Percutaneous Nephrolithotomy (PCNL) versus Retrograde Intrarenal Surgery (RIRS) in Medium Sized Renal Pelvic Stones

A Thesis

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Abdelrahman Ali Ismail Abdallah

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List of Abbreviations

Abb.	Full term
PCNL	**percutaneous nephrolithotomy**
ESWL	**extracorporeal shock wave lithotripsy**
RIRS	**Retrograde intrarenal surgery**
UPJ	**Uretropelvic junction**
UVJ	**Uretrovesical junction**
UTI	**Urinary tract infection**
URS	**Uretrorenoscopy**
Ca Ox	**Calcium oxalate**
Ca p	**Calcium phosphate**
HIV	**Human immunosuppression virus**
PTH	**Parathiroid hormone**
PUT	**Plain X ray of urinary tract**
U/S	**Ultrasonography**
NC-CT	**Non contrast computed tomography**
3D	**3 dimention**
HU	**Hounsfield units**
AUA	**American urology association**
EAU	**European association of urology**
IVP	**Intravenous pyelogram**
MRU	**Magnetic resonant uorogram**
MET	**Medical expulsive therapy**
PDE5	**Phosphodiesterase type 5**
BMI	**Body mass index**
EGA	**Endoscopic guidance access**
TAE	**Transcatheter arterial emboliztion**
AVF	**Arteriovenous fistula**
UAS	**Uretral access sheath**

INTRODUCTION

Urolithiasis is a common disease that affects urinary tract in all age groups. Both in adults and in children, stone size, location, renal anatomy, and other factors can influence the success of treatment modalities ***(Mehmet et al., 2015).***

At present, the treatment of kidney stones has changed from open surgery to minimally invasive surgery, including extracorporeal shock wave lithotripsy (ESWL), percutaneous nephrolithotomy (PCNL) and retrograde intrarenal surgery (RIRS) ***(Srisubat et al., 2015)***.

RIRS was first reported for the treatment of small kidney stones in 2002. In recent years, urologists also suggested using this approach to treat large stones, because of the fewer complications and reduced morbidity ***(li et al., 2018)***.

RIRS is advantageous in its minimal invasiveness, safety, rapid recovery and high efficiency as it is a natural orifice performed under direct vision. It is extremely effective for stones that are ≤2 cm in diameter and complex kidney stones, and suitable for elderly patients, obese patients, patients with hemorrhagic disorders and patients that are not suitable for ESWL or PCNL ***(Hassan et al., 2015)***.

Retrograde Intra Renal Surgery (RIRS) is included among the first line treatments for kidney stones between 1 and 2 cm, but could be proposed as a viable alternative therapy to PCNL for stones larger than 2 cm in special groups of high-risk patients (e.g. those with bleeding disorders, obesity, renal congenital abnormalities, or solitary kidney) ***(Al-Qahtani et al., 2012)***.

ESWL is preferred for stones >1 cm, while PCNL for stones <2 cm. But the management of stones of 1-2 cm is still controversial ***(Srivastava et al., 2013).***

Aim of the Work

To assess the safety of percutaneous nephrolithotomy (PCNL) and retrograde intrarenal surgery (RIRS) for the management of renal pelvic stones 1-2cm as regard stone free rate, complications, operative time, need for retreatment and hospital stay

Chapter 1

ANATOMY

The kidneys are bean-shaped organs weighing anywhere from 150 to 200 g in males and about 120 to 135 g in females. The dimensions are usually a length of 10 to 12 cm, a width of 5 to 7cm, and the thickness varies from 3 to 5 cm. Each kidney is about the size of a closed fist. They are located retroperitoneally in the posterior abdominal wall and are found between the transverse processes of T12 and L3. Both of the upper poles are usually oriented slightly medially and posteriorly to the lower poles. If the upper renal poles are oriented laterally, this could suggest a horseshoe kidney or a superior pole renal mass. Further, the left kidney is usually slightly more superior in position than the right kidney. ***(Coccolini et al., 2018)***

Figure (1): Posterior view of the abdominal region of a woman with projections of the kidneys and ureters.

Kidney Relationships:

The following are the relation of the kidneys to the surrounding organs: ***(Soriano and Leslie, 2019)***

- Superiorly, on top of each kidney, are the suprarenal glands.
- The medial aspect of the right kidney is adjacent to the second part of the duodenum.
- The tail of the pancreas lies medial to the left renal hilum.
- The greater curvature of the stomach may extend over the superomedial aspect of the left kidney.

- The upper pole of the left kidney is located adjacent to the spleen and attached to it by the lienorenal ligaments.
- The colon rests anterior to both kidneys.

Posteriorly, the diaphragm rests over the upper third of each kidney with the 12th rib frequently passing over (anteriorly) the upper pole. The kidneys located over the medial aspect of the psoas muscle and the lateral aspect of the quadratus lumborum muscle. The proximal ureters will typically pass over the psoas muscle on their way to the bony pelvis ***(Soriano and Leslie, 2019): Figure (2)***

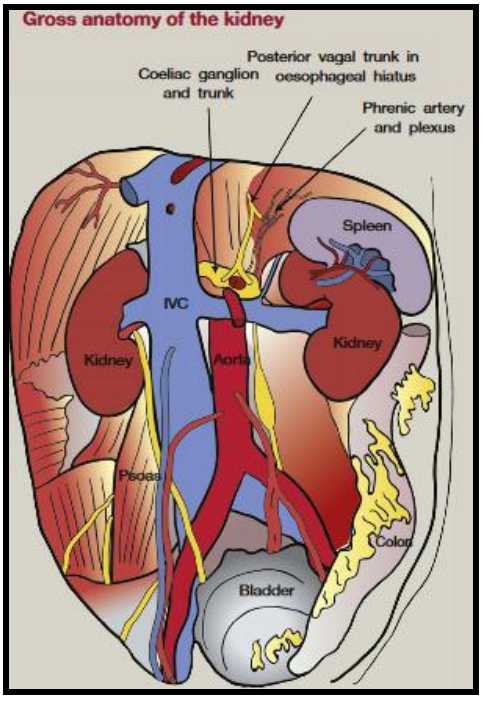

Figure (2): Gross anatomy of the kidney

Pelvicalyceal System:

Renal parenchyma basically consists of two kinds of tissue the cortex and medulla. The cortical tissue is made up of the glomeruli with proximal and distal convoluted tubules. The renal pyramids are made up of loops of Henle and collecting ducts; these ducts join to form the papillary ducts (about20), which open at the papillary surface and drain urine into the collecting system. A minor calyx is defined as the calyx which is in an immediate relation to a papilla ***(Kaye and Goldberg, 1982)***

The renal minor calyces drain the renal papillae and range in number from 5 to 14 minor calyces (mean, 8). A minor calyx may be single (drains one papilla) or compound (drains two or three papillae). The minor calyces may drain straight into an infundibulum or join to form major calyces, which subsequently will drain into an infundibulum. Finally, the infundibula, which are considered the primary divisions of the pelvicalyceal system, drain into the renal pelvis. ***(Kaye and Goldberg, 1982)*** **Figure (3)**