Original Article

Guy's Stone Scoring in Predicting Postoperative Residual Stone

Muhammad Waqas Iqbal, Farhan Jamshed, Adeen Akram, Nauman Khalid,
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ABSTRACT

Objective: To determine the frequency of postoperative residual stone based on preprocedural Guy's scoring system.
Methodology: This cross-sectional descriptive study was conducted from1st June 2018 to 30th November 2019 at University Medical College Faisalabad. All patients with stones in the kidney undergoing PCNL, 20 to 60 years of age of both genders were included. Patients with secondary stones due to pelviureteric junction obstruction, CRF and recurrent stones were excluded. In all patients Guy's scoring was measured. Then all patients underwent PCNL. After 24 hours of operation, CT scan was done in each patient and residual stone (present/absent) was noted.
Results: This study was comprised of 91 patients of age ranged from 20- 60 years. Fifty-three patients (58.24%) were males and 38 (41.76%) females. Seven (7.69%) were of Guy's grade I, 48(52.75%) grade II, 21(23.08%) grade III and 15 of grade IV. Number of patients with residual stone was 09 (9.89%), 0.0% of GS 1, 12.5% of GS 2, 4.76% of GS 3 and 13.33% of GS 4 patients had residual stone.
Conclusion: Pre-PCNL Guy's scoring is easy, rapid and useful for predicting the residual stone after percutaneous nephrolithotomy.
KEYWORDS: Residual stone, Guy's scoring system, Extracorporeal shockwave lithotripsy

INTRODUCTION

Nephrolithiasis is a common disorder with estimated prevalence of 1-13% in various regions of the world.[1] Precipitating factors of kidney stone disease include age, gender, diet, lifestyle, socioeconomic status, geographical location and race/ethnicity resulting in various incidence rates in different countries.[2,3] Urinary stone disease has affected mankind since antiquity. It has been even found in Egyptian Mummies.[4] Nephrolithiasis is a recurrent disorder. In some studies recurrence rate has been

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reported from 21% to 53%. Most of the stones are of calcium oxalate (75%-90%). Other components were uric acid (5%−20%), calcium phosphate (6%−13%) and struvite (2%−15%).[5,6]
New techniques have been developed for the management of renal stones with the advances in technology in this modern era. Extracorporeal shockwave lithotripsy (ESWL), Percutaneous nephro-lithotomy (PCNL), Retrograde intrarenal surgery (RIRS), and Laparoscopic stone surgeries have replaced open surgical procedures in majority of cases.[7] Percutaneous Nephrolithotomy (PCNL) is now considered as first line standard treatment for large renal stones >2cm. As the incidence of renal stone is increasing, procedure of PCNL has become increasingly popular. Stone free rate after PCNL and its complications are topic of discussion due to increasing number of procedures in the world. The objective and goal of PCNL is the provision of maximum stone clearance with minimal rate of complications.[7] Different preoperative factors which affect the outcome of PCNL are size & site of the stone, patient's characteristics and renal anatomy.[8]
To date computed tomography (CT) is considered as the most important imaging investigation in renal stones prior to PCNL. CT plays a very important role in preoperative assessment of stone's characteristics and renal anatomy. Various scoring systems like Guy's scoring, CROES nomogram and S.T.O.N.E., are based on findings of preoperative CT.[9,10] Aims of the study was to determine the frequency of

postoperative residual stone based on pre-procedural Guy's scoring system.

METHODOLOGY

It was a descriptive study conducted at University Medical College Faisalabad from June, 01, 2018 to November, 30, 2019. All patients with kidney stones of either gender, with age range 20-60 years were included into this study. Diagnosis was confirmed by plain computerized tomography (CT). Ethical approval was taken from ethical approval committee (TUF/Dean/2018 dated May, 15, 2018).

Preoperatively Guy's scoring was done for each patient as follows: Guy's stone score 1 (GSS1): a solitary stone in the mid/and or lower pole or in the renal pelvis with a normal anatomy and simple collecting system Guy's stone score 2 (GSS2): a solitary stone in the upper pole; multiple stones in patients with simple anatomy; or a solitary stone in a patient with abnormal anatomy Guy's stone score 3 (GSS3): multiple stones in a patient with abnormal anatomy or in a calyceal diverticulum or partial staghorn calculus Guy's stone score 4 (GSS4): a complete staghorn calculus or any stone in a patient with spinal bifida or a spinal injury, calculus in patients with clinical neurological alternations (spinal cord injury, myelomeningocele) All patients underwent PCNL by experienced consultant. CT-scan was performed on 1st postoperative day to see any residual stone >2mm. Patients with secondary stones due to pelviureteric junction obstruction as assessed on Computed Tomography Urography (CTU), of chronic renal failure (s/creatinine >1.5 mg/dl) and with recurrent stones were excluded from study. Morbidly obese patients (BMI >37 kg/m^2) and the Patients in which procedure was converted to open pyelolithotomy were also excluded.

Statistical analysis: Social Science (SPSS) Version 20.0 was used to analyze the entered data. Quantitative data were presented as mean ± SD. Qualitative data were presented as frequency and percentage. Pre-operative Guy's grading (1/2/3/4) and effect modifiers like age, gender & BMI were stratified. Post-stratification chi-square was used to assess their effect on postoperative residual stone and p-value ≤0.05 was taken as significant.

RESULTS

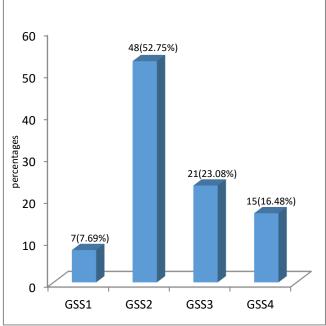Total no of patients in this study was 91. Age ranged from 20- 60 years with mean age of 35.64 ± 8.12 years.

Characteristics of Patients according to age, gender and BMI is shown in table 1. Male to female ratio was 1.4:1. Mean BMI was 27.73 ± 2.86 kg/m^2.

Table 1: Characteristics of Patients According to Age, Gender and BMI (N=91)

Groups		No. of Patients (N)	Percentages (%)
Age	20-40	69	75.82
	41-60	22	24.18
Gender	Male	53	58
	Female	38	42
BMI (kg/m2)	≤27	44	48.35
	>27	47	51.65

Fifty three patients (58.24%) were males and 38 (41.76%) females. Male to female ratio was 1.4:1. Mean BMI was 27.73 ± 2.86 kg/m2 (Table I). Mean preoperative Guy's grading was 2.48 ± 0.86. Distribution of patients according to Preoperative Guy's grading is shown in (Figure 1).

Figure 1: Distribution of Patients According to Pre-Operative Guy's Grading (n=91).

GSS=Guy's stone score

Residual stone was present in 09 (9.89%) with none in grade 1 and 2(15.38%) in grade 4(table 2).

Table 2: Stratification of Residual Stone with Respect to Pre-Operative Guy's Grading (n=91).

Pre-operative Guy's grading	Residual stone		P-Value
	Present N (%)	Absent N (%)	
Grade 1	00	7 (100)	
Grade 2	06 (12.5)	42 (87.5)	0.582
Grade 3	01 (4.7)	20 (95.2)	
Grade 4	02 (13.3)	13 (86.6)	

p-value ≤0.05 taken as significant.

Stratification of residual stone with respect to age, gender and BMI shows greater number of residual stones in age group of 41-60 years (Table 3).

Table 3: Stratification of Postoperative Residual Stone with Respect to Age, Gender and BMI Groups (n=91).

Groups		Residual stone		P-values
		Present N	Absent N	
Age	20-40	04	65	0.021*
	41-60	05	17	
Gender	Male	04	49	0.377
	Female	05	33	
BMI (kg/m2)	≤27	06	38	0.247
	>27	03	44	

p-value ≤0.05 taken as significant.

DISCUSSION

Percutaneous nephrolithotomy (PCNL) is being considered as procedure of choice for large and complex renal calculi and has replaced the open surgical procedures to greater extent.[11] Although PCNL is an endoscopic procedure with higher success rate and minimal complications, however stone free rate is not 100%.[12] Stone size, burden, and location, renal calyceal anatomy and associated hydronephrosis are different parameters which predict the outcome of PCNL. However, when these parameters are used individually, precise outcome of the procedure cannot be predicted.[13] Due to this reason various scoring systems have been invented to predict the outcome of PCNL. These scoring systems are based on preoperative stone size/burden, renal calyceal anatomy and patient's characteristics (age/gender/body built/BMI).[14] Besides prediction of stone free rate, counseling of patient, refinement of procedure and adjustments of various training programs can be managed by these scoring.[15] Various scoring systems have been developed to predict stone free rate and complications. Guy's scoring system, the S.T.O.N.E. scoring system, the S-ReSC Scoring System of the

Seoul National University and the CROES, are among the most commonly applied and evaluated. Guy's scoring is easy to perform, simple and rapid to predict the outcome of PCNL.[16-19] In our study, the percentage of patients with residual stone was 09 (9.89%). 0.0% of GS 1, 12.5% of GS 2, 4.76% of GS 3 patients and 13.33% of GS 4 had residual stone. In a study, 75% of the subjects were GS 1, 21% GS 2 and 3% GS 3. In this study, 66% of GS 3, 4% of GS 2 and 10% of GS had residual stone. [20]Another published series reported residual stones in 70% of GS 1, 65% of GS 2 and 38% of GS 3 persons.[21] Results of our study are comparable with these studies, however with better outcome in present study. Vicentini et al reported rates of 95% and 79 %, 59 % and 41% of stone-free patients in GS1, GS2 GS 3 and GS 4 scoring system respectively in their series involving 147 PCNL patients , and elaborated a significant association of Guy scores and stone-free rate.[13] Kay Thomas evaluated residual stones in 100 patients who underwent PCNL, and found residual stones in 19% of grade I, 28% of grade II, 65% of grade III and 71% of grade IV.[18] Results obtained by Kay Thomas and Vicentini et al are contradictory to the study conducted by Mandal et al[19], who found stone free rate of 0%, 56%, 68%, 74%, for grade 1-4 respectively. As reported in all above mentioned series, Guy's scoring system precisely discriminates between the two endpoints. Guy's scoring system briefly creates two group of grades, good and bad. Grades 1 and 2 are considered as good and grades 3 and 4 are relatively bad group. Our study has age range from 20 - 60 years (mean = 35.64 ± 8.12 years). As the age and clearance of renal stone is concerned there is significant difference in terms of residual stone among two age groups. 29% of patients in age group 41-60 have residual stone as compared to 6% in age group 20-40 years(p-<0.021). In a study conducted by Rahul Gupta there is no difference in different age groups as far as stone free rate is considered (94% vs 92% respectively in older & young).[22] Most probable causative factor for higher residual stone in the older age group in our study is obesity.[23] No statistically significant difference in terms of residual stone with respect to gender (8% in Male and 13% in Female) and weight (14% in BMI ≤27 and 6% in BMI >27). These results are comparable to other series.[23, 24] The Guy score has been validated externally in a large number of published series. In two separate series by Mandal and Ingimarsson, Guy's scoring system effectively predicted SFR and has been externally validated.[19,25] The Guy score has excellent interobserver reliability.[25]

CONCLUSION

Pre-PCNL Guy's is useful for predicting the residual stone after the procedure. We recommend that this scoring system can be applied routinely in patients undergoing PCNL for pre-operative evaluation of surgical outcome so that patients can be counseled pre-operatively for chances of residual stone.

Disclaimer: This study was a part of dissertation for FCPS part II, a mandatory requirement of eligibility to appear in examination.

Conflict of Interest: None

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Dr. M. Waqas Iqbal	Study design, manuscript writing. Revised and approved the articles. Study design, acquisition of data and manuscript writing. Revised and approved the articles
Dr. Farhan Jamshed	Study design, acquisition of data and manuscript writing. Revised and approved the articles
Dr. Adeen Akram	Study design, acquisition of data, data analysis and interpretation and write up of results
Dr. Nauman Khalid	data analysis and interpretation and write up of results approve the final version of article.
Dr. M. Saifullah	Study design. Revising manuscript critically for important intellectual content and approve the manuscript
Dr. M. Akram Malik	Study design, critically Revising manuscript critically for important intellectual content and approve the manuscript
	All authors are equally accountable for research work and integrity