

Comparison of Safety and Effectiveness of Multi Tract Conventional and Mini Percutaneous Nephrolithotomy Simultaneously Versus Sandwich Therapy in Management of Staghorn Stones

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ABSTRACT

Objective: To compare the effectiveness and safety of multi-tract conventional and Mini PCNL simultaneously versus Sand which therapy in the management of Staghorn stones.

Study Design: A Comparative study

Place and Duration of Study: This study was conducted at the Urology Department Team "C" at the Institute of Kidney Diseases (IKD) Hayatabad Medical Complex (HMC) Peshawar from June 2020 to June 2022.

Materials and Methods: The study included a total of 80 patients with Staghorn renal stones. We had only Guys 4 score as inclusion criteria. The sample was divided into two groups by non-probability consecutive sampling. Consultants of the team performed all cases. Group-A comprised 40 patients who underwent multi-tract conventional and Mini PCNL simultaneously versus 40 patients in Group B Who had sandwich therapy (Initial PCNL followed by ESWL and then PCNL). Stone-free rates and the safety of procedures were assessed in both groups. Structured proforma was used for data collection, and then data was analyzed on SPSS 24.0

Results: In our study, complete stone clearance was recorded in 36 patients (90%) of Group-A, while it was in 30 patients (75%) in Group B. (p 0.002). Regarding safety, Group-A needed a blood transfusion in 3 patients (7.5%), while it was necessary for seven patients (17.5%) in Group B. (p 0.001) Infection-related complications were recorded in 8 (20%) patients in Group-A while 18 (45%) patients were in Group B. (p 0.002). The mean hospital stay in Group-A was 3.4±1.5 versus 12.2±3.4 days in Group B. (p 0.001). There was no mortality recorded in both group.

Conclusion: Multi-tract PCNL is more effective and safe than sandwich therapy in managing Guys 4 Staghorn renal stone. Multi tracts PCNL clears the stone more effectively as compared to sandwich therapy. Based on safety, Multi tracts PCNL had fewer infection-related complications and required fewer blood transfusions than sandwich therapy. More large-sample, prospective, multicenter, and randomized controlled trials (RCTs) should be conducted to validate our findings.

Key Words: Multi tract PCNL; Safety; Effectiveness; Sandwhich; Staghorn stones

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INTRODUCTION

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Ureteral calculi are a prevalent condition that puts a person's life and ability to work at considerable risk. They affect over 12% of the population globally. One of the most challenging issues in urology is staghorn or complicated caliceal calculi, which have a high chance of impairing kidney function and resulting in sepsis that might be fatal.¹ The aim of therapy for individuals with a staghorn or complicated caliceal calculi is to provide maximum kidney function preservation with minimum side effects while achieving maximal stone clearance. Percutaneous nephrolithotomy (PCNL), as recommended by the newly revised recommendations of the "American Urological Association Nephrolithiasis Guideline Panel" on Staghorn Calculi,

is an essential part of the treatment for the majority of staghorn calculi.

Moreover, a single-tract PCNL technique is challenging for staghorn stones.² For most staghorn calculi, percutaneous monotherapy employing multiple tracts has been the recommended therapeutic strategy.³ The possibility for more bleeding and excellent complication rates compared to the single-tract technique is a concern with multiple percutaneous tracts. As a result, many urologists are hesitant to do PCNL with multiple percutaneous tracts.

Sandwich therapy is a minimally invasive endourologic treatment for large, widespread branching or complicated calculi in individuals who may need surgery or might not improve from PCNL or SWL alone. Sandwich therapy lowers the frequency of shock waves necessary for SWL alone and reduces the risk of bleeding and infection related to PCNL alone. Moreover, this combination treatment may minimize prolonged nephrostomy drainage, an element of past techniques. Sandwich therapy uses primary percutaneous debulking to remove any remaining "inaccessible" infundibulocalyceal stone extensions or pieces.⁴ To speed up the clearance of fragments after SWL, subsequent percutaneous treatment is performed via the mature tract after SWL. To remove all stones within a reasonable period, further percutaneous or SWL procedures may be used as needed.⁵ Using this method, just one or two tracts must be punctured to handle large stones. Reducing the number of accessing tracts may reduce the risk of bleeding issues that may arise from the multiple percutaneous tracts needed for percutaneous monotherapy. And because upper pole access is usually unnecessary, pleural problems may be avoided.⁶ This combination therapy strategy has been shown to be secure and efficient. In our country, no such study has been carried out on the comparative outcomes of multi-tract conventional and Mini PCNL simultaneously versus Sandwich therapy in managing Staghorn stones.⁷ The current study compared the safety and effectiveness of multi-tract conventional and Mini PCNL simultaneously versus Sandwich therapy in managing Staghorn stones.⁸

MATERIALS AND METHODS

It is a comparative study that was carried out in Urology Department Team "C" at the Institute of Kidney Diseases (IKD) Hayatabad Medical Complex (HMC) Peshawar from June 2020 to June 2022. A total number of 80 patients with Staghorn renal stones were included in the study. We had only Guys 4 score as inclusion criteria. The sample was divided into two groups by non-probability consecutive sampling. Consultants of the team performed all cases. Group A comprises 40 patients who underwent multi-tract conventional and Mini PCNL simultaneously versus 40 patients in Group B Who had sandwich therapy (Initial

PCNL followed by ESWL and then PCNL). Stone-free rates were assessed on the 7th day, 14th day and 28th day post-procedure. The safety of procedures was also evaluated in preoperative, immediate postoperative and early postoperative periods. The safety included the need for blood transfusion, Injury to pleura needing Chest intubation, Urosepsis, Readmission for secondary Haematuria, Mean hospital stay and 24-hour mortality. Structured proforma was used for data collection, and then data was analyzed on SPSS.

RESULTS

The mean age of the patients in group-A was 37 ± 7.1 and in Group B was 40 ± 5.1 . (Table 1) The choice of either procedure was determined by the operating surgeon, co-morbid, availability of either nephroscope in OT, operation time and feedback from the anaesthetist. The mean stone size in group-A was 32 ± 9.6 mm, and it was 35 ± 6.9 mm in Group B. (Table 1). Complete stone clearance was recorded in 36 patients (90%) of Group-A, while it was in 30 patients (75%) in Group B. ($p < 0.002$) (Table 2). In group A, one patient had spontaneous stone passage and three required flexible URS for the mean residual fragment of 8 mm after 28 days. Regarding safety, Group-A needed a blood transfusion in 3 patients (7.5%), while it was necessary for seven patients (17.5%) in Group B. ($p < 0.001$) (Table 2) Infection-related complications were recorded in 8 (20%) patients in Group-A while it was 18 (45%) patients in Group B. ($p < 0.002$) (Table 2) The readmission for secondary Haematuria was also significantly high $p < 0.005$ in Group B. The mean hospital stay in Group-A was 3.4 ± 1.5 versus 12.2 ± 3.4 days in Group B. ($p < 0.001$). (Table 1) There was no mortality recorded in both group.

Table No. 1: Mean age, stone size and hospital of both the group

Parameter	Group A	Group B
Mean Age	37 ± 7.1 (years)	40 ± 5.1 (years)
Mean stone size	32 ± 9.6 mm	35 ± 6.9 mm
Mean Hospital stay	3.4 ± 1.5 (Days)	12.2 ± 3.4 (Days)

Table No. 2: Comparative safety and efficacy of patients in both the group

Parameter	Group A	Group B	P value
Complete stone clearance	36 (88%)	30 (77%)	0.002
Need for blood transfusion	3 (7.5%)	7 (17.5%)	0.001
Infection-related complications	8 (20%)	18 (45%)	0.002
Mortality	00 (00%)	00 (00%)	-

DISCUSSION

A frequent urological condition with a high probability of recurrence is kidney calculi. Urologists still face an unsolvable problem with staghorn stones and complicated caliceal calculi. PCNL is vital in treating most staghorn and large-volume kidney stones.⁹ The goal of surgical treatment for staghorn stones is to altogether remove the stone to avoid problems and recurrences.¹⁰

In our study, complete stone clearance was recorded in 36 patients (90%) of Group A, while it was in 30 (75%) patients in Group B. (p 0.002). A previous study by Hüseyin Cihan Demirel et al. reported complete stone clearance in 69.5% of patients treated with Multi tracts PCNL and 62.5% in patients treated with sandwich therapy. These findings are comparable with the results of our study that Multi tracts PCNL is an effective procedure compared to sandwich therapy for managing Guys 4 Staghorn renal stone. Another study reported stone- a clearance rate of 79% by using Multi tracts PCNL, which is also following our study.¹¹ A survey by Mahesh Desai et al. divided their patients into three groups and reported 81%, 86% and 93% complete stone clearance in their patients using Multi tracts PCNL.¹² A study by LEE E. PONSKY and STEVAN B. STREAM reported 70% complete stone clearance using sandwich therapy which is under our findings.¹³ The mean hospital stay was less in patients of group A as compared to group B in our study, which is under the previous study.¹⁴

Regarding safety, Group A needed a blood transfusion in 3 patients (7.5%), while it was necessary for seven patients (17.5%) in Group B. (p 0.001) Infection-related complications were recorded in 8 (20%) patients in Group A while it was 18 (45%) patients in Group B. (p 0.002) Other studies also reported that Multi tracts PCNL had fewer infection-related complications and required fewer blood transfusions as compared to other procedures.¹⁵ A previous study reported that 20.5% of patients treated with sandwich therapy needed a blood transfusion, while the infection rate was 33%.¹⁶ Another study reported that 10.3% of patients required a blood transfusion, while the infection rate was 12.1% in patients treated with sandwich therapy.¹⁷ A study by Omer Rashid et al. reported an 85% stone-free rate in patients treated with Multi tracts PCNL. They reported the need for blood transfusion in 9% of their patients.¹⁸ These findings were compared with the results of our study. The limitation of the current study was the small sample size. More large-sample, prospective, multicenter, and randomized controlled trials (RCTs) should be conducted to validate our findings.¹⁹

CONCLUSION

Multi-tract PCNL is more effective and safe than sandwich therapy in managing Guys 4 Staghorn renal

stone. Multi tracts PCNL clears the stone more effectively as compared to sandwich therapy. Based on safety, Multi tracts PCNL had fewer infection-related complications and required fewer blood transfusions than sandwich therapy. More large-sample, prospective, multicenter, and randomized controlled trials (RCTs) should be conducted to validate our findings.

Author's Contribution:

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Conflict of Interest: The study has no conflict of interest to declare by any author.

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