

بسم الله الرحمن الرحيم





شبكة المعلومات الجامعية التوثيق الالكتروني والميكرو فيلم



جامعة عين شمس

التوثيق الإلكتروني والميكرو فيلم

قسم

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



يجب أن

تحتفظ هذه الأقراص المدمجة بعيدا عن الغبار



A Comparative study of Robot-Assisted Laparoscopic Intracorporeal Versus Open Urinary Diversion

Thesis

*Submitted in Partial Fulfillment of M.D Degree
in Urology*

By

Mahmoud Ibrahim Mahmoud Khalil

M.B.Bch., M.Sc. of Urology

Supervised by

Prof. Mohamed Sherif Mohamed Adel Mourad

Professor of Urology

Faculty of Medicine - Ain Shams University

Dr. Khaled Mokhtar Kamal

Assistant Professor of Urology

Faculty of Medicine - Ain Shams University

Dr. Ehab Abdallah Eltahawy

Assistant Professor of Urology

University of Arkansas for Medical Sciences (UAMS)

Little rock, Arkansas, United States of America

Dr. Mohamed Hamdy Ibrahim Kamel

Assistant Professor of Urology

University of Arkansas for Medical Sciences (UAMS)

Little rock, Arkansas, United States of America

Dr. Ahmed Farouk Mahmoud

Assistant Professor of Urology

Faculty of Medicine - Ain Shams University

Faculty of Medicine - Ain Shams University

2021

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قالوا

سببنا نك لا علم لنا
إلا ما علمتنا إنك أنت
العليم العظيم

صدق الله العظيم

سورة البقرة الآية: ٣٢

Acknowledgment

First of all, I would like to thank “ALLAH”, the most kind and the most merciful giving me the power, patience and persistence to accomplish this work regardless all difficulties.

*I would like to thank **Prof. Sherif Mourad**; Professor of Urology, Ain Shams University for his continuous understanding, encouragement and support. I also appreciate the efforts of **Dr. Ahmed Farouk**; lecturer of urology, Ain Shams university for his helpful advice and precious time.*

*I would like to express my deepest gratitude and great respect to **Dr. Khaled Mokhtar Kamal**, Assistant Professor of Urology, Faculty of Medicine, Ain Shams University, under his supervision I had the honor and pleasure to proceed with work. His constant guidance encouragement and foresight made all the difference for me. May Allah be pleased with him and grant him the highest level in Gannah, Amen.*

*I am also grateful to **Dr. Mohamed Kamel**, associate professor of urology, University of Arkansas for medical sciences, and **Dr. Ehab Eltahawy**, Associate Professor of Urology, University of Arkansas for medical sciences for allowing me to complete my study at the University of Arkansas for medical sciences. I am thankful for their support and sincere guidance throughout the study.*

*Finally, I would like to express my profound gratitude to my family; my father; **Dr. Ibrahim Khalil**, my mother; **Dr. Samia Abdelfattah**, my wife; **Dr. Amira Elhariry** and my kids; **Mariam, Yahia and Noor** for their continuous encouragement and support.*

Mahmoud Khalil

List of Contents

Title	Page No.
List of Tables	i
List of Figures	ii
List of Abbreviations.....	v
Introduction	1
Aim of the Work.....	4
Review of Literature	
▪ History and Advantages of Robotic Surgery	5
▪ Robot-Assisted Laparoscopic Urinary Diversion.....	24
▪ Urinary Diversion: Considerations and Complications ...	48
Patients and Methods.....	98
Results	124
Discussion	153
Summary and Conclusion.....	174
References	176
Arabic Summary	

List of Tables

Table No.	Title	Page No.
Table (1):	An enhanced recovery after surgery for radical cystectomy ± Neobladder focusing on reduced bowel preparation and standardized feeding and analgesic regimens.	27
Table (2):	Illustration of American Society of Anesthesiologists (ASA) Score	104
Table (3):	Clavien Dindo Classification.....	122
Table (4):	Patient demographics.....	125
Table (5):	Complications according to the organ system involved.....	146
Table (6):	Pathological outcomes of the study cancer patients.	148
Table (7):	Binary logistic regression analysis for predictors of postoperative complications among the studied cohort	152

List of Figures

Fig. No.	Title	Page No.
Figure (1):	a Modern reconstruction of da Vinci's robot. b Mandolin- playing lady.....	7
Figure (2):	PUMA robot.....	9
Figure (3):	a AESOP. b Zeus robot	12
Figure (4):	da Vinci Surgical System ©[2009] Intuitive Surgical, Inc.	16
Figure (5):	Picture of single-port specific robotic instruments.....	21
Figure (6):	Illustration of single-port robotic instruments at work in a patient.....	22
Figure (7):	Key aspects of ERAS protocols	30
Figure (8):	Position of patient during the robotic cystectomy	33
Figure (9):	Different robotic instruments	34
Figure (10):	Goh and colleagues port placement.....	35
Figure (11):	City of Hope port placement (A)assistant trocar, (R) = robotic trocar, (C)camera trocar	36
Figure (12):	Karolinska group port placement	36
Figure (13):	Pruthi and colleagues port placement	36
Figure (14):	Use of a chest tube to assist with detubularization of bowel	39
Figure (15):	Karolinska-modified Studer neobladder	42
Figure (16):	University of Southern California– modified Studer neobladder	43
Figure (17):	Pyramid neobladder.....	44
Figure (18):	Y-pouch neobladder.....	45
Figure (19):	Coronal CT image shows dilated fluid- filled small-bowel loops with a moderately collapsed distal ileum and colon, but does not depict the cause of obstruction	65
Figure (20):	Enterocutaneous fistula.....	66

List of Figures (cont...)

Fig. No.	Title	Page No.
Figure (21):	Ileal conduit 11 years after construction. Shrunken, thick walled conduit 11 years after reconstruction.....	67
Figure (22):	Stomal necrosis	69
Figure (23):	CT image shows parastomal herniation and intestinal obstruction after the creation of an ileal conduit	70
Figure (24):	Stomal stenosis	71
Figure (25):	Stoma, or abdominal wall-related, changes	73
Figure (26):	Urinary leakage	75
Figure (27):	Benign ureteral stricture in a 54-year-old man after Studer-type neobladder construction	77
Figure (28):	Unenhanced CT image obtained in a 59- year-old man 1 year after neobladder construction shows calculus in the reservoir.....	88
Figure (29):	Multiple calculi in a 78-year-old man 1 year after cystectomy and urinary diversion with ileal conduit creation.....	88
Figure (30):	Urinoma in a 61-year-old man 18 days after cystectomy and urinary diversion with the Bricker procedure	92
Figure (31):	Hematoma in a 66-year-old man 7 days after cystectomy and urinary diversion with creation of an ileal conduit.....	93
Figure (32):	Typical lymphocele in a 59-year-old man 1 month after cystectomy with lymphadenectomy and ileal conduit creation for treatment of bladder carcinoma	94
Figure (33):	Female patient on the OR table with mark of stoma location.....	108

List of Figures (cont...)

Fig. No.	Title	Page No.
Figure (34):	Ports locations just before docking of the robot.....	109
Figure (35):	Intraoperative picture showing robotic arms after docking and connections just before starting surgery (patient head on the right side of the picture)	110
Figure (36):	OR picture showing the surgeon at the robotic console and the scrubbed assistant during surgery.....	111
Figure (37):	Pulling the ileal conduit stoma by Babcock clamp after undocking of the Robot.....	112
Figure (38):	Picture showing the abdomen of the patient just after surgery.....	113
Figure (39):	Drain site and stoma appliance after placement	113
Figure (40):	V- Loc suture	118
Figure (41):	Type of urinary diversion in both groups.....	124
Figure (42):	Difference of mean age of patients in both groups.....	127
Figure (43):	Gender distribution in both groups.....	127
Figure (44):	Ethnicity differences in both groups	128
Figure (45):	ASA score recorded in both groups.....	130
Figure (46):	Preoperative diagnosis in both groups	131
Figure (47):	Concurrent surgical procedures in both groups.....	136
Figure (48):	Stapled vaginal vesicostomy. The anvil of a 60 cm GIA stapler is placed into the urethra and the other arm of the stapler into the vagina	140
Figure (49):	PICC line	142

List of Abbreviations

Abb.	Full term
<i>AKI.....</i>	<i>Acute kidney injury</i>
<i>ASA.....</i>	<i>American society of anesthesiologist</i>
<i>ASIS</i>	<i>Anterior superior iliac spine</i>
<i>BMI.....</i>	<i>Body mass index</i>
<i>CBC</i>	<i>Complete blood count</i>
<i>CT.....</i>	<i>Computed tomography</i>
<i>DVC</i>	<i>Dorsal vein complex</i>
<i>ERAS</i>	<i>Enhanced recovery after surgery</i>
<i>GCS</i>	<i>Glasgow coma scale</i>
<i>ICIC.....</i>	<i>Intracorporeal ileal conduit</i>
<i>ICNB.....</i>	<i>Intracorporeal neobladder</i>
<i>ICUD</i>	<i>Intracorporeal urinary diversion</i>
<i>IPSS.....</i>	<i>International prostate symptom score</i>
<i>IR.....</i>	<i>Interventional radiology</i>
<i>LOS.....</i>	<i>Length of stay</i>
<i>MBP.....</i>	<i>Mechanical bowel preparation</i>
<i>MICU.....</i>	<i>Medical intensive care unit</i>
<i>MSK.....</i>	<i>Memorial Sloan Kettering</i>
<i>NBM</i>	<i>Nothing by mouth</i>
<i>NCDB</i>	<i>National cancer database</i>
<i>ORC</i>	<i>Open radical cystectomy</i>
<i>PLND.....</i>	<i>Pelvic lymph node dissection</i>
<i>QOL</i>	<i>Quality of life</i>

List of Abbreviations (Cont...)

Abb.	Full term
<i>RARC</i>	<i>Robotic assisted radical cystectomy</i>
<i>RC</i>	<i>Radical cystectomy</i>
<i>RCTs</i>	<i>Randomized controlled trials</i>
<i>RHQOL</i>	<i>Health related quality of life</i>
<i>RLESS</i>	<i>Robotic laparoendoscopic single site</i>
<i>SCC</i>	<i>Squamous cell carcinoma</i>
<i>SHIM</i>	<i>Sexual health inventory for men</i>
<i>SICU</i>	<i>Surgical intensive care unit</i>
<i>SMs</i>	<i>Surgical margins</i>
<i>TAP block</i>	<i>Transversus abdominus plane block</i>
<i>TCC</i>	<i>Transitional cell carcinoma</i>
<i>UAMS</i>	<i>University of Arkansas for medical sciences</i>
<i>UCS</i>	<i>Uretero-cutaneousotomy</i>
<i>UIA</i>	<i>Uretero-ileal anastomosis</i>
<i>UTI</i>	<i>Urinary tract infection</i>

INTRODUCTION

Urinary tract reconstruction aiming to urine diversion after radical cystectomy for bladder cancer represents a complex process that attempts to maximize health-related quality of life (HRQOL) for patients after surgery (*Gschwend, 2003*).

Open radical cystectomy (ORC) remains the gold standard treatment of localized muscle invasive bladder cancer and high-risk non-muscle-invasive bladder cancer, however, the use of a minimally invasive approach is advocated to reduce the morbidity and mortality associated with the open technique (*Huang and Stein, 2007*).

Robotic surgery is being increasingly used in the treatment of high grade invasive urothelial carcinoma that requires radical cystectomy. Surrogate pathologic and early follow-up data from multiple centers suggest that the robotic approach may provide oncologic equivalence to open surgery (*Hellenthal et al., 2010*).

Use of robotic technology allows the surgeon to perform delicate operative steps in the confined pelvic space with precision and accuracy; steps that may be difficult to perform with open or conventional laparoscopic approach (*Rehman et al., 2011*).

Since over a decade, Menon and colleagues reported the first robot-assisted radical cystectomy (RARC). This development was much anticipated after the success of robotic technology for performing radical prostatectomy (*Menon et al., 2003*).

Robotic cystectomy and intracorporeal urinary diversion is technically challenging. Therefore, many surgeons are still adopting the hybrid approach when performing the cystectomy using robotic assistance and completing the urinary diversions extracorporeally to shorten the operating time. Wiklund and associates have pioneered the technique of intracorporeal urinary diversion creating both neobladders and ileal conduits completely intracorporeally (*Jonsson et al., 2011*).

Equally, Desai and Gill presented remarkable outcomes using a modification of the aforementioned technique (*Goh et al., 2012*).

In addition, the 10-times magnification and EndoWrist technology provide an ideal platform to perform an intracorporeal urinary diversion, which would allow the procedure to be performed in a minimally invasive way, and may eventually reduce the complications of a morbid procedure. Soon after RARC, the first robot-assisted intracorporeal neobladder was reported by Beecken and colleagues (*Beecken et al., 2003*).

Despite an early report of intracorporeal urinary diversion (ICUD), it was selectively performed. Increase in operative time, lack of expertise with the new technology, and