgery come into play when it comes to the therapy of kidney stones. Although though the function of open surgery in the treatment of renal stones has been substantially restricted and lessened as a result of advancements in endourological procedures, open surgery is still necessary in anywhere between 0.47 and 5.4% of cases when there are definite indications for it. 5 With the development of less invasive surgery, laparoscopy has evolved into a more viable treatment option for the removal of big kidney stones. Urological procedures may be performed by a laparoscopic approach that is either transperitoneal, retroperitoneal, or extraperitoneal. The trans-peritoneal method offers a shorter learning curve because it uses anatomical landmarks that are more recognisable to the surgeon and provides a greater operating area. The potential benefit of the retroperitoneal laparoscopic method is that it has the potential to reduce visceral and vascular damage while also enhancing postoperative comfort by avoiding the opening of the peritoneal cavity.Moreover, there is a lesser risk of postoperative ileus and adhesion development when using this approach. The objective of this research was to evaluate and contrast the effectiveness of laparoscopic pyelolithotomy versus open surgery in the removal of big renal pelvic stones.

Materials and methods

In the departmentof General Surgery and department of Urology at Narayan Medical College and Hospital, Sasaram, India, a prospective comparison research like this one was carried out over the course of eight years. Our research comprised a total of 74 participants, each of whom had undergone pyelolithotomy between the years 2013 and 2021 and had completed postoperative follow-up for a period of three months. Open pyelolithotomy was performed on forty-one patients, whereas laparoscopic pyelolithotomy was performed on thirty-three patients. After a detailed history and clinical examination, all of the patients underwent a complete blood count, a test of the kidney and liver function, a routine urine examination, serum electrolytes, calcium, and phosphorus, radiographs of the chest and kidney, ureter, and bladder, and abdominal ultrasonography. All of these tests were performed simultaneously. A computed tomographic urogram was performed in order to ascertain the number of stones present, their size, and their position. Before any kind of treatment was administered, a CT Urography or intravenous Urography was done to access the function of kidney. In case of doubt DTPA was done to access the function. This was done both for medicolegal purposes and to ensure that both kidneys were functioning normally. Individual who had a single large pelvic stone larger than1.5 centimetre were included in the research study. Patients who had multiple stones, stones smaller than 1.5 centimetres, bilateral stones, congenital kidney

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anomalies, patients who had undergone stone-related surgery in the past, patients with a single kidney that contained a stone, and patients with multiple-time stone formers were not allowed to participate in the study.

Using random numbers generated by a computer, the patients were split into two groups: group A consisted of patients who had laparoscopic pyelolithotomy, and group B consisted of patients who had open pyelolithotomy. After their operations, each patient was transferred to the high-dependency section of our surgical ward for strict observation. 24 hours following surgery, a kidney-ureter-bladder radiograph was performed on every patient in order to confirm the location of the stent and look for any stones that had been left behind (Fig. 1). After being discharged from the hospital, the patients were sent to our outpatient department for the remainder of their follow-up care. While doing laparoscopic surgery, we used a lateral decubitus posture and utilised an extraperitoneal technique. After performing balloon dissection to provide extraperitoneal working space, three laparoscopic ports were inserted into the patient (the camera and two working ports). When the ureter was located, diathermy dissecting forceps were used in order to meticulously dissect the ureter and reveal the renal pelvis. We made a T-shaped incision for the pyelotomy procedure so that we could remove stones from the renal pelvis. The stones were sent via the camera port in a glove-made endobag to ensure their safety throughout transit. After saline washes, laparoscopic stenting was conducted through a 5 mm port (DJ 6/26 both ends open), and then pyelotomy closure was accomplished via intracorporeal knotting with 3–0 Vicryl. After the implantation of the tube drain in the perirenal region, the pneumothorax was deflated and the port sites were closed back up.

Open surgery was conducted in the lateral kidney position using the usual extraperitoneal flank approach. This was done after following the safety checklist recommended by the World Health Organization (WHO) and confirming the side on which the operation would be performed. After separating the fascia of Gerota's abdomen laterally, the kidney was completely mobilised in all three directions: lateral, cephalic, and caudal. A precise blunt dissection was performed at the lower pole and above the psoas muscle in order to remove the fat from the parapelvic region of the renal pelvis. After this, the ureter was located, and an 8F feeding tube was used to loop it. After the placement of two 3–0 catgut stay-sutures at the pyelotomy site, an incision was created at the ureteropelvic junction. The stone was freed from its hold in the pelvis by use of Desjardin's forceps, after which it was extracted in its entirety. After performing regular saline washes and stenting the ureter with a 6/26 double-j stent, the pyelotomy was then closed using 3–0 round body Vicryl sutures. A unique incision was made for each patient, and then a 28F tube drain was inserted into the perinephric gap between the renal parenchyma and Gerota's fascia. This was done in all of the patients. The incision was stitched back together in stages.

Each procedure's operating time was meticulously documented. Quantification of intra-operative blood loss was accomplished by weighing surgical sponges used for blood and fluid mopping during surgery and measuring the volume of irrigation fluid. These gravimetric techniques.

In all sets of patients, the Foley's catheter was withdrawn between 36 and 48 hours following surgery, and the drain was taken out when the amount of drainage was less than 20 millilitres every twenty-four hour period.

The statistical analysis was carried out with the help of the SPSS software (SPSS version 22, IBM, Armonk, New York, United States). The Shapiro–Wilk normality test was used in order to analyse the distribution of the continuous data. Statistical analysis was performed using either the Student's t-test or the Mann–Whitney U test, depending on whether or not the distribution was normal. If the distribution was not normal, the Student's t-test was used. Both the Fisher's exact test (two-tailed) and the chi-squared test were used in the analysis of the

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categorical variables. The p-value was calculated, and a p-value of less than 0.05 was regarded as statistically significant. The calculation of the mean and the frequency was done in Excel 2016 for Microsoft.

Results

The participants in the research ranged in age from 20 to 70 years old and there were a total of 75 of them. By a ratio of 1.96, the proportion of men (66.21%) to females (33.78%) was much higher. The surgical procedure on the right side was performed on 51 (68.92%) of our patients, whereas the surgical procedure on the left side was performed on 23 (31.08%) of our patients. Open pyelolithotomy was performed on 40 patients (55.41%), whereas laparoscopic pyelolithotomy was performed on 35 individuals (44.59%). The age range of 31 to 40 years accounted for the largest proportion of our respondents (39.19%), followed by the age range of 41 to 50 years (27.02%) (Table 1). Patients who had laparoscopic surgery had a mean age of 36.26 years, whereas those who underwent open surgery had a mean age of 41.29 years. When the two groups' age distributions were analysed statistically, the results showed that there was almost no difference between them at all ($p = 0.13$). The mean size of the stone was 2.98 cm in the laparoscopic procedure and 3.02cm in the open surgical procedure respectively.

In the group that had laparoscopic pyelolithotomy, the average amount of time spent performing the procedure was significantly longer than in the group that underwent open pyelolithotomy. It was determined that there was a statistically significant gap between the two groups when the p-value was found to be 0.05. Those who had laparoscopic surgery experienced much less loss of blood than those who underwent open surgery. In the group that had laparoscopic pyelolithotomy, the average amount of blood lost was 62.12 mL, while the amount that was lost in the open group was 92.07 mL; this difference was statistically significant (p-value = 0.009). Throughout the surgery, two of our patients who were in the open group needed to get blood transfusions (4.87 percent of the total). Among our participants who had laparoscopic surgery, we did not experience any difficulties during the surgical procedure and there was no need for a blood transfusion (Table 2).

In the open group, 29.26% of patients experienced a post-operative issue, whereas in the laparoscopic group, only 12.12% of patients got a post-operative complication. This indicates that laparoscopic surgery is much safer than open surgery. In the open group of patients, the most common complication was a wound site infection, which accounted for 14.63 percent of cases. This was followed by postoperative paralytic ileus (4.87%), chest infection (2.4 percent), urinary tract infection (UTI) (2.4 percent), and postoperative fever (2.4 percent). Postoperative fever was the most prevalent complication in the laparoscopy group, occurring in 9.09% of patients. This was followed by urinary tract infections, which occurred in 3.03% of patients. All of the issues were treated with extreme caution, and they were resolved effectively. In the open group, there was one patient who developed an incisional hernia 8 months after surgery. This patient was treated with mesh hernioplasty. The incidence of this complication was 2.43%.

The amount of time spent in the hospital was determined by starting with the date of admission and ending with the date of release. The laparoscopic group had a significantly shorter length of stay in the hospital as compared to the open group. The open surgery group had a mean length of hospital stay of 6.74 days, whereas the laparoscopic surgery group had a mean length of 3.77 days. A total of around 87.87% of our laparoscopic patients were released within five days, whereas approximately 90.24% of our open group patients were sent home between the sixth and eighth day after their hospitalisation. The difference between the two groups was statistically significant, with a p-value of 0.02 indicating the gap between them.

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Every patient was seen in the outpatient department once every week for the first month, and then once every month for the next three months after that. At the end of one month, we found that neither the laparoscopic nor the open groups of patients had any stones remaining in their systems. Cystoscopy was used to remove the stent 6 weeks following the first surgical procedure. For the whole of the research, not a single one of our patients passed away.

Table1: Agedistribution

Age group(y)	Number of patients(frequency)	Laparoscopic group(frequency)	Open group(frequency)
20–30	16	12	4
31–40	28	11	18
41–50	21	10	10
51–60	6	1	7
61–70	4	1	1
Total	75	35	40
Meanage	38.88	35.86	40.19

Table2: Operative time

Operative time(min)	Laparoscopic group	Open group
<60	2	20
61–90	3	13
91–120	11	4
121–150	11	1
>150	6	3
Mean	117.23min	77.93min

Discussion

Urolithiasis is one of the primary causes of morbidity all over the globe. It affects anywhere from 5 to 15% of the population and has a recurrence rate of close to 50% over a period of 5 years.(6,7) Acute renal colic that is characteristic is a common presentation that is commonly accompanied with nausea, vomiting, hematuria, and even fever in certain instances. This is a common symptom of acute renal colic. It is one of the top three causes why patients need to be admitted to the hospital for urological emergencies.(8) The accurate diagnosis requires several components, including a comprehensive medical history, clinical presentation, adequate systemic examination, and suitable imaging. Plain radiographs of the abdomen, which have only a somewhat effective diagnostic performance (sensitivity ranging from 44–77% and specificity from 80–87%), may assist differentiate between radiopaque and radiolucent stones. (9) It has been shown that ultrasonography of the abdomen may identify renal stones with a sensitivity of 70 percent and a specificity of 94 percent. (10) Noncontrast-enhanced computed tomography is a popular imaging approach that has greater sensitivity and specificity for the location, size, and composition of the stone, in addition to the ability to assess the stone's density and interior structure. This imaging method is also widely used. The treatment of kidney stones has evolved from open surgery to less invasive endourology techniques in recent years. It would be wonderful if there was a method that was less intrusive, had lower morbidity, allowed for speedier recovery, and had better stone removal

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rates. With the development of minimally invasive surgery, the use of laparoscopy as a method for treating big renal stones has become more commonplace. Patients who have abnormalities in their urinary system are good candidates for laparoscopic stone surgery since it has a high rate of removing all stones in a single session, decreased risk of complications, and a quicker recovery time. (11) While the transperitoneal strategy is becoming more popular and has a track record of effectiveness, the retroperitoneal approach still has some clear benefits to offer. The extraction site is less noticeable with the transperitoneal method, which takes place from an inconspicuous region of the lower abdomen or, if the mass is not too big, from the umbilicus. Since the peritoneum covers the renal pelvic closure, the procedure may be completed more quickly, and there is a decreased risk of urine leakage. (11–14) With a transperitoneal technique, the concomitant aberrant vascular that is causing the ureteropelvic junction blockage may be recognised and treated with more effectively. (15) In this research, we analyse and contrast the benefits, advantages, and safety of open surgery with laparoscopic surgery for the treatment of renal stones.

In our research, the preoperative statistics were comparable between subjects in terms of age, gender, and stone side, and there were no statistically significant variations between them. Male patients (66.21%) significantly outnumbered female patients (33.78%) by a ratio of 1.96. Among our patients, 51 (68.92%) received surgery on the right side, while 23 (31.08%) got surgery on the left side. The bulk of our individuals, who comprised 39.19% of the total, ranged in age from 31 to 40, with their mean age being 39.18 years. The patients who had laparoscopic pyelolithotomy had a mean age of 36.26 years, whereas those who underwent open surgery had a mean age of 41.29 years. While urolithiasis may affect persons of any age or gender, it strikes males between the ages of 20 and 49.16 more often than it does women throughout same age range. Fifty percent of patients are diagnosed with the condition between the ages of 30 and 50. 8

In the group that had laparoscopic pyelolithotomy, the average amount of time spent performing the procedure was much longer (117.66 minutes) than in the group that underwent open pyelolithotomy (78.13 minutes). There was a difference that may be considered statistically significant between the two groups. The operating time varied from 60 minutes to 150 minutes, with a mean of 117 minutes. This is a shorter amount of time than what Al-discovered. Azaby's (135 minutes) (17) although this is greater than what was reported by Al-Hunayan and colleagues (112.1 minutes). 18 Qin and colleagues found that the average amount of time needed to perform a retroperitoneal laparoscopic pyeloli- thotomy on 76 patients was 96 minutes. (19) In addition to the lengthy learning curve of retroperitoneal laparoscopic pyelolithotomy, other contributing variables were the amount of time needed for dissection of the renal pelvis, intracorporeal suturing in a limited working area, and stone removal.

The amount of blood that was lost during the operation was noticeably reduced in individuals who had laparoscopic surgery as opposed to those who underwent open surgery. It was statistically significant that the laparoscopic pyelolithotomy group had a significantly lower mean blood loss of 62.12 mL when compared to the open group's mean blood loss of 92.07 mL. In the open group, 29.26% of patients ended up developing a postoperative problem, while in the laparoscopic group, only 12.12% of patients ended up developing a postoperative issue. All of the issues were treated with extreme caution, and they were resolved effectively. The results of our research are consistent with those found in Singal and Dhar's 2018 study. (20) They found that the laparoscopic group had much less postoperative blood loss than the open group (63 vs. 103 mL) and significantly fewer problems (p 0.001). Others found that the retroperitoneal laparoscopic approach resulted in a blood loss that ranged from 20 to 400 mL, with the mean being 80 mL. (19)

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As compared to the open group, the length of time patients spent in the hospital after laparoscopic surgery was significantly lower (3.77 vs. 6.74 days). There were around 90.24 percent of our open group patients who were released between the sixth and eighth day of their hospitalisation, whereas there were approximately 87.87 percent of our laparoscopic patients who were discharged within five days. Our results were on par with those found by Shamim and Iqbal (21), as well as those found by Basiri et al. (22) According to other published statistics, laparoscopic pyelolithotomy requires a hospital stay of between three and five days. (23) Every patient was seen in the outpatient department once every week for the first month, and then once every month for the next three months after that. At the end of one month, we found that neither the laparoscopic nor the open groups of patients had any stones remaining in their systems. Cystoscopy was used to remove the stent 6 weeks following the first surgical procedure. For the whole of the research, not a single one of our patients passed away.

Conclusion

There is reason to be optimistic about the outcomes of laparoscopic pyelolithotomy as a viable alternative to open surgery and other endourological procedures. According to the findings of our research, the laparoscopic procedure is not only risk-free but also leads to improved cosmesis, less blood loss during surgery, fewer problems, a shorter length of stay in the hospital, and an earlier return to normal activities. Laparoscopy is an effective method that has high stone-free rates and minimum morbidity, despite the fact that it requires a high level of technical skill. It is important that the procedure be carried out by a professional and experienced surgeon. As a result of the limited number of participants in this study, more comparative research is required to define the function, practicality, and indications of laparoscopic stone surgery in contrast to open surgical approaches. Only then will these findings be able to be thoroughly validated.

References

1. Williams N, O'Connell PR, McCaskie A. 2018Bailey & Love's Short Practice of Surgery, 27th Edition: The Collector's edition. Chapter Kidneys and ureter. Page 1398. Accessed April 12, 2022 https:// www.taylorfrancis.com/books/9781351617994
2. Matlaga BR, Assimos DG. Changing indications of open stone surgery. Urology 2002;59(04):490–493, discussion 493–494
3. Melissourgos ND, Davilas EN, Fragoulis A, Kiminas E, Farmakis A. Modified anatrophic nephrolithotomy for complete staghorn calculus disease – does it still have a place? Scand J Urol Nephrol 2002;36(06):426–430
4. Esen A, Kirkali Z, Güler C. Open stone surgery: is it still a preferable procedure in the management of staghorn calculi? Int Urol Nephrol 1994;26:247–253
5. Honeck P, Wendt-Nordahl G, Krombach 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(07): 1209–1212
6. Moe OW. Kidney stones: pathophysiology and medical manage- ment. Lancet 2006;367(9507):333–344 [PubMed] [Google Scholar]
7. Fink HA, Wilt TJ, Eidman KE, et al. Medical management to prevent recurrent nephrolithiasis in adults: a systematic review for an American College of Physicians Clinical Guideline. Ann Intern Med 2013;158(07):535–543 [PubMed] [Google Scholar]
8. Williams NS, O'Connell PR, McCaskie A, Eds. Bailey & Love's Short Practice of Surgery, Chapter 76, Kidney and Ureters, 27th edition. CRC Press; USA; 2018:1398–1455

ISSN: 0975-3583,0976-2833 VOL13, ISSUE 07, 2022

9. Heidenreich A, Desgrandschamps F, Terrier F. Modern approach of diagnosis and management of acute flank pain: review of all imaging modalities. Eur Urol 2002;41(04):351–362 [PubMed] [Google Scholar]
10. Kanno T, Kubota M, Sakamoto H, et al. The efficacy of ultrasonog- raphy for the detection of renal stone. Urology 2014;84(02): 285–288 [PubMed] [Google Scholar]
11. Simforoosh N, Aminsharifi A. Laparoscopic management in stone disease. Curr Opin Urol 2013;23(02):169–174
12. Soltani MH, Simforoosh N, Nouralizadeh A, Sotoudeh M, Molla- koochakian MJ, Shemshaki HR. Laparoscopic pyelolithotomy in children less than two years old with large renal stones: initial series. Urol J 2016;13(05):2837–2840
13. Nouralizadeh A, Simforoosh N, Soltani MH, et al. Laparoscopic transperitoneal pyelolithotomy for management of staghorn renal calculi. J Laparoendosc Adv Surg Tech A 2012;22(01): 61–65
14. Simforoosh N, Radfar MH, Valipour R, Dadpour M, Kashi AH. Laparoscopic pyelolithotomy for the management of large renal stones with intrarenal pelvis anatomy. Urol J 2020;18(01):40–44
15. Nouralizadeh A, Simforoosh N, Basiri A, Tabibi A, Soltani MH, Kilani H. Laparoscopic management of ureteropelvic junction obstruction by division of the aberrant vein and cephaladrelocation of the crossing artery: a long-term follow-up of 42 cases. J Endourol 2010;24(06):987–991
16. Edvardsson VO, Indridason OS, Haraldsson G, Kjartansson O, Palsson R. Temporal trends in the incidence of kidney stone disease. Kidney Int 2013;83(01):146–152 [PubMed] [CrossRef] [Google Scholar]
17. Al-Azaby H. Transperitoneal laparoscopic pyelolithotomy: initial experience. Benha Med J 2008;25:177–178
18. Al-Hunayan A, Abdulhalim H, El-Bakry E, Hassabo M, Kehinde EO. Laparoscopic pyelolithotomy: is the retroperitoneal route a better approach? Int J Urol 2009;16(02):181–186
19. Qin C, Wang S, Li P, et al. Retroperitoneal laparoscopic technique in treatment of complex renal stones: 75 cases. BMC Urol 2014; 14:16. Doi: 10.1186/1471-2490-14-16
20. Singal R, Dhar S. Retroperitoneal laparoscopic pyelolithotomy in renal pelvic stone versus open surgery - a comparative study. Clujul Med 2018;91(01):85–91
21. Shamim M, Iqbal SA. Open renal approach: comparative analysis of sub-costal incision versus trans-costal incision with excision of 12th rib. Pak J Med Sci 2009;25(04): 557–562
22. Basiri A, Tabibi A, Nouralizadeh A, et al. Comparison of safety and efficacy of laparoscopic pyelolithotomy versus percutaneous nephrolithotomy in patients with renal pelvic stones: a random- ized clinical trial. Urol J 2014;11(06):1932–1937
23. Mujeeburahiman M, Vipin C. Laparoscopic pyelolithotomy as a monotherapy for the management of intermediate-sized renal pelvic stones. Urol Ann 2018;10(03):254–257