TRANSURETHRAL RESECTION OF BLADDER TUMOR (TURBT)

CHALLENGES AND OPPORTUNITIES

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- No conflicts of interest

1. INTRODUCTION

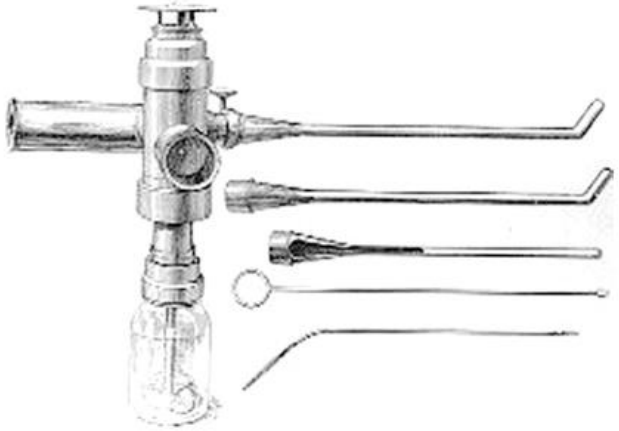
1.1. HISTORY

1.2. MODERN TURBT

1.3. ‘STANDARD TECHNIQUE’

1.1. HISTORY

- **1853**: first description of a transurethral procedure for treating bladder tumors (*Desormeaux* extracted a papilloma through the urethra using his urethroscope)
- **1923**: introduction of resectoscope by *Sterne* and its improvement by *McCarthy* adding a cutting loop (that was able to resect and not only fulgurate tumors)
- **1939**: *Nesbit* modification, allowing the loop to extend 1 cm beyond the beak of the resectoscope



Desormeaux and its urethroscope

Sterne-McCarthy resectocope

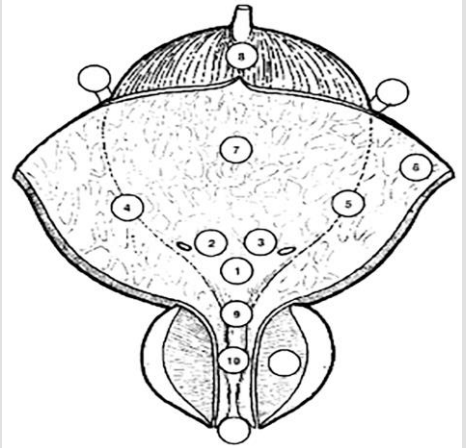
1.2. MODERN TURBT

MAIN GOALS

1. to **resect completely** and accurately all visible tumors (visually complete resection, observation of muscle at the resection base)
2. to **provide muscularis propria** of all tumors for histopathology analysis (en bloc resection or separate specimens for dome and base of tumors)
3. to **send proper tissues** to pathologists, allowing them to stage and grade BCa (avoidance of electrocautery damage as much as possible)
4. to establish important clinical **prognostic factors**, such as number, size, and configuration of tumors.
5. to **avoid complications**

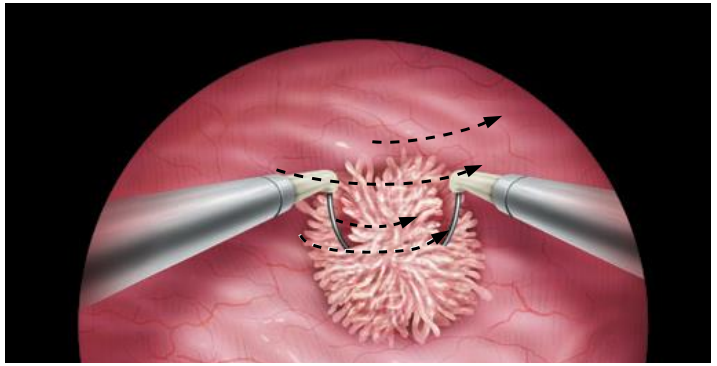
1.2. MODERN TURBT

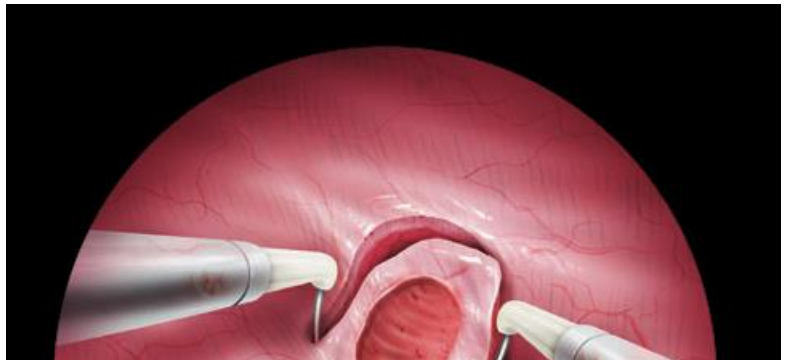
FACTORS AFFECTING 'GOOD QUALITY' TURBT

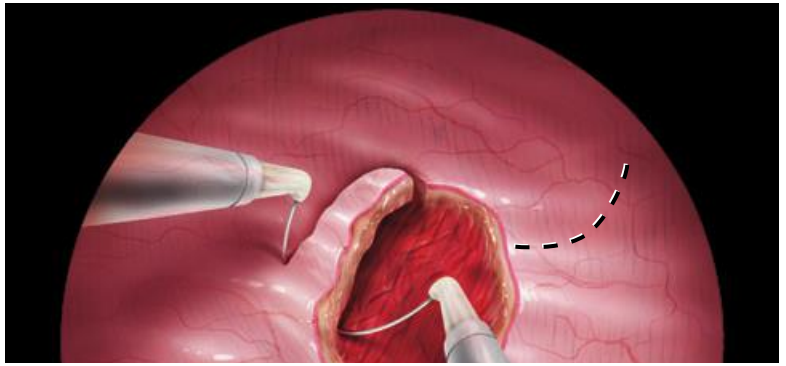
SURGEON EXPERIENCE	TOOLS
Significant technical skill and 3-dimentional orientation skills 	• Peri-op checklist • Bladder diagram (EAU) 

1.3. ‘STANDARD TECHNIQUE’

SURGICAL STEPS





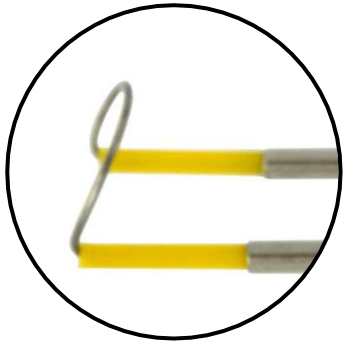


1. RESECTION OF TUMOUR	2. TUMOUR BASE BIOPSY	3. HAEMOSTASIS
the loop of the resectoscope is placed behind the tumour and is then gently retracted towards the shaft of the resectoscope	additional samples are taken from the ground of resection including detrusor muscle to allow precise pathological evaluation (pT stage)	additional resection of normal-looking urothelium from the lateral margins of the resection to assure complete resection

1.3. 'STANDARD TECHNIQUE'

TYPE OF RESECTING LOOP

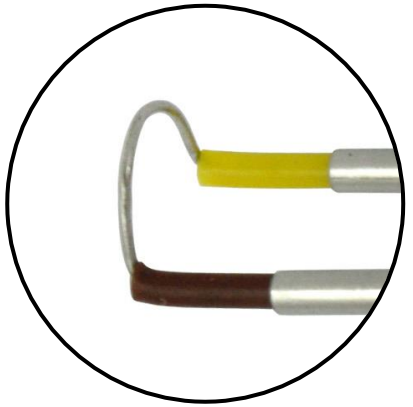
- **90°** → traditional and most commonly used (trigone and bladder neck).
- **45° or 180° (flat)** → designed for the curve of the bladder, allows greater control of depth during resection (posterior or lateral wall)



MONO- VS BI-POLAR VS lasers

The advantages of bipolar resection are the use of normal saline rather than water or glycine, less cautery artefact, and a lower chance of obturator nerve stimulation.

NO DIFFERENCES REGARDING ONCOLOGIAL AND SURVIVAL OUTCOMES



Venkatramani et al J Urol 2013

2. CHALLENGES

2.1. TUMOURS AT THE URETERAL ORIFICES

2.2. TUMOURS ON ANTERIOR/LATERAL WALLS

2.3. TUMOURS IN BLADDER DIVERTICULAE

2.4. TUMOURS IN THE PROSTATIC FOSSA

2.5. POOR VIEW DUE TO BLEEDING

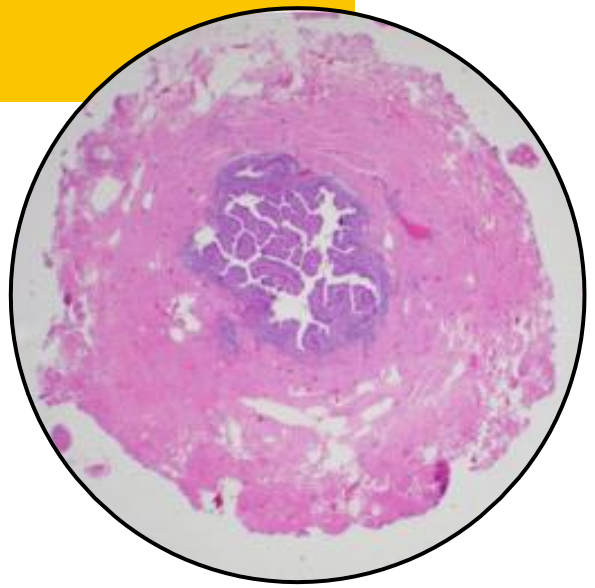
2.6. BLADDER PERFORATION

2.1. TUMOURS AT THE URETERAL ORIFICES

Coagulation close to the ureteral orifices should be avoided as it may cause scarring and lead to ureteric obstruction; resection can be performed judiciously under

pure cutting

- It may result in **vesicoureteric reflux**
- Uncommon risk of **stricture** (temporary ureteric stent placement between 2 and 6 weeks can further reduce the risk)
- **Post-op imaging** (renal ultrasound, CT urogram or DTPA renal scan) is recommended.



Ureteral orifice resected along with tumour inside the lumen.

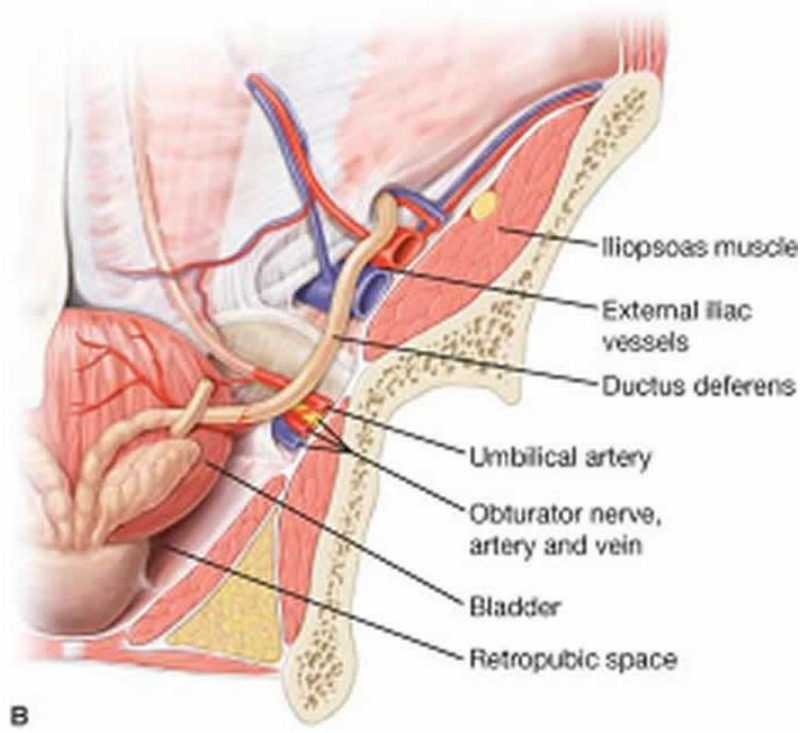
2.2. TUMOURS ON ANTERIOR/LATERAL WALLS

- **LATERAL WALL** → **stimulation of ONR** resulting in increased risk of perforation.

  Possible solutions: avoidance of bladder overfilling, reduced cutting current, use of short intermittent burst current ('Staccato'), use of bipolar electrocautery, and use of **neuromuscular blockade (ONB)**.

- **ANTERIOR WALL** → could be **challenging to resect**.

  Possible solutions: suprapubic depression by an assistant, proper resectoscope angles (open-angled loops)



2.3. TUMOURS IN BLADDER DIVERTICULAE

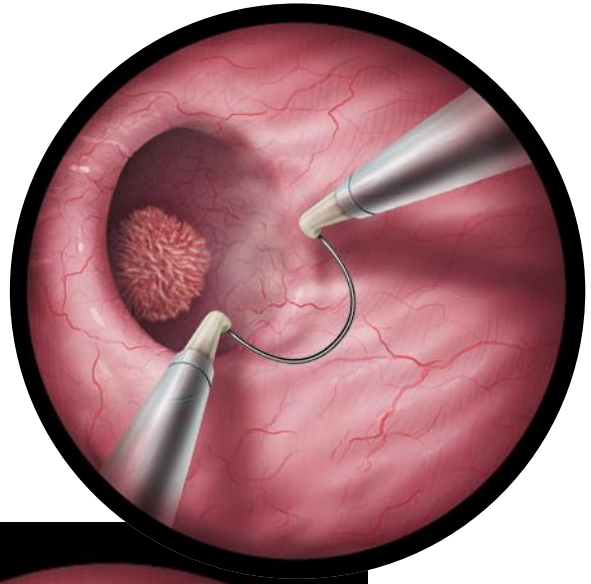
RISK OF:

incomplete clearance

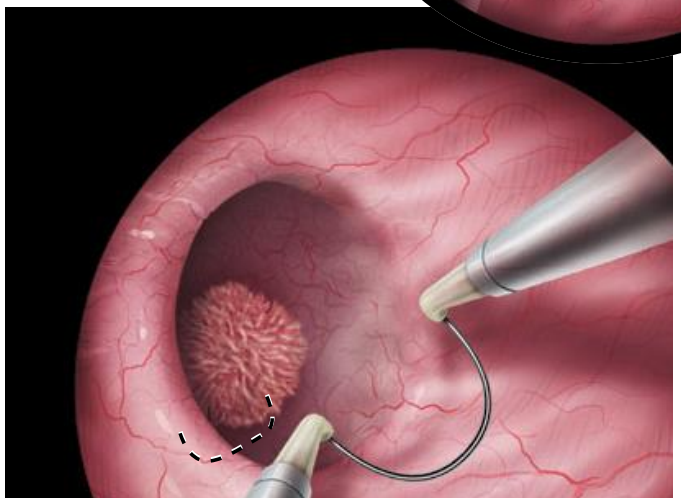
due to suboptimal access and resection in particular if the diverticular neck is narrow and lack of muscularis propria layer.

+

perforation



- SMALL, LOW GRDE → **careful resection**
- LARGE, HIGH GRADE → **diverticulectomy**, **partial/radical cystectomy**



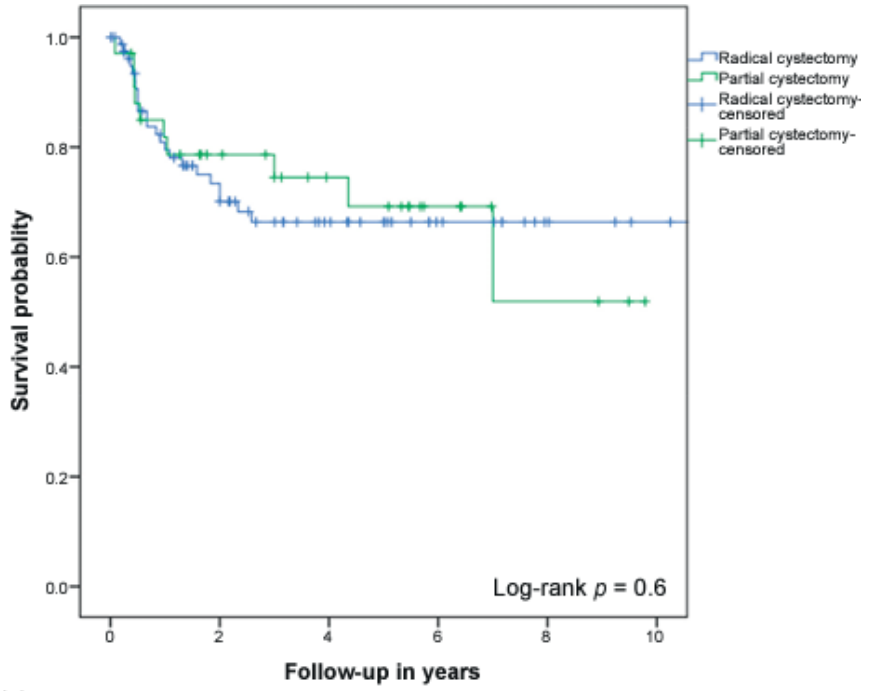
2.3. TUMOURS IN BLADDER DIVERTICULAE

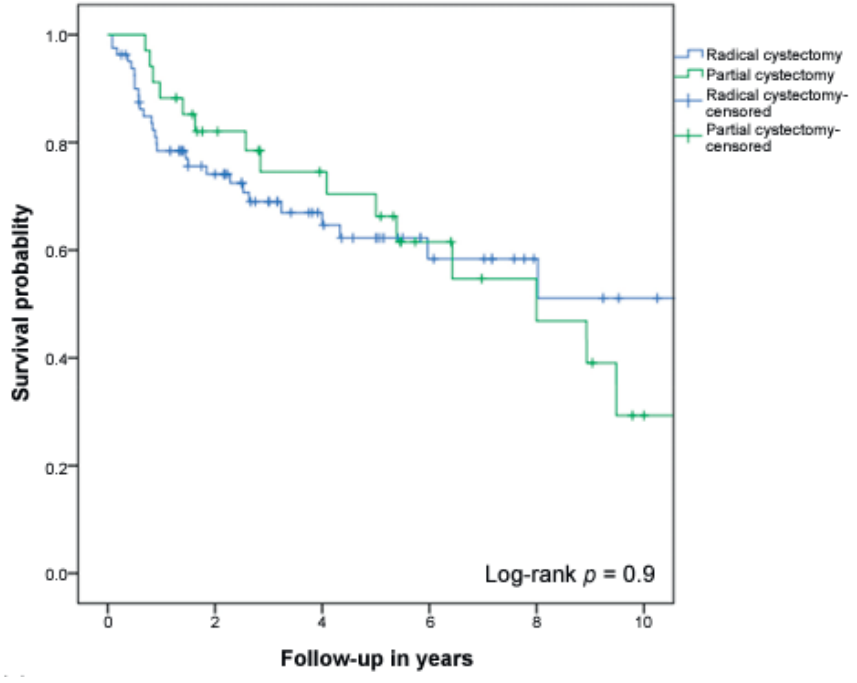
Bladder Cancer

Urothelial Carcinoma in Bladder Diverticula: A Multicenter Analysis of Characteristics and Clinical Outcomes

Charlotte S. Voskuilen[a,*], *Roland Seiler*[b], *Michael Rink*[c], *Cédric Poyet*[d], *Aidan P. Noon*[e], *Florian Roghmann*[f], *Andrea Necchi*[g], *Atiqullah Aziz*[h], *Alexandre Lavollé*[i], *Matthew J. Young*[e], *Phillip Marks*[c], *Karim Saba*[d], *Bas W.G. van Rhijn*[a], *Elisabeth E. Fransen van de Putte*[a], *Jason Ablat*[j], *Peter C. Black*[j], *Roman Sosnowski*[k], *Jakub Dobruch*[l], *Pardeep Kumar*[m], *Samer Jallad*[m], *James W.F. Catto*[e], *Evanguelos Xylinas*[i], *Kees Hendricksen*[a],

for the Young Academic Urologists' Working Group on Urothelial Carcinoma of the European Association of Urology





2.4. TUMOURS IN THE PROSTATIC FOSSA

- **Carcinoma in situ (CIS) of the prostatic urethra** can be difficult to identify, as it usually does not have the typical red, slightly raised patches characteristic of CIS in the bladder.
- The progression of CIS of the prostatic urothelium is via the ducts and **invasion of the prostatic stroma**.

DO NOT FORGET TO BIOPSY PROSTATIC URETRA

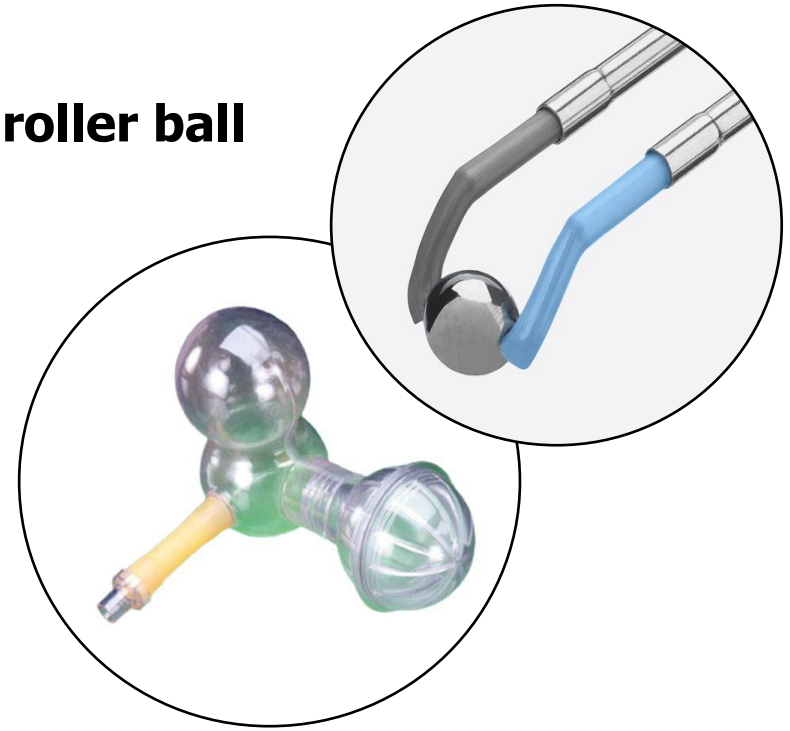
→ **Biopsy of the prostatic urothelium** can be considered if there is CIS in the bladder or HG cancer in the trigone or bladder neck.

→ If HG urothelial cancer is found in the prostatic urethra, a **loop resection** will be needed to stage the cancer adequately. There is little morbidity if this is performed on the bladder neck at 6 o'clock position, but optimal staging requires resection at 4 and 8 o'clock positions and care should be taken to avoid resecting the veru.

2.5. POOR VIEW DUE TO BLEEDING

- Occasionally, the bladder will be full of tumour such that very **little or no normal urothelium will be visible**.
- Significant **haematuria and/or clots** often accompany such tumours, which exacerbates the problem by impairing the view.

Possible solutions:
→ discrete areas of bleeding should be cauterised using a **roller ball**
→ clots should be evacuated with an **Ellik's evacuator**



2.6. BLADDER PERFORATION

potentially the
most serious
intraoperative complication.

Risk factors	• Obturator jerk • TURBT in elderly females who have a thin bladder • Multiple previous resections • TURBT into fat.
classification	• **Intra**-peritoneal • **Extra**-peritoneal

procedure should be **completed as soon as possible**.

→

Catheterization + **cystogram** before removing catheter

↓

Avoid irrigation/instillation of chemotherapy

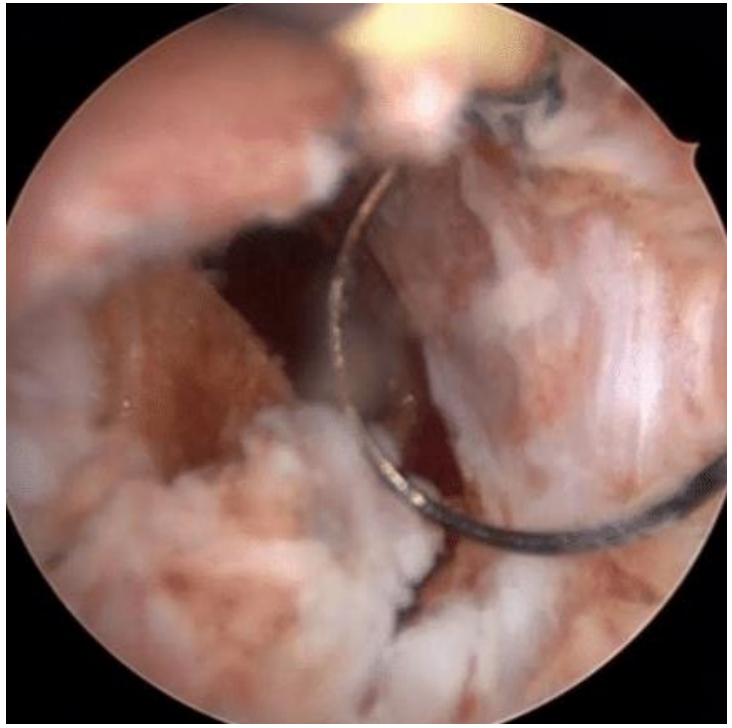
←

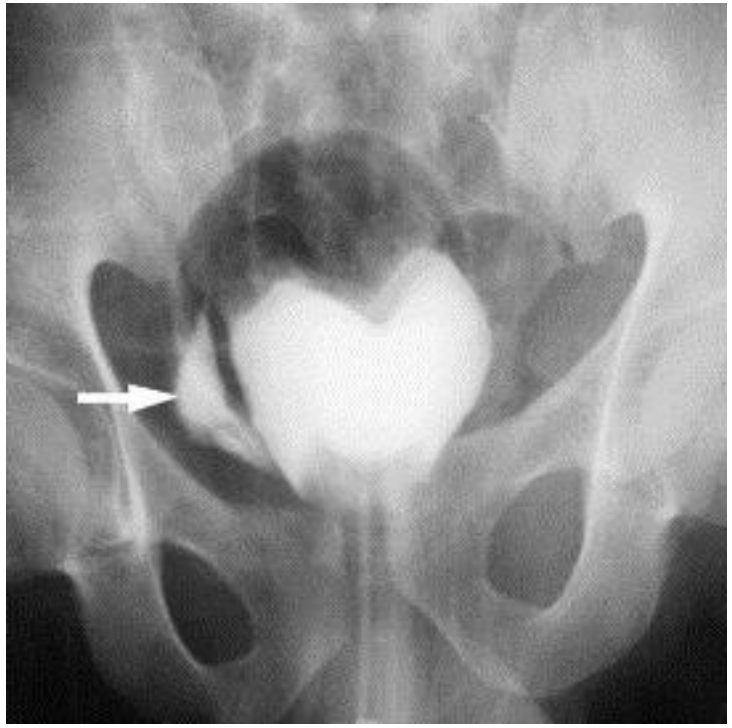
If symptomatic

(check for signs of distension)

- US-guided puncture and drainage
- Emergency laparotomy

2.6. BLADDER PERFORATION





Intraoperative recognition of a small perforation at the right lateral wall of the bladder after intense obturator jerk; post-operative cystogram showing leakage of contrast liquid.

3. OPPORTUNITIES

3.1. ‘EN BLOC’ RESECTION (EBRT)

3.2. ENHANCED CYSTOSCOPY: PPD AND NBI

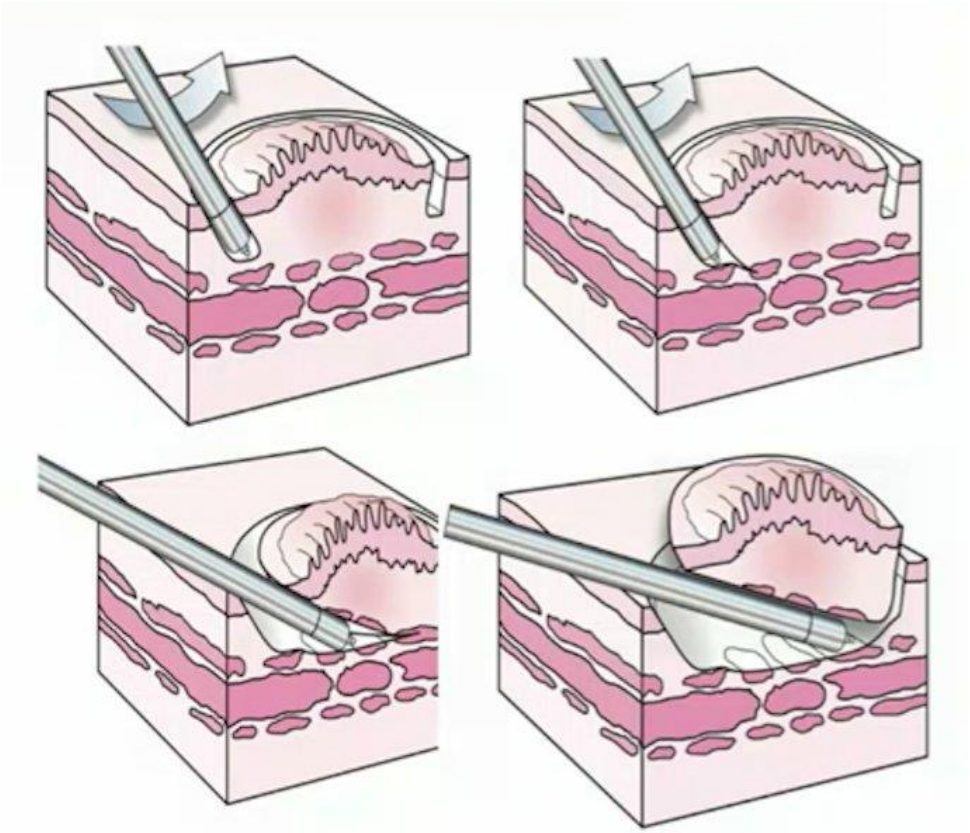
3.3. PROGNOSTIC TISSUE-BASED BIOMARKERS

3.4. TRIMODAL THERAPY

3.1. 'EN BLOC' RESECTION (EBRT)

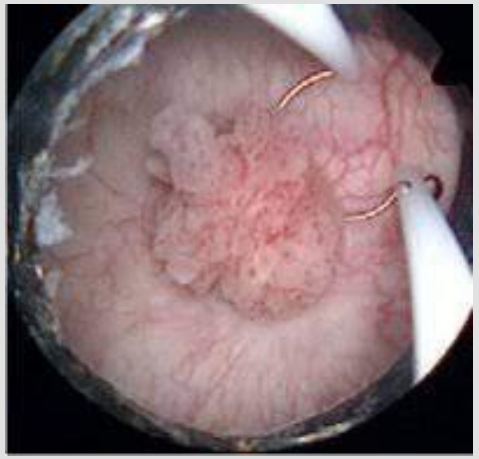
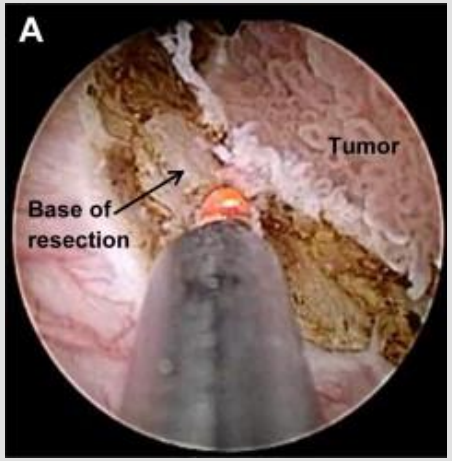
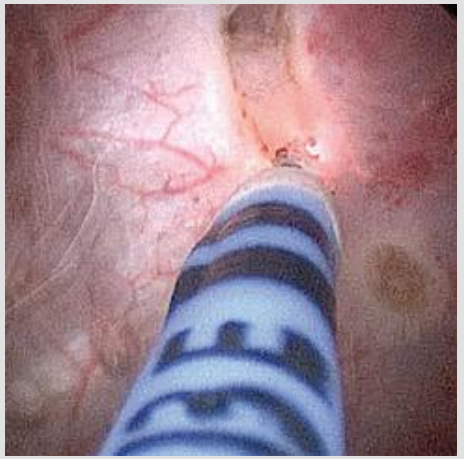
STEPS

1. Typically, a **circumferential incision** is made on the mucosa around the tumour with the tip of laser fibre maintaining a distance of 5–10 mm from tumour edge.
2. The **dissection is carried out** in the macroscopically normal mucosa and extended through the submucosal and muscular layer.
3. The **muscular fibres** are divided cautiously from the periphery to the centre of the tumour.
4. The lesion is then **detached and removed** using various exit strategies



3.1. 'EN BLOC' RESECTION (EBRT)

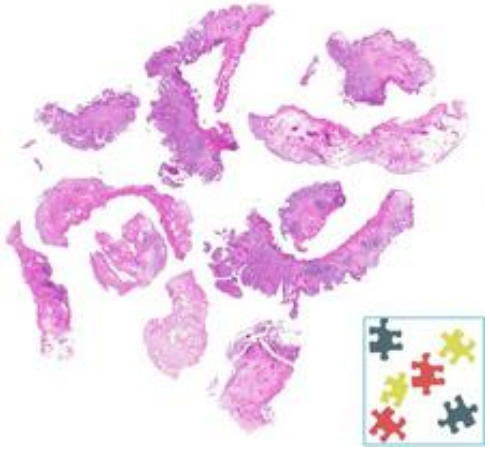
MODALITY

ELECTRIC	LASER	HYDRODISSECTION
• Monopolar • Bipolar	• Ho-YAG • Th-YAG • KTP	• Needle • Waterjet
		

3.1. 'EN BLOC' RESECTION (EBRT)

ADVANTAGES

SAFER



Standard TURBT specimen

EBRT specimen

EQUAL
Recurrence and progression rates

BETTER
histological specimens

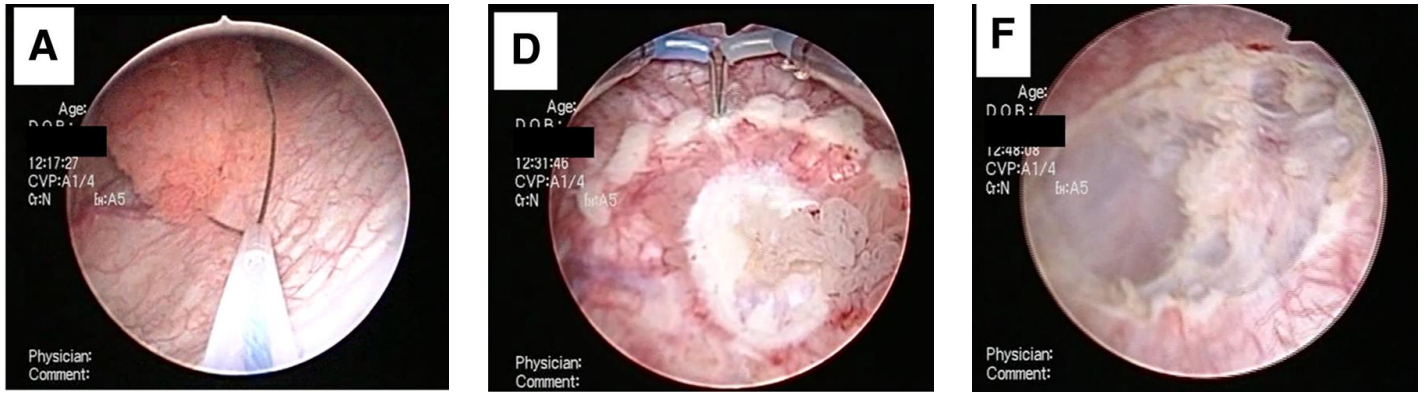
Yanagisawa et al J urol 2022

3.1. 'EN BLOC' RESECTION (EBRT)

...TOO BIG?

it is often avoided if tumour is **> 3 cm** in size

Hayashida et al described an 'hybrid' technique consisting of the combination of endoscopic mucosal resection using a **polypectomy snare** and EBRT technique

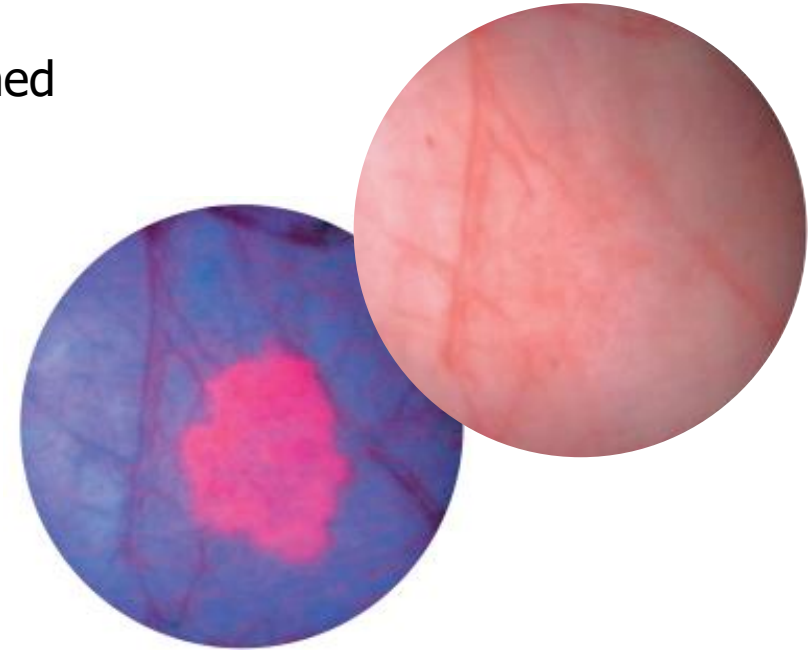


3.2.a. PHOTODYNAMIC DIAGNOSIS (PPD)

Key limitations of '**WHITE-LIGHT' CYSTOSCOPY** of early-stage bladder cancer:
- difficulty of identifying **all areas of malignancy** (multifocal nature of bladder cancer)
- Inconspicuous lesions characteristic of **CIS**

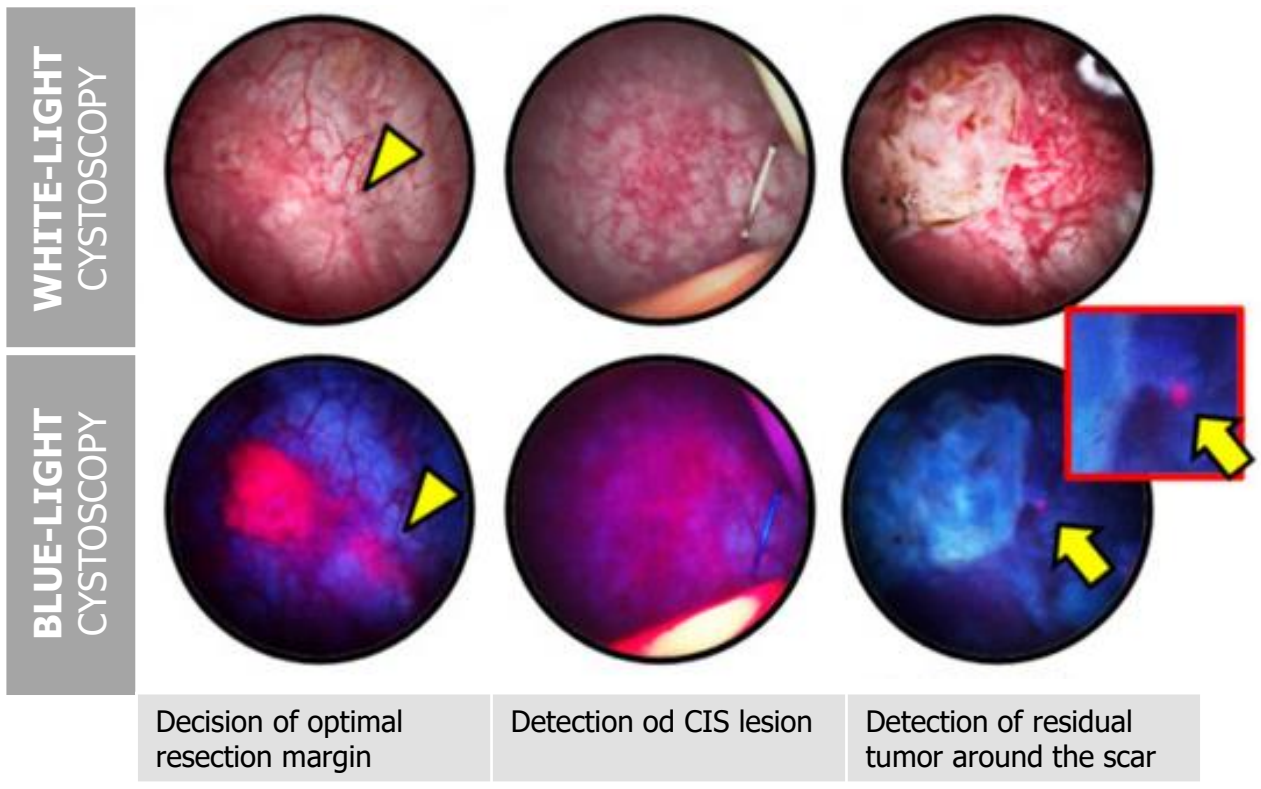
'BLUE-LIGHT' CYSTOSCOPY

1. intravesical instillation of a **photosensitizing agent**, most commonly hexaminolevulinate (HAL) one hour prior to planned resection.
2. It is **absorbed preferentially by malignant cells**.
3. Tumour cells will fluoresce **red** with its distinct demarcation when illuminated by **blue-violet** light (380–480 nm)



3.2.a. PHOTODYNAMIC DIAGNOSIS (PPD)

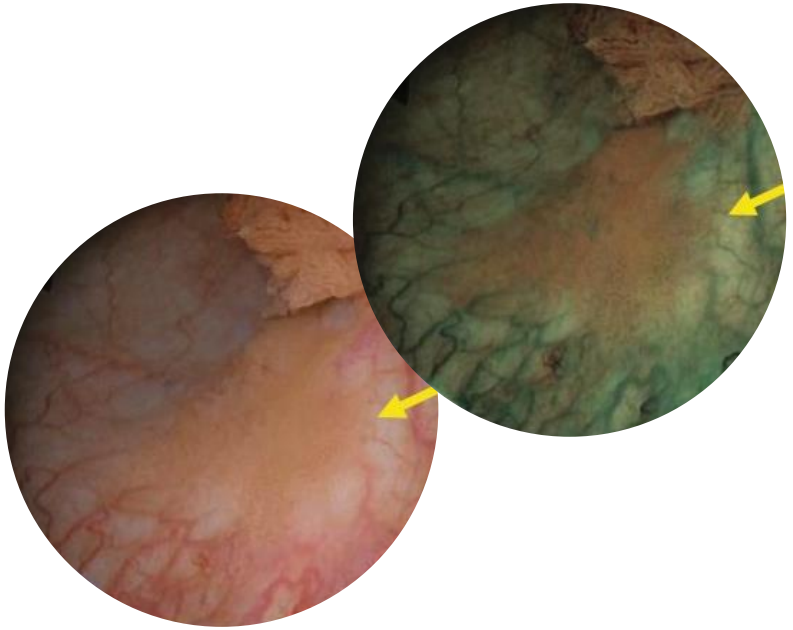
ADVANTAGES



Lower recurrence rates of
- **Progression**
- **Recurrence**

3.2.b. NARROW-BAND IMAGING (NBI)

Tool for improved tumour visualisation that
avoids preoperative bladder instillation
of a photosensitizing agent



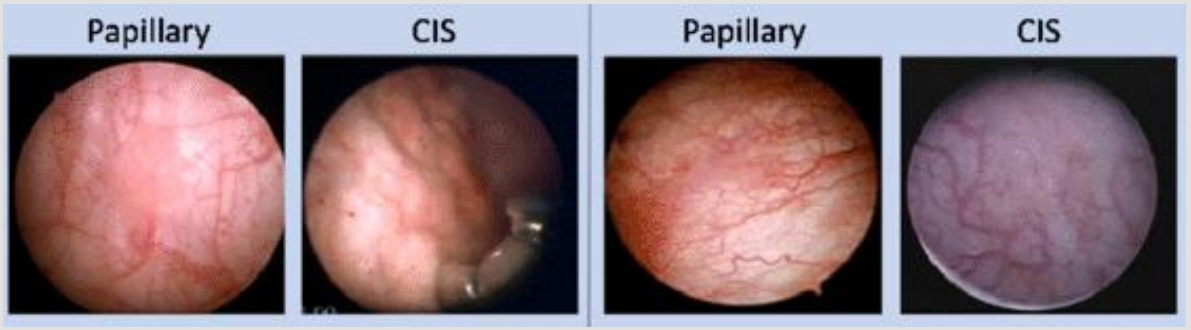
Relies on the **hypervascular nature of bladder cancer** to aid in differentiation of normal urothelium.

Optical filters reduce light to **blue** (415 nm) and **green** (540 nm) components which are preferentially **absorbed by haemoglobin** in neoplastic cells providing enhanced contrast between vascularized cancer tissue and normal urothelium.

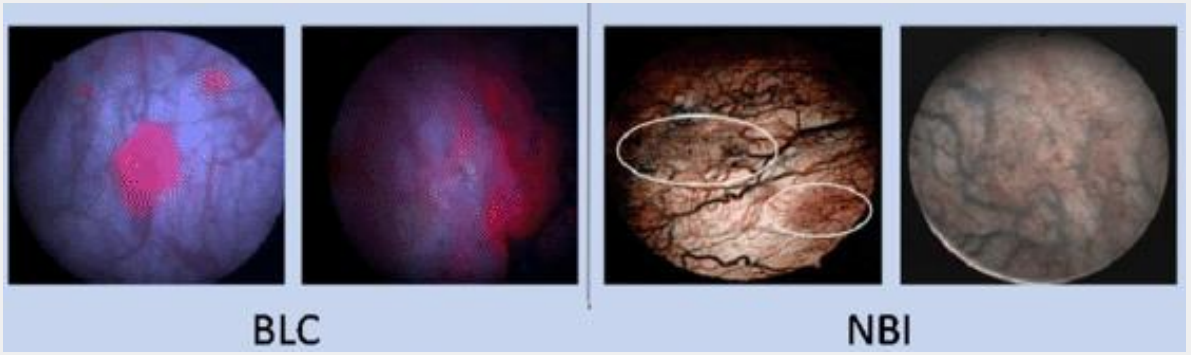
3.2.b. NARROW-BAND IMAGING (NBI)

ADVANTAGES

SURVEY
WITH WLC…

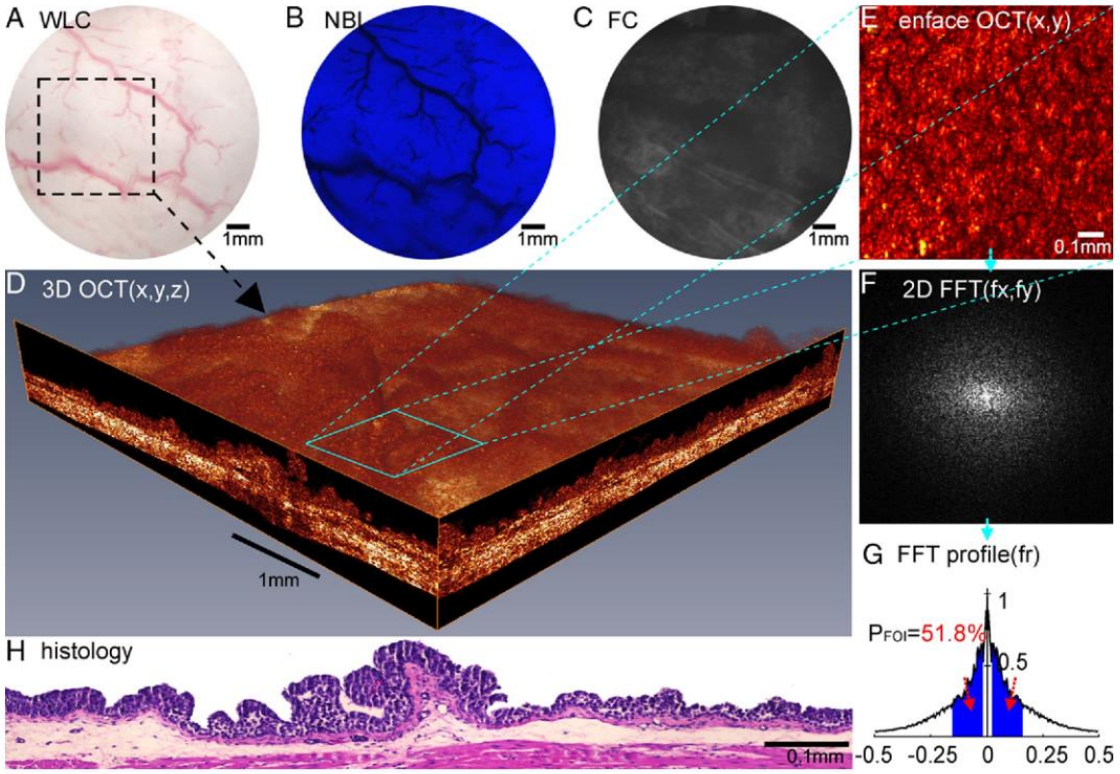


…SUSPECT
IN PPD OR NBI



→ Better **SENSITIVITY** than WLC

3.2 PDD/NBI



Use if available

Use what you have

Increases recurrence and progression free rate (PDD)

Useful in re-TURBT, small tumors, positive citology, multifocal tumors

Ren et al. Journal of Urology (2012)

3.3. PROGNOSTIC TISSUE-BASED BIOMARKERS

Molecular markers are promising tools that may give insight into which MIBC patients **will or will not benefit** from neoadjuvant systemic therapy (NAST) before radical cystectomy (RC).

- Specific genomic alterations in **DNA repair genes** (e.g., ATM, RB1, FANCC, and ERCC2) provide predictive value for predicting pathologic response and oncologic outcomes after NAC.
- Quantitative PCR results for the **expression of genes** selected through microarray analysis (e.g., BRCA1) could correctly classify cases with regard to their NAC response.
- A higher pathologic response rate was shown in patients with **PD-L1** positive tumors compared to those with PD- L1 negative tumors undergoing NAI.

3.4. 'TRIMODAL' THERAPY

MAXIMAL TURBT

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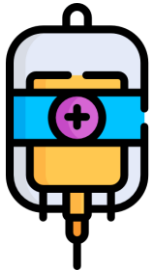

CHEMOTHERAPY

+

RADIOTHERAPY

alternative to cystectomy

(AUA, strong/B; EAU, strong/2b) for patients who decline or are ill suited for surgery

Chemotherapy used in TMT is often combination cisplatin with fluorouracil or paclitaxel, or fluorouracil with mitomycin C, or cisplatin-alone (NCCN, preferred/2A) or low-dose gemcitabine (NCCN, other/2B), and functions both as a **radiosensitizing** agent as well as **systemic treatment** for any micrometastatic disease

THANK YOU!