



شبكة المعلومات الجامعية  
التوثيق الإلكتروني والميكروفيلم

# بسم الله الرحمن الرحيم



**MONA MAGHRABY**



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# شبكة المعلومات الجامعية التوثيق الإلكتروني والميكروفيلم



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# جامعة عين شمس

## التوثيق الإلكتروني والميكروفيلم

### قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها  
علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات



### يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار



**MONA MAGHRABY**



# **Comparative Study between Pneumatic and Holmium Laser Lithotripsy in Treatment of Ureteric Stones**

*Thesis*

*Submitted for Partial Fulfillment of Master Degree in Urology*

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# *List of Contents*

Title	Page No.
List of Tables.....	i
List of Figures .....	ii
List of Abbreviations.....	iv
Introduction .....	1
Aim of the Study .....	4
Review of Literature	
Anatomy of the Kidney and Ureter .....	5
Urolithiasis.....	11
Ureteroscopy.....	22
Lithotripsy Devices .....	36
Materials and Methods.....	45
Results.....	64
Discussion .....	75
Summary and Conclusion .....	79
References .....	78
Arabic Summary .....	—

# *List of Tables*

Table No.	Title	Page No.
<b>Table (1):</b>	X-ray characteristics of the stones .....	13
<b>Table (2):</b>	Stone composition .....	15
<b>Table (3):</b>	High risk stone formers .....	16
<b>Table (4):</b>	ASA PS classification.....	46
<b>Table (5):</b>	Hydronephrosis classification.....	47
<b>Table (6):</b>	Clavien-Dindo grading of surgical complications.....	58
<b>Table (7):</b>	Comparison between two groups regarding demographic data.....	61
<b>Table (8):</b>	Comparison between two groups as regard stone location, mean number of stones and mean stone burden.....	63
<b>Table (9):</b>	Comparison between two groups as regard mean operative period (MOP) and Hospital Stay (HS) .....	65
<b>Table (10):</b>	Comparison between two groups as regard JJ. Application, & intraoperative complication (Mucosa Injury, Stone Migration and Perforation Avulsion). .....	67
<b>Table (11):</b>	Comparison between two groups as regard ESFR and LSFR.....	69
<b>Table (12):</b>	Comparison between two groups as regard postoperative complications (hematuria, stricture, fever and LUTS).....	70

# *List of Figures*

Fig. No.	Title	Page No.
<b>Figure (1):</b>	Intra renal structure of kidney .....	6
<b>Figure (2):</b>	Representation of the possible minor calyx (mc) arrangements .....	7
<b>Figure (3):</b>	The ureter demonstrating sites of normal functional or anatomic narrowing at the ureteropelvic junction (UPJ) the iliac vessels, and the ureterovesical junction (UVJ).....	9
<b>Figure (4):</b>	Top, 5 Fr open-ended ureteral catheter.....	25
<b>Figure (5):</b>	Facial Dilators .....	27
<b>Figure (6):</b>	One-step ureteral balloon dilator (white) attached to a locking screw syringe (white) .....	28
<b>Figure (7):</b>	Ureteromat .....	29
<b>Figure (8):</b>	Modern semirigid ureteroscope with separate working/irrigation channels .....	30
<b>Figure (9):</b>	Modern semirigid ureteroscope with separate working/irrigation channels .....	31
<b>Figure (10):</b>	Flexible ureteroscope .....	32
<b>Figure (11):</b>	Flexible ureteroscopes with standard primary deflection (above) and exaggerated primary deflection (below) .....	33
<b>Figure (12):</b>	Various types of forceps and baskets.....	34
<b>Figure (13):</b>	Pneumatic lithotripsy.....	36
<b>Figure (14):</b>	Cystoscopy with 22 Fr and 25 Fr sheath.....	48
<b>Figure (15):</b>	Semirigid ureteroscopy .....	49
<b>Figure (16):</b>	Flexible ureteroscopy. ....	49
<b>Figure (17):</b>	Different guidewires.....	50
<b>Figure (18):</b>	Teflon sequential dilators. ....	51



## *List of Figures Cont...*

Fig. No.	Title	Page No.
<b>Figure (19):</b>	Balloon dilator. ....	51
<b>Figure (20):</b>	JJ catheter. ....	52
<b>Figure (21):</b>	Ureteric catheter. ....	52
<b>Figure (22):</b>	Laser fiber.....	53
<b>Figure (23):</b>	Ureteral access sheath .....	53
<b>Figure (24):</b>	Comparison between two groups regarding mean age.....	62
<b>Figure (25):</b>	Comparison between two groups regarding gender. ....	62
<b>Figure (26):</b>	Comparison between two groups as regard stone location.....	64
<b>Figure (27):</b>	Comparison between two groups as regard mean number of stones and mean stone burden.....	64
<b>Figure (28):</b>	Comparison between two groups as regard MOP.....	66
<b>Figure (29):</b>	Comparison between two groups as regard HS. ....	66
<b>Figure (30):</b>	Comparison between two groups as regard JJ. Application, & intraoperative complication (Mucosa Injury, Stone Migration and Perforation Avulsion). ....	68
<b>Figure (31):</b>	Comparison between two groups as regard ESFR and LSFR. ....	69
<b>Figure (32):</b>	Comparison between two groups as regard postoperative complications (hematuria, stricture, fever and LUTS).....	71

# *List of Abbreviations*

Abb.	Meaning
ANOVA.....	A one-way analysis of variance
BMI.....	Body mass index
BUN.....	Blood urea nitrogen
CBC .....	Complete blood count
CRP.....	C-reactive protein
CTUT.....	Computed tomography urinary tract
EHLs.....	Electrohydraulic lithotriptors
ESFR .....	Early stone free rate
ESWL .....	Extra corporeal shock wave lithotripsy
HFU .....	Hounsfield unit
Ho: YAG.....	Holmium: yttrium aluminum garnet
KUB.....	Kidney-ureter-bladder
LL .....	Laser lithotripsy
LSFR.....	Late stone free rate.
MET.....	Medical expulsive therapy
NCCT.....	Non-contrast-enhanced computer tomography
NSAIDs .....	Nonsteroidal anti-inflammatory drugs
PCNL.....	Percutaneous nephrolithotomy
PH.....	Primary hyperoxaluria
PLs.....	Pneumatic lithotriptors
PS .....	Physical status
PTFE .....	Polytetrafluoroethylene
RIRS .....	Retrograde intrarenal surgery
RTA.....	Renal tubular acidosis
SD .....	Stander deviation
SFRs .....	Stone free rates

## *List of Abbreviations Cont...*

Abb.	Meaning
SPSS .....	Statistical Program for Social Science
ULs .....	Ultrasonic lithotriptors
UPJ .....	Ureteropelvic junction
URS .....	Ureterorenoscope
US .....	Ultrasound
UVJ .....	Ureterovesical junction

# INTRODUCTION

Urolithiasis is a very common and complex disease which needs a lot of researches to understand its epidemiology, pathogenesis, and management (*Johnson et al., 1979*).

Urinary tract stone disease incidence differs between countries due to genetic, dietary and climatic factors. Incidence varies from 1 – 20 %. And lifetime prevalence differ between male and female (12% and 6% respectively) (*Trinchieri et al., 2003*).

Urinary stones may be found at any part of urinary tract (kidney, ureter, bladder and even urethra). Stone site and other factors affect the decision to choose a treatment modality. The treatment modalities for stones in upper ureter and kidney are extra corporeal shock wave lithotripsy (ESWL), ureterorenoscope (URS), percutaneous nephrolithotomy (PCNL) and open or laparoscopic surgery (*Tiselius et al., 2001*).

Technological improvement in tools of retrograde intrarenal surgery (RIRS) as flexible, semirigid ureteroscopes and lithotripsies improves techniques and successes of RIRS (*Wickham, 1993*).

Ureterorenoscope is a less invasive modality of treatment that used for ureteric or renal stones. It may be used antegrade or retrograde. Nowadays semirigid ureteroscope can be used to treat all ureteric stones but flexible ureteroscope is preferred due to improvement in its technology, quality and tools (*Troy et al., 2004*).

Stones that can't be extracted directly by forceps and baskets must be disintegrated by lithotripsies. There are many types of lithotripsies as Electrohydraulic lithotripsy, Pneumatic lithotripsy, Ultrasonic lithotripsy and laser lithotripsy each have their advantages and disadvantages (*Santa-Cruz et al., 1998*).

Laser is abbreviation to Light Amplification by Stimulated Emission of Radiation. Laser energy is absorbed and converted to heat producing its effect. Laser lithotripsy used in urology since 1990s. Complications of laser lithotripsy with ureterorenoscope are generally due to the technique itself but not the laser, however ureteral perforation noted (*Parsons et al., 1966*).

Holmium: yttrium aluminum garnet (Ho: YAG) laser is the most commonly used laser for lithotripsy nowadays. It has photothermal mechanism of action and its energy absorbed by water (*Vassar et al., 1999*) with wavelength 2140 nm and tissue penetration 400  $\mu\text{m}$  (*Van Iersel et al., 1996*).

It is the preferred laser as it is the most effective. Ho: YAG laser is used with all ureteroscopes as it has small fibers. It can fragment all stones with different compositions and hardness (HFU) in all sites of urinary tract. Also it has the advantages of less need to anti-migration devices (*Sofer et al., 2002*).

Ho: YAG laser not only used for urinary tract lithotripsy but also used for treatment of various urological (*Yamada et al., 2003; Yamada et al., 2001; Krambeck et al., 2010*) and non-urological diseases (*Ponsky et al., 2001; Teichman et al., 2001*) as it cases cutting and coagulation to tissues at the same time.

Laser settings or techniques are an important issue of researches as with increased pulse energy many disadvantages appear.

Stone dusting is to convert stone to tiny fragments or dust by decreasing energy and varying frequency to allow these tiny fragments to pass spontaneously.

Laser fibers are damaged with energy  $> 1$  J due to thermal effect (*Vassar et al., 1999; Spore et al., 1999*). Fragment size is a challenging problem to urologists as it correlate or affect stone free rates (SFRs), as small fragment size result in high SFRs (*Sea et al 2012*). Stone retropulsion or migration increases with high energy.

Several studies were done using different laser settings. But all suggest that energy  $< 1$  J result in small fragment size, decrease migration and decrease laser fiber damage (*Vassar et al., 1999*).

## **AIM OF THE STUDY**

**T**he aim of this study was to compare the efficacy & safety of holmium laser and pneumatic lithotripsy used in the ureteroscopic treatment of ureteral stones.