Original Article

OPEN ACCESS
Pak. J. Adv. Med. Med. Res.
2023; 1 (2):Page- 46-51

CONVENTIONAL PERCUTANEOUS NEPHROLITHOTOMY (PCNL) COMPLICATIONS RATE IN A TERTIARY CARE CENTER.

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ABSTRACT

Background: To find The Complication Rate Of Conventional Percutaneous Nephrolithotomy In A Tertiary Care Hospital (PCNL).

Study design: A Retrospective observational study.

Place and duration of study: Department Urology Lady Reading Hospital In Peshawar, Pakistan, From 05-January 2016 To 05- January 2020

MATERIALS AND METHODS: 439 patients with regular panels underwent the study. Before non-contrast, C.T. kub was used on all subjects. The patient was lying flat after the 6-fr ureteric catheter was inserted in the lithotomy position. All prone procedures using 30fr am plating sheaths were directed by fluoroscopy. Hydraulic lithoclasts broke the stone. All nephrostomy tubes were Foley devices with a 16-fr size. Six physicians performed these operations with four years of penal experience. Postoperative problems were evaluated using an adapted Cloven rating method.

Results: 46.9%. 54 (12%) and (120) grade I and II clavier problems were discovered. 67 (15%) stage I patients with transient temperature were treated with antipyretics. 53 (12%) patients used supine pressure bands to treat nephrostomy site leakage. 9 (2%) of the grade II issues needed IV antibiotics for sepsis, and 45 (10%) required blood transfusions. Extended hemorrhage occurred in 4 (0.8%) patients who underwent percutaneous angioembolization and 6 (1.2%) patients who underwent perinephric collection drainage. One (0.2%) patient had a colostomy, and 24 (5.3%) patients with persistent nephrostomy leakage or PCS injury underwent D.J. stenting. I was all right with Intensity IV. 0.4% of fatalities were due to severe bleeding.

Conclusion: Percutaneous nephrolithotomy is economical, risk-free, and well-tolerated. Minor problems like brief temperature and nephrostomy site leaks usually go away independently. The degree of complexity has been reduced to almost nothing due to the shrinking size of Pcnls from conventional to mini, ultra-mini, and micro**.**

Keywords: Complications, Tertiary Care, Percutaneous Nephrolithotomy, Conventional, Pakistan

How to Cited this Article : Ullah S, Asif M, Haroon N, Ghani A. Conventional percutaneous nephrolithotomy (PCNL) complication rate in a tertiary care center. Pak J Adv Med Med Res. 2023;1(2):46-51. doi:10.69837/pjammr.v1i02.10.

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Article History

Received:	February	21 2023
Revision:	March	12, 2023
Accepted:	April	22, 2023
Published:	July	05- 2023

INTRODUCTION

Currently surgeons widely perform percutaneous nephrolithotomy (PCNL) as a minimal invasive method that treats renal stones with special effectiveness in handling large incomprehensive calculi. The advanced procedure of PCNL first appeared in 1976 and now represents the leading surgical approach for removing renal stones over 2 cm in diameter because it delivers superior SFRs together with minimized complications than open surgical methods [1,2]. The three stages of PCNL development starting with conventional then progressing to mini and finally advancing to ultra-mini and micro techniques resulted in lower complication risks and superior patient recovery [3].PCNL provides several benefits to patients however it comes with certain complications which include bleeding episodes and sepsis occurrence alongside incidental organ injury and nephrostomy complications. Medical literature uses the modified Clavien grading system as its main method for classifying complications that occur from PCNL treatments [4]. Medical research indicates PCNL complications develop from 20% to 83% based on stone volume together with surgeon experience and access method and post-treatment care [5].The main drawback of typical PCNL procedures is bleeding complications that sometimes lead clinicians to order blood transfusions or undertake angioembolization or require performing nephrectomy in extreme cases [6]. The risk of postoperative infection along with sepsis represents important complications which affect up to 10% of patients [7]. Surgical technique advancement together with better perioperative practices and instrument upgrades have reduced the standard operating risks [8].PCNL benefits most frequently from treatment by positioning patients in the prone position. Scientific research now investigates the supine position as a potential alternative to the prone position during PCNL procedures due to its association with shorter operations and lessened intrathoracic pressure and enhanced stability of anesthesia [9]. Research shows that the prone position maintains its suitability for PCNL because of its broader Access angle and better stone extraction performance [10].

METHODS

The observational retrospective analysis took place during January 5th 2016 to January 5th 2020 at the Urology department of Lady Reading Hospital Peshawar Pakistan. A total number of 439 patients experienced conventional PCNL treatment for their renal calculi.The evaluation of stone dimensions and renal anatomy together with stone site using preoperative non-contrast CT KUB scans took place for all patients. The procedure implemented fluoroscopy-assisted insertion of 30Fr amplatz sheaths through which hydraulic lithoclasts fragmented the stones. A 16Fr Foley catheter functioned as the device for nephrostomy insertion. Six skilled urologists performed all procedures with at least four years of practice experience.

APPROVAL FORM ETHICS COMMITTEE:

The research received passing approval from the Ethics Review Board (ERB) of Lady Reading Hospital, Peshawar under reference number ERB-**1346/08/2022.** The research followed ethical guidelines from institutions together with international standards. Before data collection started every participant received informed consent. (Principal Investigator: Sami Ullah).

Data Collection

Medical teams recorded both patient demographic details along with stone data and operative procedures together with postoperative complications. The postoperative complications were classified into four categories through the modified Clavien grading system ranging from minor (Grade I-II) to major (Grade III-IV).

STATISTICAL ANALYSIS

Research analysts conducted their data examinations through SPSS version 24.0 from IBM Corp based at Armonk in New York (USA). The report expressed continuous numbers as mean values plus standard deviation (SD) while categorical numbers appeared through frequencies and percentages. A statistical analysis was conducted using the Chi-square test for categorical data while the threshold value for significance remained at $p < 0.05$.

RESULTS:

Across the board, 46.9% had complications.

Most Grade I and II Clavier problems were found in 120 (27%) and 54 (12%), respectively. Temporary fever in 67 (15%) of the patients who received antipyretics and nephrostomy site leakage in 53 (12%) patients who received pressure dressings at the bed site were Grade I complications. 10% of patients with Grade II complications required blood transfusions, and 2% developed sepsis that required parenteral antibiotic treatment. 10 (2% of the participants) experienced Grade III-A complications, including prolonged bleeding in 4 (0.8%) of the patients were treated with percutaneous angioembolization, and 6 (1.2%) needed percutaneous drainage of the perinephric collection. Grade IB sequelae occurred in 25 patients (5.5%), 24 patients (5.3%) needed D.J. stenting due to PCS damage or ongoing leakage from the nephrostomy site, and one patient (0.2%) required a colostomy due to a gastrointestinal injury. No Grade IV complication existed. Mortality due to bleeding was 0.4% (Grade V).

Figure 01: Demographically view

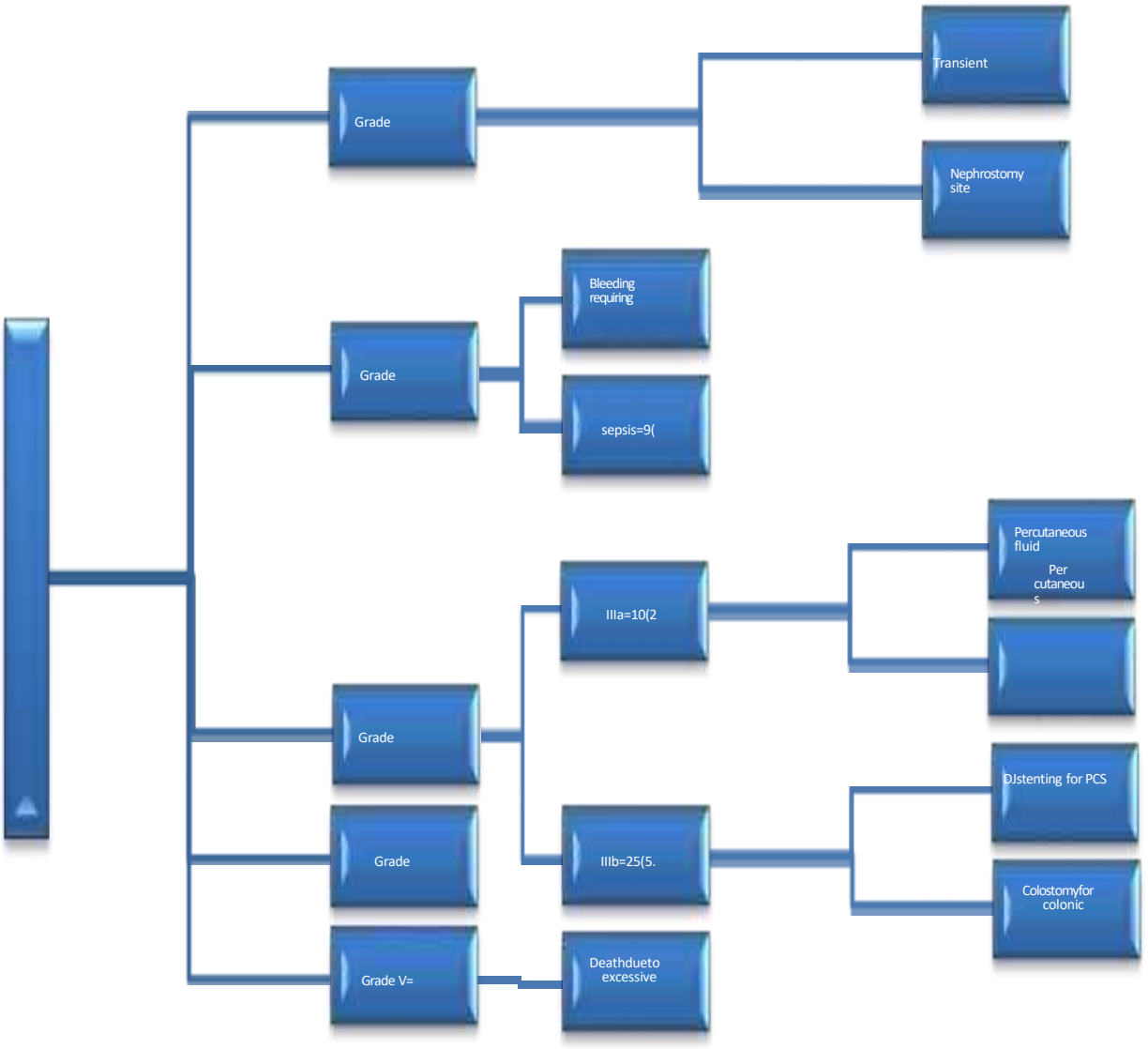

Table 1: Complications According to the Modified Clavien Grading System

Clavien Grade	No. of Patients	Comments
I	120 (27%)	Antipyretics managed transient fever in 67 people (15%). 53 (12%) patients with nephrostomy site leaks received basic pressure bandages at the bedside.
II	54 (12%)	9 (2%) and 45 (10%) received intravenous drugs for sepsis.
III	25 (5.5%)	4 (0.8%) cases of percutaneous angioembolization, 6 (1.2%) cases of percutaneous drainage of per nephric collections, 24 (5.3%) cases of nephrostomy site leakage, and one (0.2%) case of colonic injury requiring a colostomy.
IV	0	-
V	2 (0.4%)	Deaths

Table 2: Situations That Are Complicated According To The Modified Clavien Grading System

Clavien Grade	No. of Patients	Comments
I	120 (27%)	Antipyretics managed transient fever in 67 people (15%). 53 (12%) patients with nephrostomy site leaks received basic pressure bandages at the bedside.
II	54 (12%)	9 (2%) and 45 (10%) received intravenous drugs for sepsis.
III	(5.5%)	4 (0.8%) underwent percutaneous angioembolization, 6 (1.2%) experienced percutaneous drainage of perinephric collections, 24 (5.3%) underwent D.J. stenting for PCS injury or nephrostomy site leaking, and one (0.2%) underwent a colostomy due to a colon injury.
IV	0	-
V	2 (0.4%)	Deaths

Table 3: Complications Rate in PCNL Studies

Study	Complication Rate
Tefekli et al.	29.2%
De la Rosette et al.	43.8%
Guy's Hospital	50.5%
This Study	46.9%

DISCUSSION:

Studies show wide variations of PCNL complication rates from 20% to 83% among patients as reported in [10]. The research-reported complication rate stand at 46.9% while showing similar numbers to earlier studies' findings including Tefekli et al.'s 29.2% and De la Rosette et al.'s 43.8% and Guy's Hospital 50.5% [11]. Results from a big multi-center study on 5803 patients showed that complications developed in 21.5% of cases.A total of 15% of patients experienced nephrostomy tube leakage and blood transfusion needed by 10% of patients in the study [12]. Nine-point-four percent of patients required either surgical or radiological intervention because of their Grade III complications. The complication rate mentioned in 244 PCNL patients amounted to 44.8% as reported by De la Rosette et al. while Guy's Hospital noted similar statistics at 43% in 2008 with Clavien Grade I being the prevalent form of complication [13].The 9% of patients who experienced Grade III complications needed surgical or radiological care yet no patients had Grade IV or V complications . The low incidence of pleural injury from PNL access procedures was observed in 0.3% to 1% of cases according to previous reports but our study revealed no pleural violations because patients underwent access through lower calyceal networks [14].A major bleeding event affected only 1% of patients in a PCNL study involving 3,878 patients while 5.5% needed blood transfusions [15]. The observed transfusion rate reached 10% in our study possibly because surgeries lasted longer and patients had multiple stone accumulations including staghorn calculi. Srivastava et al. documented that 1.4% of their 1,854 patients required angioembolization for bleeding control as observed in our study that affected 0.8% of patients [16].The occurrence of postoperative febrile episodes affected 15% of our

patient population and sepsis developed in 2% of cases. The literature shows that post-PCNL transient fever affects 10-30% of patients yet the sepsis risk falls between 0-3% [16]. The Clavien grading system functions as a standard classification device to measure PCNL complications uniformly in different operational environments [17].The data confirms PCNL continues to be a safe interventional operation which produces minimal complications but substantial adverse effects are rarely observed. Technical progress in PCNL equipment size will bring better treatment results coupled with decreased surgical complications.

CONCLUSION

PCNL stands as a safe and effective minimal intervention that treats renal stones through minimally invasive means since most postoperative challenges resolve independently. The improvement of surgical techniques together with proper perioperative care and patient selection strategies will produce better outcomes and protection against complications specifically through the implementation of miniaturized PCNL technology.

LIMITATIONS

The research design as well as the location at a single tertiary care center threatens the broad applicability of the findings. The complication rates tend to vary according to surgical experience levels and patient criteria used for selection between different institutions. The study did not measure long-term functional end results from treatment. Medical scientists need to perform additional multicenter research by using standardized methods to improve risk assessment and validation.

FUTURE FINDINGS

Multi-center trials following PCNL procedures should become the focus of future research since they will evaluate both renal function outcomes and quality of life results along with recurrence patterns. Research should be conducted to establish the significance of robot-supported PCNL along with AI-guided imaging and enhanced recovery protocols for lowering complication risks while enhancing patient outcomes during renal stone treatments.

Disclaimer: Nil

Conflict of Interest: Nil

Funding Disclosure: Nil

Authors Contribution

Concept & Design of Study: Sami Ullah

Drafting: Muhammad Asif

Data Analysis: Naveed Haroon

Critical Review: Azara Ghani

Final Approval of version: All Mentioned Authors Approved

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