

Original research article**A study of intra-operative urine and stone culture in PCNL****¹Dr. Shankar Gunadal, ²Kiran Kumar, ³Dr. Chandralekha P**¹Assistant Professor, Department of Genito Urinary Surgery, Dr. Chandramma Dayananda Sagar Institute of Medical Education and Research, Harohalli, Ramanagara, Karnataka, India²Associate Professor, Department of General Surgery, Kanachur Institute of Medical Sciences, Natakal, Mangalore, Karnataka, India³S S Sparsh Hospital, Rajarajeswari Nagar, Bangalore, Karnataka, India**Corresponding Author:**

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Abstract

Introduction: In general urology practise, calculus renal disease is one of the most prevalent types of disorders seen, and percutaneous nephrolithotomy (PCNL) is the therapy of choice for patients who have significant amounts of renal calculi. Even while infectious complications of PCNL aren't very prevalent, they nonetheless have the potential to cause considerable morbidity and even death. Infection-related consequences of percutaneous nephrolithotomy (PCNL) include postoperative urinary tract infections (UTIs), secondary haemorrhage of infectious origin, and surgical site infections (SSIs). These problems can lead to considerable morbidity. Additionally, bacteruria, sepsis, and septicemic shock are recognised and have been recorded in several investigations. It is well knowledge that the use of perioperative antibiotic prophylaxis can effectively cut down on the risk of postoperative infectious problems. In this work, an effort is made to locate 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 something that may be rather prevalent in this region of the world, and they can also be connected with difficulties ^[1]. As a result of the significant reduction in work hours caused by this condition, the work hours of the working young population, who are frequently affected by this disease ^[2], are being substantially compromised. The demographics of India have never been documented, although data on the demographics of other parts of the world is accessible ^[3, 4]. It is well knowledge that the stones that are found are, in the vast majority of cases, the gravestones of the bacteria that formerly inhabited the area. The question that has to be answered is whether the illness leads to the production of stones or if it is a result of their presence. According to the work of a variety of writers ^[5, 6], the creation of the stone can be attributed to a variety of different factors. Urinary tract stones affect around ten percent of adults throughout the course of their lifetimes ^[7]. There are 185,000 hospitalisations, 2 million outpatient visits and 2.1 billion dollars spent yearly for management of renal calculi disease in the United States ^[8, 9, 10]. This places a significant strain on the nation's health care system. Supersaturation, the process by which the concentration of chemicals in urine, such as calcium and oxalate, exceed the limits of their solubility, has traditionally been seen as an important contributor to the development of urinary stones ^[11]. However, there is a significant degree of overlap in the chemical profiles of urine between those 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. This conclusion is supported by the information that therapy with dietary adjustments, increased fluid intake, citrate salts and/or thiazide diuretics to lower urine CaOx supersaturation only minimally improves recurrence rates ^[15]. This conclusion is supported by the knowledge that this conclusion is supported by the knowledge that this knowledge. In spite of these therapeutic measures, the prevalence of renal calculi illness in adults and children in the United States has lately grown 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 may be seen within stag horn calculi. Since the infection is obscured by the stone, it is not always possible to identify infections using pre-operative cultures. Detection of infections might be hit or miss. Patients who had an absolutely negative pre-operative urine culture are known to have a significantly increased risk of developing a post-PCNL infection. As a result, our research makes an honest attempt 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

For the purpose of analysing the intra-operative urine and stone culture.

Materials and Methods

Study design: A Prospective Study.

Study period: May 2021-October 2021.

Study setting: Department of urology, Government medical College, Kottayam, Kerala.

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

Sample size: 191 cases.

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

Inclusion criteria

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

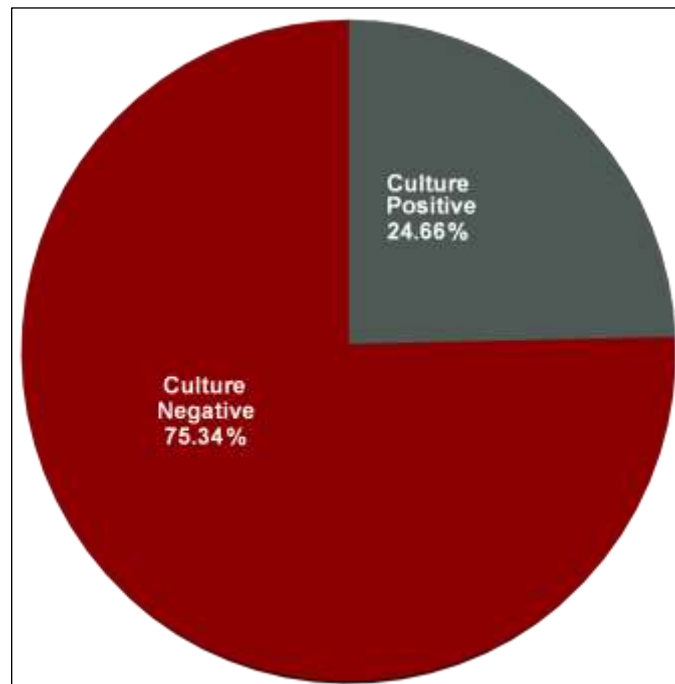
Exclusion criteria

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.

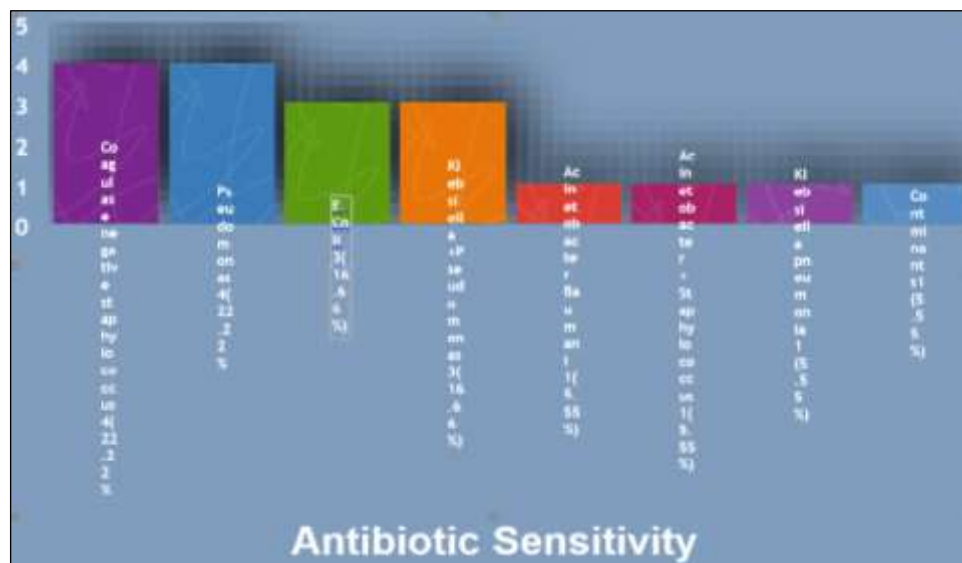
Method

Consent is obtained after being informed. Patient information During this stage, a comprehensive amount of patient information and history is gathered. Typical Behaviour As part of the diagnostic workup for calculus, a pre-operative urine culture and sensitivity test will be performed on an outpatient basis. The initial dosage 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 acquired during PCNL are sent out 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 surgery, a Foley catheter is inserted via the urethra. Additional doses of the antibiotic are administered at regular intervals of 12 hours until the findings of the intraoperative culture have been acquired (three doses). In the event that the culture comes out negative for antibiotics, treatment should be discontinued for a period of 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



Graph 1: Status of culture



Graph 2: Culture

Table 1: Sensitivity

culture report	103	104	106	496	1111	1219	345	499	1143	282	398	124	231	387	19	104
organism isolated					S	P	E.Coli 16%				P+K		A	K	A+S	
Amikacin	*	*	*		*	*		*	*	*	*	*	*	*	*	*
Ampicillin																
Aztreonam																*
Carbenicillin																
Cefoxitin	*	*	*		*	*		*	*	*	*	*	*	*	*	*
Ceftriaxone	*	*														
Ceftazidime																
Ciprofloxacin	*	*	*		*	*		*	*	*	*	*	*	*	*	*
Doxycycline	*	*	*		*	*		*	*	*	*	*	*	*	*	*
Erythromycin	*	*														
Gentamicin	*	*	*		*	*		*	*	*	*	*	*	*	*	*
Levofloxacin	*	*			*	*		*	*	*	*	*	*	*	*	*
Ofloxacin																
Penicillin	*	*			*	*		*	*	*	*	*	*	*	*	*
Piperacillin					*	*		*	*	*	*	*	*	*	*	*
Tobramycin					*	*		*	*	*	*	*	*	*	*	*
Trimethoprim/ Sulfamethoxazole					*	*		*	*	*	*	*	*	*	*	*
Cotrimoxazole					*	*		*	*	*	*	*	*	*	*	*

S- staphylococcus 22%
 P- pseudomonas 22%
 P+K- Pseudomona
 +Klebsiella pneumonia 16%
 A-Actinobacter baumani 5%
 A+S- Actinobacter baumani
 and staphylococcus
 5%
 K- Klebsiella pneumonia
 5%

Discussion

After the operation (PCNL) many complications are encountered although known to be elective surgery which is done in patients with negative urine culture. Some commonly encountered complications are Postoperative urinary tract infections (UTIs), Secondary haemorrhage of infective origin and Surgical site infections (SSIs leading to significant morbidity. Sepsis, bacteruria, septicemic shock are also known. Urine is collected intra-operatively in a sterile container and it is plated in Mac-conkey Agar and checked for growth. If present then the colony is tested for sensitivity. The urine sample collected in the sterile wide mouth container should be transported to the laboratory immediately. In case of any delay in transit it can be stored in the refrigerator. The urine sample is centrifuged and wet mount is performed. The microscopy is done to check for the pus cells and the bacteria. Followed by microscopy the sample is inoculated into blood agar and MacConkey agar. The inoculation of urine sample is done as per the Kass semi quantitative technique. The growth obtained on the blood agar and MacConkey agar is quantified. The colony count of >10⁵ Colony Forming Units (CFU) /ml of urine sample is considered significant. Gram stain is performed on the growth obtained in the media. It is then proceeded for biochemical reactions and antibiotic susceptibility testing using the routine antibiotic discs as per the standard CLSI guidelines. Patients with renal calculus undergoing PCNL, stones are collected in BHI (Brain Heart Infusion broth) and sent to Micro-biology Department. Colour changes are recorded after 24 hours and if turned positive it is plated in Muller Hinton Agar Plate. Sensitivity is observed after the procedure.

Alternative method of stone culture; The renal calculi were initially rinsed in the sterile normal saline. Then the calculi were crushed with a sterile saw. The stones were then inoculated into 1 ml of brain heart infusion broth. The broth was incubated at 37 °C for about 18 to 24 hours. The broth was sub cultured onto blood agar and MacConkey agar plate. The isolated organisms were identified by standard techniques. The infections may or may not be detected in pre-operative cultures and the stone actually masks the infection. Post-PCNL infection is known to be much higher in patients with absolute urine pre-operative.

Even though it is common knowledge that PCNL is an optional 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 frequent problems that can arise after surgery. These complications can result in severe morbidity. There are other conditions known as sepsis, bacteruria, and septicemic shock. Urine is taken from the patient during the operation and placed in a clean container before being plated on MacConkey agar and examined for signs of growth. If the condition is found, the colony will be examined for its susceptibility. Urine should be collected in a clean container with a wide opening, 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 microscope during the examination process. The material 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 deemed significant. The growth that was obtained in the medium is given a gramme stain. After that, it is put through a series of biochemical reactions and an antibiotic susceptibility test using regular 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 in an incubator at 37 degrees Celsius for approximately 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 separated. Since the infection is obscured by the stone, it is not always possible to identify 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. 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-sulbactam or fluoroquinolones for your treatment. Antibiotics should not be used carelessly since it might lead to the development of bacteria that are resistant to Extended Spectrum Beta Lactamases (ESBL). Even though they have been demonstrated to be very 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 diagnosis of infectious complications, which, when combined with rapid early treatment of such complications, will result in reduced postoperative morbidity.

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