



## African Journal of Urology

Official journal of the Pan African Urological Surgeon's Association  
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### Stones and Endourology

Original article

# Utility of the Guy's Stone Score in predicting different aspects of percutaneous nephrolithotomy

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Received 25 January 2018; accepted 24 June 2018; Available online xxx

#### KEYWORDS

Guy's scoring system;  
Percutaneous  
nephrolithotomy;  
Stone free rate;  
Complications;  
Modified Clavien

#### Abstract

**Objective:** To evaluate Guy's scoring system (GSS) as a grading system for complexity of kidney stone before percutaneous nephrolithotomy (PCNL) as a predictor for different items of outcome.

**Patients and methods:** Between July 2014 till July 2015, 100 patients with renal stone (s) and candidates for prone PCNL were evaluated and graded by GSS preoperatively. All intraoperative and postoperative data and complications using modified Clavien system were recorded, collected and statistically analyzed in relation to different grades of GSS to evaluate its predictive ability to different items of outcome.

**Results:** Mean age of the patients was  $47.38 \pm 14.6$  years. The patients were distributed in different grades of GSS with no statistically significant difference as mean age, sex, and mean BMI of the patients, stone size and previous renal surgery. There was high statistically significant difference in mean operative time, rate of blood transfusion, and mean number of renal punctures between different Guy's scores, with all of them showed the highest values at GS IV. There was significant correlation between increase in the grade of GS and the need for re-PCNL and auxiliary procedures. The final stone free rate (SFR) was 93% and complication rate was 27% with significant increase in the immediate success rate, SFR, and complication rate with advancement of the grade of GSS.

**Conclusion:** GSS has a positive correlation with SFR, re-treatment rate, need for auxiliary procedure, and rate of complication.

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**Abbreviations:** BMI, body mass index; CIRF, clinically insignificant residual fragments; ESWL, extra corporeal shock wave lithotripsy; GS, Guy score; GSS, Guy's scoring system; IVU, intravenous urography; NCCT, non-contrast enhanced spiral computed tomography; PCNL, percutaneous nephrolithotomy; PUT, plain X ray urinary tract; SFR, stone free rate.

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Peer review under responsibility of Pan African Urological Surgeons' Association.

<https://doi.org/10.1016/j.afju.2018.06.005>

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## Introduction

Percutaneous nephrolithotomy (PCNL) is considered nowadays as a standard endoscopic treatment for large and complex kidney calculi and replacing to a large degree open surgical management of these stones [1]. Despite being a minimally invasive procedure with high stone free rate, PCNL is not devoid of complications and stone free rate is not 100% [2]. Many parameters were used to predict the outcome of the procedure like stone diameter or burden, stone location, association of hydronephrosis, however, when these parameters are used separately, they are not reproducible and do not give precise idea about the outcome [3]. For that reason, nephrolithometric scoring systems were developed based on preoperative data like stone size and site, renal anatomy and patients' conditions to predict the outcome (stone free rate and complications) [4,5]. Defining stone complexity by grading or scoring systems has other benefits beside prediction of the outcome, like patients counseling, adjustment of training program, and monitoring the technical refinement of the procedure [6,7].

Many scoring systems and nomograms are used to predict stone free rate and complication of PCNL like Guy's scoring system [7], the CROES (Clinical Research Office of Endourological Society) nomogram [8], the STONE nephrolithometric scoring system [9], and the S-ReSC Scoring System of the Seoul National University [2]. Guy's scoring system is simple, rapid, and easy to perform scoring system, with good reproducibility with stone free rate (SFR) and complications [7–10]. The current study evaluates the Guy's scoring system not only in predicting the stone free rate and complication like that in most published studies, but also in evaluation of the intraoperative events and the re-treatment rate of the failed cases after PCNL.

## Patients and methods

Between July 2014 till July 2015, 100 patients with renal stone(s) and candidates for PCNL were enrolled in the study, all patients were presented to the outpatient clinic managed by PCNL in the same hospital. All patients were evaluated by careful general and local examination with estimation of the body mass index (BMI), full laboratory examination including complete blood picture, serum biochemistry, coagulation profile and urine culture and sensitivity. In case of positive urine culture, the patients were treated first with proper antibiotic before the procedure. Radiological examination in the form of ultrasound abdomen and pelvis, plain X ray on urinary tract (PUT), and non-contrast enhanced spiral computed tomography (NCCT) were done for all patients. The inclusion criteria of the patients were, renal stone(s) more than 2 cm, and less than 2 cm in case of pelvicalyceal anatomy or body habitus that unfavorable for extra corporeal shock wave lithotripsy (ESWL), or failed ESWL as a primary management for the stone. Patients with uncorrected bleeding disorders, concomitant ureteral calculi in the same side, active urinary tract infection (UTI) and renal impairment were excluded from the study. All patients were informed by the study, details of the surgical procedure, and signed an informed written consent. The study protocol was approved by our university research ethical committee.

### *Preoperative*

Two urology residents revised the NCCT preoperatively and classified each case using the GSS as Guy's I, II, III and IV. When there

was a difference between them in classifying any case, an opinion of a urology consultant was taken (Fig. 1).

### *Intra-operative*

The procedure was performed by the standard prone PCNL technique under general anesthesia by three urology consultants. The data of operative time, number of access (puncture), and need for blood transfusion were recorded.

### *Post-operative*

All patients underwent NCCT in the first post-operative day. The outcome of the treatment was considered stone free if there were no stone at all or clinically insignificant residual fragments (CIRF) less than 4 mm without obstruction, infection or symptoms that would not need any further intervention.

Patients with significant residual stone were subjected to re-treatment by re-PCNL through the same tract or by another puncture within one week. Auxiliary procedures in the form of ESWL were performed for cases with residual stones not amenable for re-PCNL or failed re-PCNL.

The modified Clavien grading system was used to evaluate postoperative complications of PCNL [11].

### *Statistical analysis*

All data were collected and tabulated using SPSS (statistical program for social science version 20) with description of quantitative variables as mean  $\pm$  SD and range, and qualitative variables as number and percent. Chi-square test, Fisher exact test, Unpaired t-test and Mann Whitney Wilcoxon U test were used.

## Results

There was an agreement on classification in a specific GS between the two-urology residents in 84 patients (84%) and the remaining 16 patients were revised by a urology consultant before classification. This disagreement was between GS II and III in 11 cases and in the other 5 cases between GS III and IV.

The mean age of the patients was  $47.38 \pm 14.6$  years, 47 (47%) of them were female, and 53 (53%) were males. According to Guy's scoring system (GSS), patients were stratified into 4 groups as shown in Table 1. Patients and stone characters' stratifications according to GSS are presented in Table 2 and, we found no statistically significant difference as regard mean age, sex, and mean BMI of the patients, stone side, and previous renal surgery in between different scores, however the stone size showed high statistically significant difference with the highest mean stone diameter was in GS IV ( $47.2 \pm 13.4$  mm).

There was high statistically significant difference in mean operative time, rate of blood transfusion, and mean number of renal punctures between different Guy's scores, with all of them showed the highest values at GS IV.

Immediate stone free rate was 77%, there was statistically significant difference regarding immediate stone free rate, between different

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