

## The various access for renal calyx in PCNL – A urologist perspective– Study conducted at a multi-speciality hospital

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### Abstract

**Introduction:** Renal stones have been a common & disabling surgical problem.<sup>1</sup> Nephrolithiasis is a very common disease, with an increasing incidence and prevalence and a significant economic impact associated with its treatment.<sup>2</sup> The surgical management of kidney stone disease has changed dramatically over the past 25 years, as a result of revolutionary technologic and treatment advances.<sup>3</sup> Many patients need to undergo invasive surgery and undergo prolonged recovery. Until the last 2 decades, open surgery for kidney stones was common.

Advances in surgical technique and technology have allowed the urologist to remove calculi percutaneously with increasing efficiency. In PCNL widely preferred is the infracostal approach. Supracostal access in general and supra11th access in particular, continues to be underutilized due to an unfounded fear of thoracic complications though the view of the renal calyceal system is better with this approach.

In view of the above said we in our study evaluated the prospectively safety, efficacy and complications of supracostal access for PCNL.

**Material and Methods:** The study was a Prospective study that was conducted at the department of Urology, January 2016-September 2018 on patients who were planned for PCNL on cases aged between the Age of 18 years and 55 years with unilateral uncomplicated renal calculi.

**Exclusion criteria:** Patients who have had undergone intervention procedures for renal calculi Patients with diabetes Mellitus and those with bleeding disorders, Contraindications for anesthesia.

Initially with ultrasound KUB and then IVU/CT KUB to know the exact location of calculi, pelvicalyceal anatomy and dilatation, lie of the kidney, relationship with ribs and surrounding organs.

Informed written consent was taken in all patients. Antibiotics were given at the time of induction of anaesthesia. Type of puncture either supracostal or subcostal was analyzed preoperatively and also intra-operatively after RGP in prone position under C-arm. All cases were done under general anaesthesia.

**Results and analysis:** The demographic details were as follows the mean age was 49 standard deviation  $\pm$  2.08years in the subcoastal group and 48 standard deviation  $\pm$  2.18years.

Overall males predominated the study we had 42 males and 2 females. Between the two groups there was no statistical difference in terms of age, sex, pre-operative characteristics like mean stone size, the ASA status hence the two groups were comparable.

In the present study renal access in supracostal group the access was done both in the upper calyx 20 cases and mid calyx in one case. In the infracostal group 19 cases were through the lower calyx and on three cases the access was achieved through the mid calyx.

We observed that the need for blood transfusion, pleural and pulmonary complications, mean operating time was higher in the supra-coastal group but the duration of post-operative hospitalization, the need for post operative analgesia and the mean Vas score did not differ between the groups with a p value of more than 0.05.

**Conclusions:** in order of access of PCN Supra -costal access method is an effective and safe procedure with acceptable morbidity.

**Keywords:** PCNL, Nephrolithiasis, Supracostal, complications.

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### Introduction

Renal stones have been a common & disabling surgical problem. Nephrolithiasis is a very common disease, with an increasing incidence and prevalence and a significant economic impact associated with its treatment. The surgical management of kidney stone disease has changed dramatically over the past 25 years, as a result of revolutionary technologic and treatment advances. Many patients need to undergo invasive surgery and undergo prolonged recovery. Until the last 2 decades, open surgery for kidney stones was common.

Advances in surgical technique and technology have allowed the urologist to remove calculi percutaneously with increasing efficiency. As the percutaneous approach to stone removal is superior to other approaches in terms of morbidity, convalescence and cost, PCNL has replaced open surgical removal of larger or complex calculi at most institutions.<sup>1,4</sup> The intimate understanding of the anatomic relationships of the kidney and surrounding structures is crucial for successful and safe percutaneous entry into the renal collecting system.<sup>1,3</sup>

In PCNL widely preferred is the infracostal approach. Supracostal access in general and supra 11th access in particular, continues to be underutilized due to an unfounded fear of thoracic complications though the view of the renal calyceal system is better with this approach.

In view of the above said we in our study evaluated the prospectively safety, efficacy and complications of supracostal access for PCNL.

### Material and Methods

The study was a Prospective study that was conducted at the department of Urology, January 2016-September 2018 on patients who were planned for PCNL and met the predefined criteria.

**Inclusion criteria:** Age:- 18 years - 55 years Unilateral renal calculi

**Exclusion criteria:** Patients who have had undergone intervention procedures for renal calculi Patients with diabetes Mellitus and those with bleeding disorders, Contraindications for anesthesia.

Initially with ultrasound KUB and then IVU/CT KUB to know the exact location of calculi, pelvicalyceal anatomy and dilatation, lie of the kidney, relationship with ribs and surrounding organs.

Informed written consent was taken in all patients. Antibiotics were given at the time of induction of anaesthesia. Type of puncture either supracostal or subcostal was analyzed preoperatively and also intra-operatively after RGP in prone position under C-arm. All cases were done under general anaesthesia. Initially with the patient in lithotomy position with adequate padding to pressure points, cystoscopy and retrograde ureteric catheterization with no: 4/5Fr ureteric catheter over a 0.035/0.032 guide wire was done in all cases under fluoroscopy.

Post-operatively patients were shifted to ward and oral fluids followed by soft diet was initiated in all cases after 6 hours. Post-operatively quinolones/culture positive antibiotics were continued for 5-10 days. Tramadol hydrochloride 50mg was used for analgesia twice daily. Patients had mild to moderate pain at the operated site for 1-2days which was treated by tramadol hydrochloride. Severity of pain was reduced by 50% by second post-operative day. We were able to remove PCN tube on the first post-operative day in all patients as urine was clear or mildly hemorrhagic. In case of gross hematuria on day one, PCN was clamped overnight and was removed once the urine is clear.

### Statistical Analysis

Descriptive and inferential statistical analysis will be carried out. Results on continuous variables was presented as mean  $\pm$  standard deviation (min-max) and the results on categorical variables were presented as numbers (%). Significance will be assessed at 5% level of significance.

### Results and analysis

In the present study during the planned study we had 44 cases who were included in the study.

The demographic details were as follows the mean age was 49 standard deviation  $\pm$  2.08 years in the subcoastal group and 48 standard deviation  $\pm$  2.18 years.

Overall males predominated the study we had 42 males and 2 females, in each of the groups we had one female and 21 males.

The mean BMI was 21.3 standard deviation  $\pm$  0.51 kg per m<sup>2</sup> in the subcoastal group and 20.8 standard deviation  $\pm$  0.28 kg per m<sup>2</sup>. Both the females had hyperthyroidism, none of the males had a thyroid problem. The other co morbidities that existed were hypertension in 10 cases, diabetes mellitus in 12 cases. All cases were either ASA status 1 or ASA status 2. None of the cases had any cardiac or respiratory co morbidities. The mean stone size was 3.8 cms in the supracostal group and 3.48 in the infracostal group. Between the two groups there was no statistical difference in terms of age, sex, pre-operative characteristics like mean stone size, the ASA status hence the two groups were comparable.

In the present study renal access in supracostal group the access was done both in the upper calyx 20 cases and mid calyx in one case. In the infracostal group 19 cases were through the lower calyx and on three cases the access was achieved through the mid calyx in the supracostal group all punctures were between 11<sup>th</sup> rib.

The mean operating time did not differ between the groups with a p value of 0.057. In the supracostal group it was 128 minutes standard deviation  $\pm$  3.09 minutes and in the infra-coastal group it was 111.09 minutes standard deviation  $\pm$  0.05 minutes though it was more in the supra-coastal group.

We observed that the need for blood transfusion was higher in the supra-coastal group (4 cases versus 1 case) of these 4 cases in the supracostal group 3 cases had a staghorn calculi in the supra-coastal group we had 8 cases of ipsilateral pleural effusion and one case of ipsilateral pneumonia. No case in the infra-coastal group developed pleural or pulmonary complication.

We had two cases in the supra-coastal group that needed double tracts for stone clearance as compared to this all cases in the infra-coastal group were managed with single tract. The stone clearance rates were above 98% in both groups. We had two cases of surgical site infection in the supra-coastal group in both of them we had additional tracts and the operative time was more, the SSI was mild and managed conservatively. We noticed that in spite of the complications rate being higher in the supra-coastal access group the duration of post-operative hospitalization (12.05 days versus 13.05 days), the need for post-operative analgesia and the mean VAS score did not differ between the groups with a p value of more than 0.05.

## Discussion

Incidence of staghorn calculi necessitating PCN

In a study that was done by Sudhir sukumar and co- workers<sup>5</sup> they stated that staghorn calculi comprised 29.0 percent of all cases, N. S. Kakre and co- workers.<sup>6</sup> In both the studies upper ureteric calculi were the most common indication similar to our study.

The following studies had a higher complication rate in the supracostal group especially with an access above the 11 rib like in our study Gupta and co- workers,<sup>7</sup> Shah et al.<sup>8</sup> and Shaban and co- workers.<sup>9</sup>

In the present study in order to achieve a complete stone clearance rate double tracts were needed in 2 cases in supracostal group the following studies also needed additional tracts for achieving a complete stone clearance rate. Sukumar and co- workers<sup>11</sup> (8.2), Shah and co- workers.<sup>8</sup> (15.3), Gupta and co- workers.<sup>7</sup>

## Conclusions

In the present study we concluded the following:

Supracostal PCNL is a safe procedure with acceptable morbidity. The need for blood transfusion is higher with supra-costal access.

The rate pleural or pulmonary complications and surgical site infection of is higher with supra-costal access.

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