



Laser Ablation of Non-Muscle Invasive Bladder Tumors; Any Advantage Over Standard Resection Prospective Comparative Study

Thesis

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قَالَ

لَسْبَدَانِكَ لَا مَلِمَ لَنَا
إِلَّا مَا مَلَمْتَنَا إِنَّكَ أَنْتَ
الْعَلِيمُ الْعَظِيمُ

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List of Abbreviations

Abb.	Full term
µm.....	Micrometer
ALA.....	Aminolaevulinic acid
AUA.....	American Urological Association
BCG.....	Bacille Calmette-Guerin
BPE.....	Benign prostatic enlargement
BPH.....	Benign prostatic hyperplasia
CIS.....	Carcinoma in situ
CT.....	Computed tomography
CTURBT.....	Conventional transurethral resection of bladder tumor
DNA.....	Deoxyribonucleic acid
DRE.....	Digital rectal examination.
EAU.....	European Association of Urology
EORTC.....	European Organization for Research and Treatment of Cancer
Er:YAG.....	Erbium yttrium–aluminum–garnet
ESWL.....	Extracorporeal shock wave lithotripsy
F.....	French
FDA.....	Food and Drug Administration
FISH.....	Fluorescence in situ hybridization.
FLA.....	Focal laser ablation
HAL.....	Hexaminolaevulinic acid
HG.....	High grade
HIV.....	Human immunodeficiency virus
Ho: YAG.....	Holmium yttrium aluminum garnet
HoLEP.....	Holmium laser enucleation of the prostate
KTP.....	Potassium titanyl phosphate
LASER.....	Light amplification by stimulated emission of radiation
LBO.....	Lithium Triborate

List of Abbreviations Cont...

Abb.	Full term
LG	Low grade
MIBC	Muscle invasive bladder cancer
MMC	Mitomycin C
MRI	Magnetic resonance imaging
NBI	Narrowband imaging
Nd:YAG	Neodymium-doped yttrium aluminum garnet
Nm	Nanometer
NMIBC	Non-muscle invasive bladder cancer
NOS	Not Otherwise Specified
NOTES	Natural Orifice Transluminal Endoscopic Surgery
PCa	Prostate cancer
PET	Positron emission tomography
PFS	Progression-free survival
pH	Power of hydrogen
PSA	Prostatic specific antigen.
PUNLMP	Papillary urothelial neoplasm of low grade potential
PVP	Photoselective vaporization of the prostate
QH	Quartz head contact fiber
RFS	Recurrence-free survival
SD	Standard deviation
TCC	Transitional cell cancer
Thu:YAG	Tm: YAG: Thulium yttrium aluminum garnet
ThuLEP	Tm: YAG transurethral anatomical laser enucleation of the prostate
ThuVARP	Tm: YAG vaporesction of the prostate
ThuVEP	Tm: YAG vapoenucleation of the prostate
Tis	Tumor in situ
TNM	Tumor, lymph node, metastases.

List of Abbreviations Cont...

Abb.	Full term
TUR	Transurethral resection
TURBT	Transurethral resection of bladder tumor
TURP	Transurethral resection of the prostate
UPJO	Ureteropelvic junction obstruction
VLAP	Visual laser ablation of the prostate
W.....	Watts
WHO	World Health Organization
YAG	Yttrium aluminum garnet

INTRODUCTION

Urinary bladder tumors is one of the commonest diseases in genitourinary system. About 549393 new bladder cancer cases have been diagnosed all over the world in 2018, with 199922 cases estimated cancer related death. In other words, bladder cancer accounts around 7% of new cancer diagnoses and 4% of new estimated deaths in men (*Bray et al., 2018*).

About 75% of all newly diagnosed cases per year, tumors are confined to the mucosa (Ta, CIS) or submucosa (T1), called non-muscle-invasive bladder cancer (NMIBC) (*Babjuk et al., 2013*).

The prevalence of Non-muscle invasive bladder cancer (NMIBC) is higher because of long term survival of most cases, and lower risk of cancer linked mortality compared to muscle invasive bladder cancer (MIBC) (*Ferlay et al., 2012; Burger et al., 2013*).

For non-muscle invasive bladder cancer (NMIBC), conventional transurethral resection of bladder tumor (TURBT) combined with Bacille Calmette-Guerin (BCG) and or intravesical chemotherapy is the standard treatment (*Böhle et al., 2017*).

The recurrence rate of NMIBC is still as high as 50–70%, and 5–25% of cases progress to muscle-invasive bladder tumor after repeated recurrence (*Muto et al., 2014*).

Therefore, we need to comprehensively reduce the recurrence rate in NMIBC patients and prolong the time to tumor recurrence (*Comploj et al., 2014*).

First attempts to use laser in bladder cancer therapy were published by Staehler and Hofstetter in 1979. However, first large report on laser use in bladder cancer therapy was published by Beer in 1989 (*Beer et al., 1989*).

Despite promising outcomes, this method was abandoned for years. The reason for that might be possible bowel injury while using deep penetrating Nd:YAG laser. Nowadays with introduction of new devices, laser resection techniques for bladder tumor are coming back (*Yang et al., 2020*).

AIM OF THE WORK

We aim to evaluate the safety and efficacy of laser ablation of the tumor bed after resection of non-muscle invasive urothelial carcinoma of the urinary bladder. The 1st end point is detection the recurrence or progression of the tumor in comparison to resection without laser ablation. The 2nd end point is the postoperative complication.