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Original research article

Intra-Operative Urine And Stone Culture In PCNL

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Abstract

Introduction: Patients who have significant renal calculi typically require pcnl as their primary mode of treatment. Calculus renal disease is one of the most common issues that arise in routine urology practise. Infectious complications of pcnl, while not very common, have the potential to cause considerable morbidity and even death in some cases. Postoperative urinary tract infections (also known as UTIs), secondary haemorrhage of infectious origin, and surgical site infections (SSIs) are all known to be infection-related complications of percutaneous nephrolithotomy (PCNL), which can result in severe morbidity. The conditions of sepsis, bacteruria and septicemic shock are likewise well-known and have been described in a great number of investigations. It is common knowledge that perioperative antimicrobial prophylaxis can reduce the risk of postoperative infections and their associated consequences. In this work, an effort is made to discover and comprehend the intra-operative urine and stone culture in order to provide more effective preventive antibiotics.
Keywords: Intra-operative, urine, stone culture in PCNL

Introduction

Stones in the kidney are quite prevalent in this region of the world and are connected with a number of complications [1]. Because a large proportion of the working-age population is frequently affected by this illness, a significant amount of work time is being lost due to the sickness, which is having a negative impact on work hours. The demographic information in India is never documented, but the demographic information for western countries is readily available [2, 3, 4]. It is common knowledge that the stones that are found are, in the vast majority of cases, the gravestones of the bacteria that once inhabited the area. The question that has to be answered is whether the illness leads to the production of stones or whether it is a consequence of their presence. According to the work of a variety of authors from the past, the creation of the stone can be attributed to a number of factors [5, 6]. A urinary stone will affect approximately ten percent of persons at some point during their lives [7]. The burden of renal calculi illness on the healthcare system in the United States is enormous, with 185,000 hospitalizations, 2 million outpatient visits and 2.1 billion dollars spent yearly on management [8, 9, 10]. Supersaturation, the process by which the concentration of chemicals in urine, such as calcium and oxalate, surpass the limits of their solubility [11], has been known to play a significant role in the production of urinary stones throughout the course of human history. However, there is a substantial amount of

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overlap in the chemical profiles of urine produced by people who have renal calculi illness and those who do not [12, 13, 14]. In addition, supersaturation with calcium oxalate (CaOx) or calcium phosphate (CaPhos) is not significantly different between individuals with recurrent renal calculi illness and controls [15]. Therefore, having supersaturated urine by itself is not enough to cause stone development, despite the fact that it is a risk factor. The information that treatment with dietary adjustments, increased fluid intake, citrate salts and/or thiazide diuretics to lower urine CaOx supersaturation only minimally improves recurrence rates15 provides support for this view. In spite of these therapeutic measures, the prevalence of renal calculi illness in adults and children in the United States has lately increased by 40% and 23%, respectively. A crucial requirement is the identification of other mechanisms that contribute to the production of CaOx and/or CaPhos stones (also known as lithogenesis). It has been known for a very long time that bacteria have a role in the development of renal calculi illness. Urinary tract infections (UTIs) that are caused by urease-producing bacteria can lead to the formation of magnesium ammonium phosphate (struvite) stones. These stones are a collection of bacteria, crystals and a protein matrix. It is well known that bacterial proliferation can be found within stag horn calculi. Since the infection is obscured by the stone, it is not always possible to detect infections using pre-operative cultures. Detection of infections might be hit or miss. Patients whose urine tested absolutely negative for PCNL prior to surgery are known to have a significantly increased risk of developing a post-PCNL infection. As a result, our research makes an honest effort to comprehend and investigate the infection that is present in the kidney stones and urine that are removed during surgical procedures. The primary goal of this research project is to develop an antibiotic prophylactic for PCNL.

Aims and Objectives

To study the intra-operative urine and stone culture

Materials and Methods

Study design: A Prospective Study.

Study period: February 2015-July 2016.

Study setting: Department of Urology, Govt. Kilpauk Medical College, Chennai.

Study population: All patients presented to our centre and underwent Percutaneous Nephrolithotomy.

Sample size: 211 cases.

Study group: Patients clinically and radiologically diagnosed with Renal stone.

Inclusion criteria

1. All patient admitted.
2. Patients giving consent for the study.

Exclusion criteria

1. Pre-operative urine culture shows growth.
2. Staged PCNL.
3. Patient with serum creatinine more than 2.0 mg %.
4. Patient already on antibiotic treatment.

Methodology

Consent was obtained after being informed. Patient information during this stage, a comprehensive amount of patient information and history is gathered. Routine As part of the diagnostic process for calculus, a pre-operative urine culture and sensitivity test

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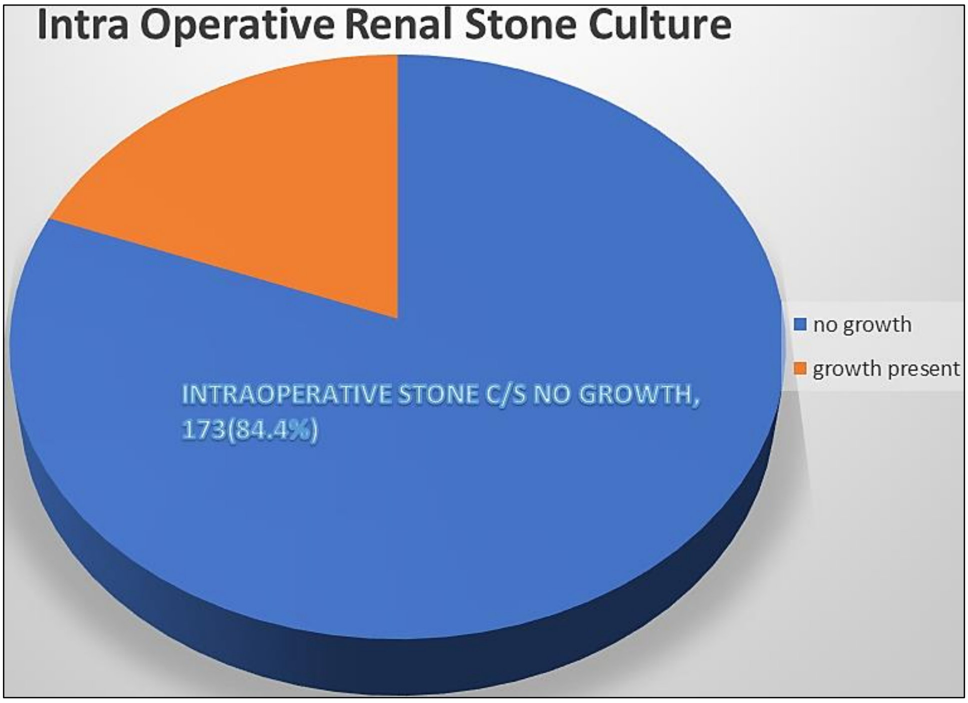
will be performed on an outpatient basis. The initial dose of an antibiotic was administered at the same time as the induction of anaesthesia. One gramme of ceftriaxone from the third generation of cephalosporins was administered intravenously ATD. Ureteric catheterization will be used during the procedure to collect intra-operative urine samples from the kidneys. Stone fragments discovered during PCNL are sent off to be analysed for cultural significance and sensitivity. Nephrostomy tube was utilised in accordance with surgical protocol after a Double J (DJ) stent was placed from the kidney to the bladder. At the conclusion of the procedure, a Foley catheter is inserted through the urethra. Additional doses of the antibiotic are administered at twelve-hourly intervals until the findings of the intraoperative culture are acquired (3 doses). If the culture comes back negative for the antibiotics, treatment is discontinued, and if the culture comes back positive, treatment is maintained for five days. Patients were released from the hospital on the fifth day and followed up with for a period of four weeks before the stents were removed.

Results

Table 1: Intra operative renal stone culture

Intra operative renal stone culture		Valid Percent
growth present	32	15.6
No growth	173	84.4
Total	205	100



Graph 1: Intra Operative renal stone culture

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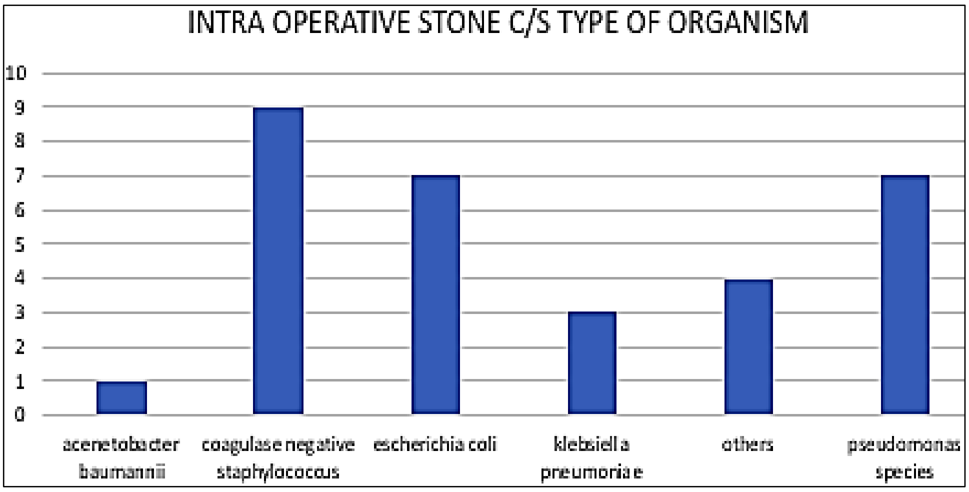

Graph 2: Intra Operative Renal Stone culture Organism Type

Table 2: Urine culture Sensitivity in the present study

Antibiotics	Organism										
	P	C	E	EC	PV	AB	EA	K	A	CK	CNS	ECS
Amikacin	5		4	10	1		1	4				
Gentamycin	5		3	11	1	2		4	1		2	
Colistin	3											
Ceftazidime	3											
Cefepime	3											
Flucytosine		2										
Fluconazole		2										
Voriconazole		2								1		
Amphotericin B		2								1		
Caspofugin		2								1		
Micafungin		2								1		
Nalidixic Acid			1					2				
Ciprofloxacin	2		2		1	1		3			1	
Norfloxacin			2		1			3				
Levofloxacin	4					1	1				1	
Nitrofurantoin			4	8				1			1	1
Fosfomycin			4	9	2			2				1
Trimethhoprim/Sulfamethoxozole			1	9	1	2		2				
Piperacillin/Tozabactam	4		2	2	1	1		2	1			
Ceftrazidine	2			6	1							
Ertapenem			3	1	1			2				
Minocyclin						1						
Tigecycline						1						1
Cefta												
Amoxiclav			2	1		1		1				
Doripenem	2		1	1			1	1	1			
Meropenem	2		1	1			1	1	1			
Clindamycin											2	
Linezolid											2	2
Teicoplanin											1	2

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Vancomycin											1	1
Tetracycline											1	
Oxacillin											1	
Benzylpenicillin												2
Cefalotin								1				
Ceftazidime								1				
Cefexime								1				
Cefoperazone/Sulbactam								1				
Cefepime	2			6				1				
Imipenem												
ceftazidime			1									
Cefoxitin			2	1								
Cotrimoxasole									1		1	
Ampicillin/Sulbactam									1			
Doxycyclin											1	
Vancomycin												1
Erythromycin											1	
Ofloxacin								1				

P-Pseudomonas aeruginosa
C-Candida tropicalis
E-Enterobacter cloacapssp cloacae
EC-Escherichia coli
PV-Proteus vulgaris
AB-Acinetobacter baumannii
EA-Enterobacter aerogenes
KP-Klebsiellapneumoniz
A-Acinetobacter spp.
CK-Candida Krusei
CNS-Coagulase negative Staphylococcus
ECS-Enterococcus spp.

Table 3: RENAL STONE Culture Sensitivity In the present study

Antibiotics	**Organism**													
	P	**C**	**E**	**EC**	**PV**	**AB**	**EA**	**K**	**A**	**CK**	**CNS**	**ECS**	**SA**	**MRSA**
Amikacin	8			3		1	2	3						
Gentamycin	6			4		1		3			8		2	
Colistin														
Ceftazidime	2							2					1	
Cefepime														
Flucytosine														
Fluconazole														
Voriconazole														
Amphotericin B														
Caspofugin														
Micafungin														
Nalidixic Acid														
Ciprofloxacin	2			1				3			9		1	
Norfloxacin								1						
Levofloxacin	4			1				3			5			

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Nitrofurantoin														
Fosfomycin														
Trimethhoprim/Sulfamethoxozole	2										3			1
Piperacillin/Tozabactam	2					1	2	2						
Ceftrazidine														
Ertapenem														
Minocyclin														
Tigecycline				1			1				1		1	
Cefta						1					1			
Amoxiclav				1										
Doripenem	4			3			1	1					1	
Meropenem	4			3			3	4					1	
Clindamycin											2			
Linezolid											7		1	1
Teicoplanin											4			1
Vancomycin											3			1
Tetracycline											3			1
Oxacillin											1			
Benzylpenicillin														
Cefalotin														
Ceftazidime	1							2						
Cefexime				1				2						
Cefoperazone/Sulbactam	1						2	2						
Cefepime	2			1				2						
Imipenem														
ceftazidime								2						
Cefoxitin											3			
Cotrimoxasole											2		1	
Ampicillin/Sulbactam						1								
Doxycyclin											4		1	
Vancomycin											1			
Erythromycin											1			
Ofloxacin														

P-Pseudomonas aeruginosa
C-Candida tropicalis
E-Enterobacter cloacapssp cloacae
EC-Escherichia coli
PV-Proteus vulgaris
AB-Acinetobacter baumannii
EA-Enterobacter aerogenes
KP-Klebsiellapneumoniz
A-Acinetobacter spp
CK-Candida Krusei
CNS-Coagulase negative Staphylococcus
ECS-Enterococcus spp

The four numbers are
41: Urine culture positive cases
32: Positive Stone culture
08 patients had both urine and stone cultures positivity.
Total Negative culture was seen in 140 cases

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Fever were reported in 9 cases
1 patient suffered from fever who was diagnosed with positive urine culture for pseudomonas.
3 patients suffered from fever whose stone showed positive culture for pseudomonas, actinobacteria and coagulase negative staphylococcus.
There is no significant difference between the growth and no growth with fever.

Chi-Square Tests		
	Value	**P value (significant if <0.05)**
McNemar Test		1.000
N of Valid Cases	205	
a. Binomial distribution used.		

Discussion
Even though it is common knowledge that PCNL is an elective procedure that is only performed on patients who have a negative urine culture, the operation is associated with a high risk of severe complications. Postoperative urinary tract infections (UTIs), secondary haemorrhage of infectious origin, and surgical site infections (SSIs) are some of the most common problems that can arise after surgery. These complications can result in severe morbidity. There are also conditions known as sepsis, bacteruria, and septicemic shock. Urine is collected intra-operatively in a sterile container, and once it has been plated in Mac-conkey Agar and examined for signs of growth, the procedure is considered complete. If the condition is found, the colony will be examined for its susceptibility. Urine should be collected in a clean container with a wide mouth, and then sent straight to the laboratory when it has been collected. In the event that there is a holdup in transportation, it may be kept in the refrigerator. After centrifuging the urine sample, a wet mount examination is carried out. The pus cells and bacteria are looked for by microscopy during the examination process. The sample is then inoculated into blood agar and MacConkey agar before being examined under a microscope. In accordance with the Kass semi quantitative technique, the inoculation of the urine sample is carried out. Quantification is performed on the growth that was observed on the blood agar and the MacConkey agar. The colony count in the urine sample must be greater than 105 colony forming units (CFU) per millilitre to be considered significant. The growth that was obtained in the media is given a gramme stain. After that, it is put through a series of biochemical reactions and an antibiotic susceptibility test using routine antibiotic discs in accordance with the standards established by the CLSI standard. Patients undergoing PCNL who have renal calculus have their stones collected in BHI broth (Brain Heart Infusion broth), and the samples are then transferred to the Microbiology Department. After twenty-four hours, any colour changes that have occurred are noted, and if the result is positive, the sample is transferred to a Muller Hinton Agar Plate. Following the completion of the process, sensitivity was noted.
Alternative technique for the cultivation of stones; The renal calculi were first washed in the sterile normal saline solution. Following that, the calculi were pulverised using a clean saw. After that, 1 millilitre of brain-heart infusion broth was contaminated with the stone fragments. The soup was kept warm in an incubator set to 37 degrees Celsius for around 18 to 24 hours. The culture was transferred from the broth onto a plate containing blood agar and MacConkey agar. Standard methods were utilised in order to determine the identities of the organisms that were isolated. Since the infection is obscured by the stone, it is not always possible to detect infections using pre-operative cultures. Detection of infections might be hit or miss. Patients whose urine tested

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absolutely negative for PCNL prior to surgery are known to have a significantly increased risk of developing a post-PCNL infection. 24 hours of antibiotic prophylaxis is what the guidelines prescribe for patients with P.C.N.L. You can choose to take cephalosporin or aminoglycoside or clindamycin or ampicillin-sulbactum or fluoroquinolones for your treatment. Antibiotics should not be used carelessly because it could lead to the development of bacteria that are resistant to Extended Spectrum Beta Lactamases (ESBL). Even though they have been demonstrated to be highly effective, other antibiotics are also known to cause damage to the kidneys. The cephalosporins of the third generation are the least harmful to the kidneys, and as a result, they are often prescribed.

Conclusion

According to the findings of our research, the use of intra-operative urine and stone culture is an effective method for the early detection of infectious complications, which, when combined with rapid early treatment of those complications, will result in reduced postoperative morbidity.

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