بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

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Prediction of surgical outcomes as regards stone free rate and complications after percutanous nephrolithotomy using S.T.O.N.E. versus sResc scoring systems

Thesis

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قَالُوا سُبْحَانَكَ لَا عِلْمَ لَنَا إِلَّا مَا عَلَّمْتَنَا إِنَّكَ أَنْتَ الْعَلِيمُ الْحَكِيمُ

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List of Contents

Title	Page No.

List of Tables

Table No.	Title	Page No.

i

List of Figures

List of Abbreviations

Abb.	Full term
AUC	Area under curve
BMI	Body mass index
CCI	Charlson Comorbidity Index
CROES	Clinical Research Office of the Endourologic Society
CT	Computed tomography
DMSA	Dimercaptosuccinic acid
DTPA	Diethylene triamine pentaacetic acid
EBL	Estimated blood loss
ESWl	Extracorporeal shock wave lithotripsy
GSS	Guy's stone score
ICU	Intensive care unit
IVC	Inferior vena cava
IVP	Intravenous pyelography
KUB	kidney, ureter, bladder
NCCT	Non contrast computed tomography
OT	Operative time
PCNL	Percutaneous nephrolithotomy
RIRS	Retrograde intrarenal surgery
RLRV	Retro-aortic left renal vein
ROC	Receiver operating characteristic
SFR	Stone-free rate
SIRS	Systemic inflammatory response syndrome
S-ReSC	Renal Stone Complexity
SWL	Shock wave lithotripsy
UPJ	Ureteropelvic junction
URS	Rigid and flexible ureteroscopy
US	Ultrasonography
UTI	Urinary tract infection

Introduction

Nephrolithiasis is a major worldwide source of morbidity affecting 10-15% of the world population *(Alelign and Petros, 2018).* It is an expanding problem associated with major economic and health consequences. Consistent technical advancements provided surgeons and patients with several options for the treatment of renal calculi, including extracorporeal shock wave lithotripsy (ESWL), percutaneous nephrolithotomy (PCNL), retrograde intrarenal surgery (RIRS), and conventional open surgery *(Scales et al., 2012, Pfau and Knauf, 2016).*

Percutaneous nephrolithotomy (PCNL) is generally considered the gold standard treatment in renal stones >2cm or lower calyceal >1cm offering high stone-free rates after the first treatment compared to the other minimal invasive lithotripsy techniques. However, serious complications although rare could be expected following this percutaneous procedure *(Chung et al., 2019).*

Perioperative bleeding, urine leak from nephrocutaneous tract, pelvicalyceal system injury, and postoperative pain are individually confronted complications after PCNL. Thus a universally accepted scoring system in percutaneous management of nephrolithiasis such as: S.T.O.N.E. nephrolithometry score, and Renal Stone Complexity (S‑ReSC) score have been described to enable appropriate

counselling of patients, expect adverse outcomes, and provide a mean of standardized reporting of stone complexity and patient outcomes *(Basiri et al., 2013; Kyriazis et al., 2014).*

S.T.O.N.E. nephrolithometry score, uses non-contrast-enhanced computed tomography (CT) scans parameters to describe and classify the most relevant features that affect the percutaneous management of renal calculi *(Jeong et al., 2013).* It represents five variables: stone size, tract length, degree of obstruction, number of involved calyces, and stone essence (stone density). On the basis of these variables, a score of 5–13 can be calculated; a higher score correlates with higher stone complexity. A score from 5 to 6 is considered low grade, from 7 to 8 moderate grade and ≥ 9 is high grade *(Noureldin et al., 2015).*

The S‑ReSC scoring system is based solely on stone distribution within the collecting system and does not take into account any patient characteristic *(Okhunov et al., 2013).* They devised the collecting system into 9 locations in which the stone is determined with preoperative CT, with 1 point assigned to each location of the nine. The score up to 9 is assigned by adding the cumulative sites involved. A score of 1 to 2 is considered low, 3 to 4 is medium, and ≥ 5 is high. *(Jeong et al., 2013).*

Aim of the Work

To compare the S.T.O.N.E versus sResc scoring system in prediction of the surgical outcomes; stone free rate and perioperative complications after PCNL.

Chapter 1
Applied Renal Anatomy

The kidneys are paired retroperitoneal structures that are normally located between the transverse processes of T12-L3 vertebrae, with the left kidney typically superior in position than the right. The upper poles are normally oriented more medially and posteriorly than the lower poles *(Kriz and Elger, 2014).*

Renal anatomy:

Grossly, the kidneys are bean-shaped structures and weight about 150 g in the male and about 135 g in the female. They are typically 10-12 cm in length, 5-7 cm in width, and 2-3 cm in thickness *(Marley, 2007).* **(Figure 1)**
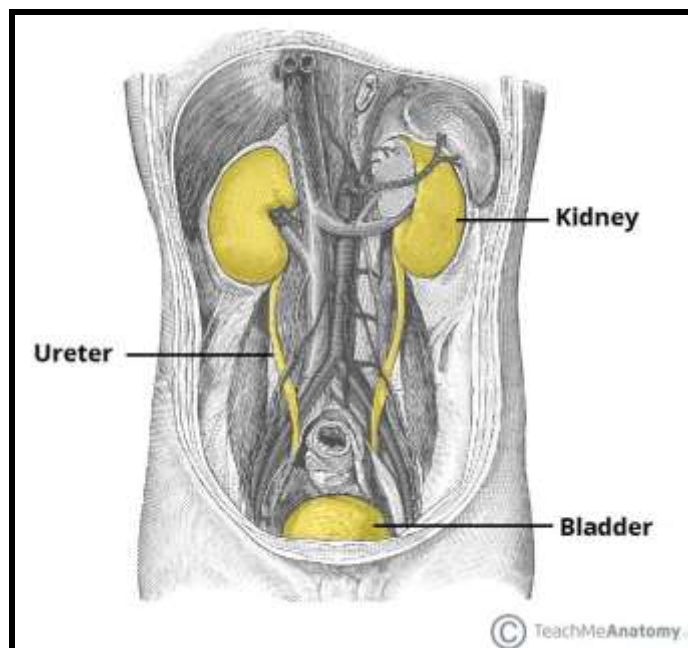

Figure 1: kidney anatomy *(Jones, 2019)*

The kidneys are retroperitoneal organs and, therefore, during an open surgery, one may choose to use an extraperitoneal flank approach, incising over the 11th-12th rib, plus or minus rib excision and staying retroperitoneally. This is particularly useful in obese patients, but not in patients with severe scoliosis or cardiorespiratory disorders, and provides direct access to the retroperitoneal space without traversing the peritoneal cavity *(Kriz and Elger, 2014).*

Relation of the kidneys to the neighboring organs (Figure 2):

Superiorly, the suprarenal (adrenal) glands sit adjacent to the upper pole of each kidney**.**

On the right side, the second part of the duodenum (descending portion) lies on the medial aspect of the kidney, and the liver lies anterior to the upper pole of the kidney and can extend in some individuals to cover the entire anterior surface.

On the left side, the greater curvature of the stomach lies over the superior medial aspect of the kidney, the tail of the pancreas extend to overlie the renal hilum, and the spleen covers small part of the upper pole anteriorly and is connected by the spleno-renal (lienorenal) ligaments**.**

Both the liver and the spleen can extend lateral to the kidney and are therefore at risk of injury with a lateral puncture during PCNL *(Kriz and Elger, 2014).*