



ORIGINAL RESEARCH PAPER

Urology

A STUDY ON POST OPERATIVE COMPLICATIONS FOLLOWING PERCUTANEOUS NEPHROLITHOTOMY

KEY WORDS: percutaneous nephrolithotomy, systemic inflammatory response syndrome, urine culture, stone culture, haemorrhage

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ABSTRACT

AIMS AND OBJECTIVES : To analyze the complications following percutaneous nephrolithotomy (PCNL) and to assess factors responsible for these complications.
PATIENTS AND METHODS: It is a retrospective study done at Department of Urology, Nizams Institute of Medical Sciences, Hyderabad. Patients who underwent PCNL between September 2016 and April 2018 were included in the study.
RESULTS: Of 250 patients who underwent PCNL during study period, 51(20.4%) developed features of systemic inflammatory response syndrome, 4 patients developed haemorrhage, 2 patients had pleural injury and 2 patients had colonic injury in the postoperative period.
DISCUSSION and CONCLUSION: Statistical analysis showed significant association between stone size, number of calculi, pyelocaliectasis, number of access tracts, intra operative bleeding, intra operative time and post-operative blood transfusion for development of fever or SIRS. Diabetes mellitus, gender distribution, bladder urine culture showing growth, pelvic urine culture showing growth and stone culture showing growth are not significant predictors for development of SIRS.

INTRODUCTION

Known since ancient times, renal stone disease constitutes a major burden of urology workload. Estimated life time prevalence of the disease is 1- 15%. Males are affected two to three times more often than females⁽¹⁾.

Treatment options available range from extra corporeal shockwave therapy (ESWL) and open surgery to minimally invasive surgery like precutaneous nephrolithotomy (PCNL). Since its first report in 1976⁽²⁾, PCNL has become standard of treatment for staghorn calculi, treatment failures of ESWL and difficult lower pole calculi.

PCNL is cost effective as it requires a shorter hospital stay and allows early return to work⁽³⁾. The technique has a steep learning curve and has certain complications specific to it. These include hemorrhage requiring transfusion, fever, sepsis, extravasation, pleural injury and colonic injury which can cause serious morbidity and mortality⁽⁴⁾.

PATIENTS AND METHODS

After institutional ethics committee approval, a retrospective observational study was done in patients who underwent PCNL at Nizams Institute Of Medical Sciences between September 2016 and April 2018.

All patients who presented to our Department with renal stone disease were evaluated with physical examination, urine analysis, urine culture and sensitivity, complete blood count, renal function test, X ray KUB. Based on the serum creatinine values and the density of opacification of stone on X ray KUB patients were subjected to Intra venous urogram, Plain CT of KUB and DTPA/EC renogram accordingly.

All patients were given 3 days of oral ofloxacin 200mg pre

operatively and all the patients pre operative urine culture were ensured that they are negative and sensitive antibiotics were started in culture positive patients and made culture negative before taking up for surgery.

All patients received 1.5 gm cefaperazone and sulbactam combination one hour before procedure and continued for 2 days after. Culture specific antibiotics were given to patients based on pre operative urine culture and sensitivity report.

Patient factors like age, sex and presence or absence of diabetes were recorded. Preoperative factors like stone size, number of calculi, urine culture sensitivity, presence or absence of pyelocaliectasis, Intraoperative parameters like operative time, number of access tracts used, intraoperative time, intraoperative bleeding, stone and pelvic urine culture sensitivity, need for blood transfusion were recorded.

Patients were followed up in postoperative period with complete blood count including haemoglobin, White blood cell count, serial pulse rate, temperature and respiratory rate monitoring.

RESULTS

Of these 250 patients 51 (20.4%) of them developed features of systemic inflammatory response syndrome, 4 patients developed haemorrhage, 2 patients had pleural injury and 2 patients had colonic injury in the postoperative period.

1. GENDER OUTCOME:

Fever / SIRS:

Table.1: gender distribution table with p value and odds ratio.

Sex	Fever or SIRS		Total	p value	Odds ratio (95% CI)
	No n (%)	Yes n (%)			

Female	78 (76.5)	24 (23.5)	102	0.308	0.725 (0.390-1.347)
Male	121 (81.8)	27 (18.2)	148		
Total	199	51	250		

In the study population of 250 patients 102(40.8%) were females and 148(59.2%) were males. Among the males 27 (18.2%) developed SIRS and 24 (23.5%) females developed SIRS (table.1).

On statistical analysis it was found that gender distribution between those who developed and who did not develop SIRS was not statistically significant (p=0.308) (table.1).

2. DIABETES MELLITUS

Fever/SIRS:

Table. 2: Distribution of diabetes mellitus

DM	Fever or SIRS		Total	p value	Odds ratio (95% CI)
	No n (%)	Yes n (%)			
No	160 (81.2)	37 (18.8)	197	0.221	1.552 (0.765-3.150)
Yes	39 (73.6)	14 (26.4)	53		
Total	199	51	250		

In the study population the number of patients with DM was 53(21.2%) and 197 (78.8%) didn't have DM. Of the patients who developed SIRS 14 (26.4%) had DM and 37 (18.8%) didn't have DM (table.2)

14 out of 53 patients who had DM developed SIRS which seems to be a significant proportion when compared with non diabetics. But the difference between them was statistically insignificant (p=0.221) (table.2).

3. NUMBER OF CALCULI

Fever/SIRS

TABLE. 3: significance of development of SIRS based on number of pre operative calculi

Pre op NOC	Fever or SIRS		Total	p value
	No n (%)	Yes n (%)		
1	177 (88.5)	23 (11.5)	200	<0.001
2	20 (46.5)	23 (53.5)	43	
3/>3	2 (28.6)	5 (71.4)	7	
Total	199	51	250	

In the study population 200 (80%) patients had single calculus, 43 (17.2%) had two calculus and 7 (2.8%) had three or more than three calculus. 23 (11.5%), 23 (53.5%) and 5 (71.4%) patients with one, two and three or more than three calculus developed SIRS respectively.

Among the study population the mean stone size in patients who developed fever/sirs was 4.47(SD=±0.81) and the mean stone size in patients who didn't have fever/sirs was 3.78(SD=±0.94)

On statistical analysis the difference in the mean size between both the groups for development of fever/sirs is statistically significant (p<0.001).

4. BLADDER URINE CULTURE AND SENSITIVITY

a) Fever/SIRS:

Table. 4: Bladder urine culture cross tab

Pre op Urine culture	Fever or SIRS		Total	p value	Odds ratio (95% CI)
	No n (%)	Yes n (%)			
Growth	60 (72.3)	23 (27.7)	83	0.043	0.525 (0.280-0.986)
No growth	139 (83.2)	28 (16.8)	167		
Total	199	51	250		

There was no statistically significance (p= 0.043) (tab.4) observed in patients between presence of growth in pre operative urine culture and sterile urine among patients who developed SIRS.

5. NUMBER OF TRACTS

a) Fever/SIRS:

Tab. 5: number of tracts cross tab

Intra op NOT	Fever or SIRS		Total	p value
	No n (%)	Yes n (%)		
1	178 (87.7)	25 (12.3)	203	<0.001
2	19 (47.5)	21 (52.5)	40	
3	2 (28.6)	5 (71.4)	7	
Total	199	51	250	

6. PELVIC URINE CULTURE AND SENSITIVITY:

a) Fever/SIRS:

Table. 6 showing pelvic urine culture cross tab

Intra op PUC	Fever or SIRS		Total	p value	Odds ratio (95% CI)
	No n (%)	Yes n (%)			
Growth	56 (74.7)	19 (25.3)	75	0.205	0.660 (0.346-1.259)
No growth	143 (81.7)	32 (18.3)	175		
Total	199	51	250		

The proportion of patients developing fever/sirs appears to be high in patients with positive pelvic urine culture but it is not statistically insignificant (p=0.205) (table.6).

7. STONE CULTURE AND SENSITIVITY:

a) Fever/SIRS:

TABLE. 7: Stone culture significance cross tab

Intraop SC	Fever or SIRS		Total	p value	Odds ratio (95% CI)
	No n (%)	Yes n (%)			
Growth	51 (76.1)	16 (23.9)	67	0.409	0.754 (0.385-1.476)
No growth	148 (80.9)	35 (19.1)	183		
Total	199	51	250		

On analysis it was found that development of SIRS in patients with positive stone growth is not significant (p=0.409) when compared with patients whose stone cultures were sterile (table.7)

DISCUSSION

Percutaneous nephrolithotomy procedure is usually done after sterilizing the urine in patients with preoperative urine culture showing growth. Still 15 - 30 % of patients develop postoperative systemic inflammatory response syndrome of which 1-2% develop sepsis.

The likelihood of developing complications in patients undergoing percutaneous nephrolithotomy can be determined by identifying certain preoperative and intraoperative factors associated with the patients.

Our study comprising of 250 patients who underwent percutaneous nephrolithotomy showed that 51 (20.4%) of them developed fever/SIRS postoperatively.

Table no: 8 Comparison of SIRS incidence

S.NO	STUDY	SIRS (%)
1	LIANG CHEN ET AL (12)	23.4%
2	SINGH ET AL (13)	17.6%
3	KORETS ET AL (11)	9.8%
4	DHINAKAR BABU ET AL (14)	24.1%
5	PRESENT STUDY	20.4%

From the above table the incidence of post operative sirs / fever in the present study is 20.4% and it is the most common complication encountered after percutaneous nephro lithotomy.

The incidence of haemorrhage and pleural injury in the present study is 1.6% and 0.8%.

Table no:9 Haemorrhage and pleural injury incidence

S.NO	STUDY	HAEMORRHAGE	PLEURAL INJURY
1	MOUSAVI ET AL (15)	0.6%	0.7%
2	RANA ET AL (16)	1.49%	0.14%
3	PRESENT STUDY	1.6%	0.8%

On analysis of data collected before, during and after surgery it showed certain factors associated significantly in developing SIRS.

Statistical analysis showed significant association between stone size, number of calculi, pyelocaliectasis, number of access tracts, intra operative bleeding, intra operative time and post-operative blood transfusion for development of fever or SIRS.

With regard to gender distribution, diabetes mellitus, bladder urine culture showing growth, pelvic urine culture showing growth and stone culture showing growth the association was found to be statistically insignificant.

In our findings two patients who had pleural injury there was supra coastal access for stone clearance i.e. above 11th rib. So supra coastal access is definitely a risk factor for pleural injury leading to effusion or nephropleural fistula.

In our study four patients had haemorrhage out of which two patients had acute haemorrhage and two patients had delayed haemorrhage. Both the patients with acute haemorrhage were successfully managed with absolute bed rest, blood transfusions and I.V antibiotics.

Both the patients with delayed haemorrhage had significant intra operative bleeding and both the patients had immediate post-operative blood transfusion. Both the patients developed delayed haemorrhage on post- operative day 5 which did not subside with conservative treatment. So both the patients were managed with super selective angioembolization.

To assess, patients with large multiple calculus with more number of access tracts and significant intra operative bleeding requiring blood transfusion are at increased risk for the development of haemorrhage.

Two out of 250 patients had colonic injury (0.8%) in the present study. One injury was identified intra operatively during nephrostogram. DJS was placed and the nephrostomy tube was pulled into the colon. Other injury was identified on the second postoperative day and the nephrostomy tube was gradually pulled.

Both the patients were managed conservatively nil by mouth for 3 days, I.V broad spectrum antibiotics, laxative rectal suppositories. On 6th post operative day lack of communication between both the systems and distal patency of colon was confirmed with contrast injection through the tube under fluoroscopy. Tube was clamped and removed on 7th post op day and was uneventful.

Haemorrhage, pleural injury and colon complication was seen in 1.6%, 0.8% & 0.8% respectively of study population. To assess the statistical significance between the risk factors and the complication the incidence is low and it should be in a significant population to analyse as chances of error are more with only few patients showing complications among 250 patients.

CONCLUSION

1. Significant association was found between stone sizes, number of calculi, presence of pyelocaliectasis,

requirement of access tracts, increased intra operative time, intra operative bleeding and requirement of post-operative blood transfusion for development of SIRS.

2. Diabetes mellitus, gender distribution, bladder urine culture showing growth, pelvic urine culture showing growth and stone culture showing growth are not significant predictors for development of SIRS.
3. Intra operative cultures (pelvic urine and stone) are only therapy guided and takes time to achieve result. These culture sensitivity reports only help in choosing the sensitive antibiotic.
4. Pre-operative sterile urine culture did not decrease the incidence of post- operative fever/SIRS.

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