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Research Article

"STRATIFYING THE RISK FACTORS FOR SEPSIS POST URETEROSCOPIC LITHOTRIPSY" – A PROSPECTIVE STUDY

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A R T I C L E I N F O

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Key words:

URSL, Ureteric stones, sepsis, risk factors.

A B S T R A C T

Background: Postoperative infections are one of the most common complications of ureteroscopic lithotripsy with about 1% incidence, preoperative use of prophylactic antibiotics is insufficient. To our knowledge only few clinical studies have reported on these infectious complications and on the risk factors related to infectious complications. The purpose of our study is to identify risk factors for sepsis with URSL in order to take advantage of modifiable factors to prevent sepsis onset and identify high risk patients in order to prevent additional complications

Methods: We prospectively collected the data of 200 patients with ureteric stones who underwent ureteroscopic lithotripsy at our hospital from sept 2016 to august 2017, including age, gender, comorbidity, urine analysis, urine culture, stone size, operative duration, previous stone surgery. Patients with and without sepsis where classified into group A and group B respectively. All the risk factors were assessed using chi-square test, Mann-Whitney U test, Fischer's exact test.

Results –all surgeries where successfully completed. The total stone free rate was 82 %(n=164). The incidence of infectious complications after URSL was 8.5 %(n=17). Analysis of group A and B indicated that operative duration, stone size, pyuria were risk factors for sepsis after URSL.

Conclusion- Antibiotics should be routinely administered to patients 2-3 days before URSL is performed, particularly for patients with pyuria., The operative duration should be controlled to the extent possible. , For large stone, fragmentation of stone to 3-4mm size is better

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INTRODUCTION

Sepsis is a dreaded postoperative outcome that complicates up to 1% of ureteroscopic operations. A delay in diagnosis and treatment of sepsis can lead to increased morbidity and mortality. The purpose of our study is to identify risk factors for sepsis with URSL in order to take advantage of modifiable factors to prevent sepsis onset and identify high risk patients in order to prevent additional complications

Aims and Objectives

The objective of this paper is to identify the modifiable risk factors for sepsis post ureteroscopic lithotripsy.

Study Centre

Department of urology Govt.Kilpauk Medical College Hospital & Govt. Royapettah hospital, Chennai Kilpauk, Chennai – 600 010.

Study Design: Prospective Study

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Methods of Study

- PLACE OF STUDY – Department of urology in Govt. kilpauk medical college & Govt. Royapettah hospital, Chennai
- DURATION OF STUDY – September 2016 to August 2017
- STUDY DESIGN - prospective study
- SAMPLE SIZE – 200 PATIENTS
- The standard preoperative assessment to confirm the size and location of stone included Computer tomography(CT) and intravenous urography(IVU) of kidney, ureter and bladder
- All patients received parenteral antibiotic on the day of surgery.

Patient demographic data including age, sex, comorbidity, history of stone surgery, hydroureteronephrosis, routine urine analysis, urine culture, operative duration.

- Procedure was done using a 6-7.5fr semi rigid scope and 8-9.8fr scope.

- At end of procedure a 3.8fr dj stent was routinely placed at end of procedure and removed after 2 weeks
- Intravenous antibiotics was given for 2-3days postoperatively
- Post op XRAY KUB and USG KUB was taken to assess for the presence of residual stones and location of dj stent

Definition of Sepsis

Sepsis was defined as

- Body temperature- : >38*C or<36*C for more than 48hrs
- Heart rate- : >100 beats /min
- Respiratory rate -: >20 breaths/min
- WBC count- : >11000 or <4000 cells/dl
- With or without positive postop urine culture

Grouping of Patients

Patients were classified into two groups

Group A- patients with sepsis
Group B- patients without sepsis

The prospectively collected data including – AGE, SEX, Comorbidity, History of Stone Surgery, Urine Culture Result, Pyuria, Operative Duration And Residual Stone, were compared between the two groups by using univariate analysis (including Mann-Whitney U test, chi square test and Fischer's exact test)

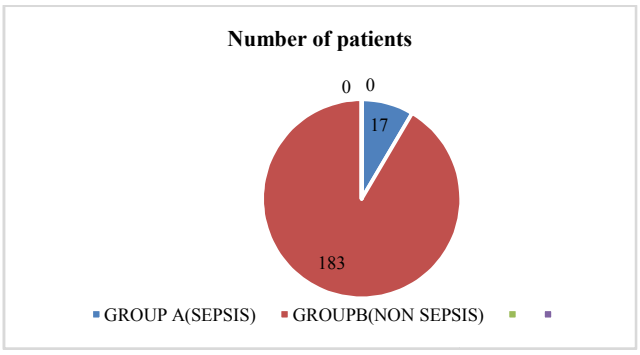
Inclusion Criteria

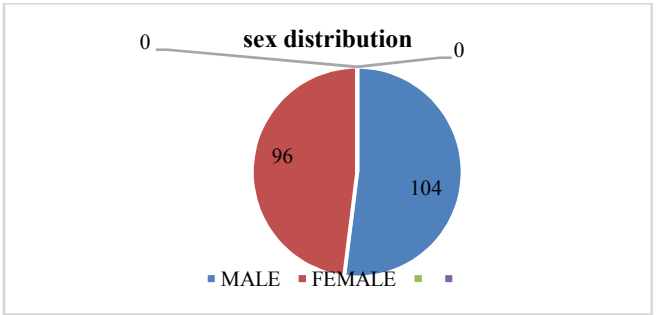
Symptomatic proximal and distal ureteric calculus

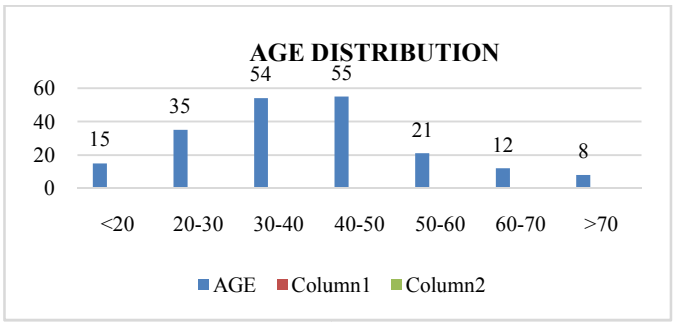
Exclusion criteria

- Ureteric calculus associated with renal calculus or vesical calculus
- Associated with morphological abnormality.
- Cases where in URSL could not be completed were excluded from the analysis

RESULTS

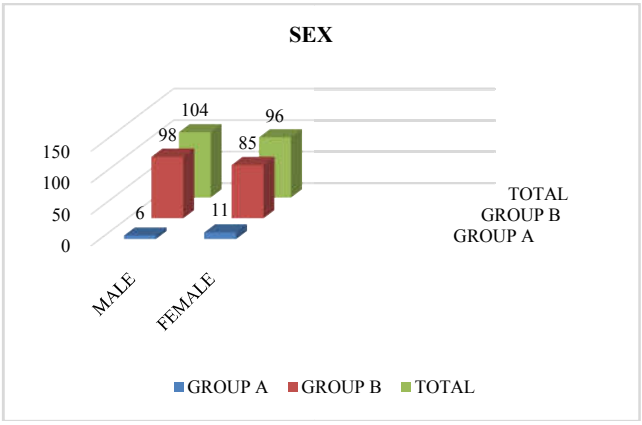


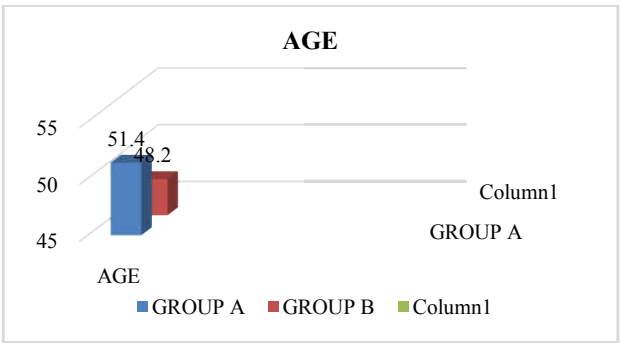


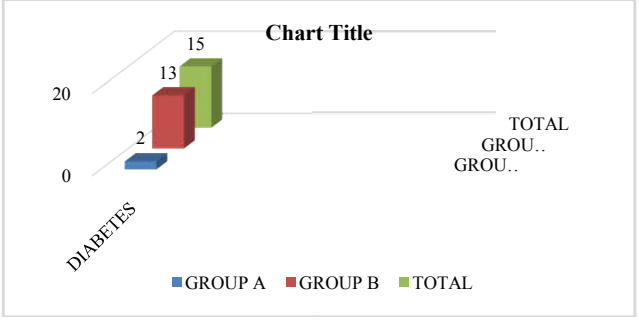


Associated Risk Factors

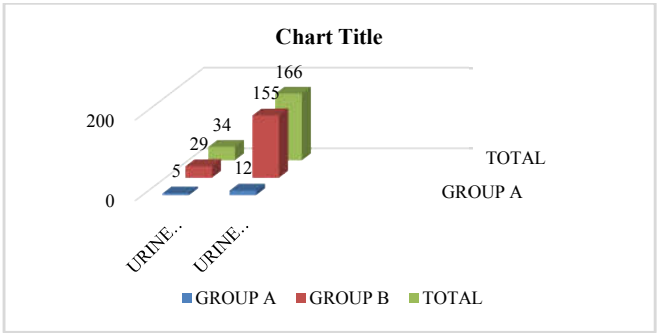
Comorbidity	Number of patients
Diabetes mellitus	15
Prior stone surgery	87
Hydroureteronephrosis	185
Urine culture	
Positive	34
negative	166
Pyuria (>10 cells/ml)	86
H/o previous stone surgery	87
Level of ureteric stone	
Proximal ureter	**34**
Distal ureter	**166**
Residual stone	36
Stone size	**0.6cm – 1.8cm**
Operative duration	12min – 64min

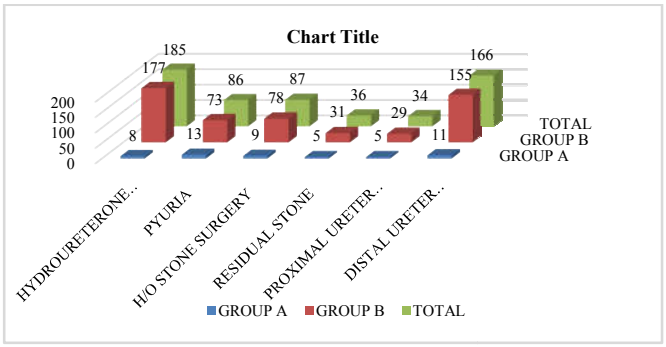


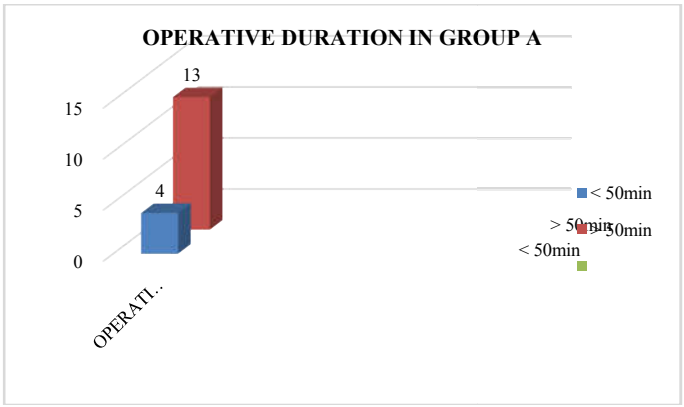


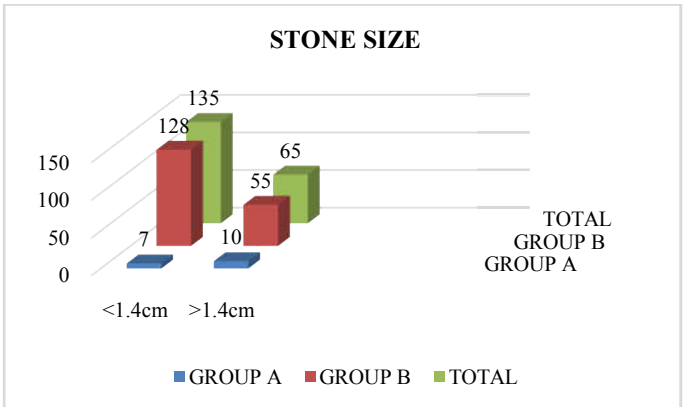


RISK FACTOR	GROUP A	GROUP B
STONE SIZE	1.4cm ± 0.4cm	0.8cm ± 0.2cm
Operative duration	50 ± 14 min	25 ± 13 min









Urine Culture

Organism	Number of Patients
E.Coli	20
Klebsiella pneumonia	4
Proteus mirabilis	4
Candida albicans	2
Staphylococcus	2
Pseudomonas	2

- Most of the patients who developed infectious complications had urinary leucocyte count(PYURIA) of >10cells/ml
- 13 patients with pyuria developed infectious complications whereas 5 patients with positive urine culture results and 11 patients with sterile urine had infectious complications.

This indicated that the presence of a positive urine culture result may not be statistically significant, which may be due to preoperative antibiotic administration and the limited number of cases

VARIABLES	GROUP A n =17	GROUP B n=183	pvalue
GENDER			
Male	6	98	0.168[b]
Female	11	85	
Mean age	51.4 ± 15.2	48.2 ± 14.2	0.248[a]
Diabetes mellitus	2	13	0.630[c]
Hydroureteronephrosis	8	177	0.507[b]
History of stone surgery	9	78	0.408[b]
Urine culture			
Positive	5	29	0.082[b]
Negative	12	154	
Pyuria	13	73	0.001[b]
Stone size(cm)	1.4 ± .4	0.8 ± .2	0.002[a]
Operative duration(min)	50 ± 14	25 ± 13	0.001[a]
Level of ureteric			
calculus	5	29	0.082[b]
Proximal	12	154	
Distal			
Residual stones	5	31	0.110[b]

[a] = Mann-Whitney U test [b]= Chi square test[c] = Fischer's exact test
Operative duration of >50min had a significant p value of 0.001 (13/17)
Stone size of >1.4cm had a significant p value of 0.002 (10/17)
Pyuria had a significant p value of 0.001 (13/17)

DISCUSSION

Many studies have assessed the use of prophylactic antibiotics in the management of upper urinary tract stones; although prophylactic antibiotics are commonly and conventionally used to prevent infectious complications, they appear to be insufficient.

O'Keeffe *et al*. reported that the incidence of septic shock was approximately 1.3% after endoscopic procedures for upper urinary tract stones, and the mortality rate was 66% in their series. To our knowledge, only a few studies are performed on the risk factors for infectious complications after URSL. Without timely treatment, the patient may develop severe infectious complications. Therefore, the prevention of postoperative infections is very important.

Other Studies

Authors	Stone size	Operative duration(min)	Patients	Infective complication
HYANS *et al*	2-3cm	74	120	pyelonephritis
Zhang *et al*	1.4 ±.2 cm	67.2	44	Fever
My study	1.4 ± .4cm	50 ± 14	200	sepsis

- Study by song fan *et al* showed pyuria as a risk factor for sepsis with pvalue of 0.001
- Study by Justin Friedlander *et al* showed preop urine culture positive as a risk factor of sepsis with pvalue of 0.004

Pyuria was an important risk factor for postoperative infections in the present study. Although urine culture is a standard method for diagnosing urinary tract infections, the incidence of

a positive urine culture result was very low. Hence, a positive result of urine culture alone cannot be considered, and clinical evidence of pyuria should also be considered when managing upper urinary tract stones.

The results of routine urinalysis should be carefully considered, particularly when a finding of pyuria is noted. Thirteen patients with pyuria developed infectious complications, whereas 5 patients with positive urine culture results and 12 patients with sterile urine had infectious complications. The Chi-square test indicated that the presence of a positive urine culture result may not be statistically significant, which may be due to preoperative antibiotic administration and the limited number of cases. Mariappan *et al* showed that a routine urine culture had a rather low predictive value for infectious complications and that a direct culture of the renal pelvis and a stone culture were better predictors for infection.

The operative duration was another risk factor for infectious complications. The patients with infectious complications had a significantly longer operative duration (mean time- 50min). Furthermore, operative duration is one of the important factors associated with postoperative fever. In the present study, 13 patients (76.47%) developed infectious complications following URSL with an operative duration of > 50 min, whereas only 4 patients (23.52%) developed infectious complications following URSL with an operative duration of <50min. Operative duration was found to be closely associated with the complexity of stone, difficult anatomy, and technical experience

Univariate analysis indicated that the presence of larger-sized stones was another risk factor for postoperative infections. Ten patients (14.7%) with a stone size of ≥ 1.4cm had infectious complications, whereas only 7 patients (5.30%) with a stone size of < 1.4cm had infectious complications. In the management of a large stone burden, it is not necessary to fragment all the stones into small pieces, and it may be suitable only to reduce the stone size to 3-4 mm; otherwise, it would prolong the operative duration and increase the possibility of injuring the mucosa of ureter.

CONCLUSION

- Antibiotics should be routinely administered to patients 2-3 days before URSL is performed, particularly for patients with pyuria.
- The operative duration should be controlled to the extent possible.
- For large stone, fragmentation of stone to 3-4mm size is better, it would prolong the operative duration and increase the possibility of urosepsis and injury of the ureteral mucosa.
- Thus, early recognition and treatment are effective for decreasing the occurrence of infectious complications.

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