



The use of three chip high definition camera with modular enhancement system with white light cystoscopy during transurethral resection of bladder tumours. Does it improve carcinoma in situ detection?

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Abstract:

The goal of our study is to assess if the use of Storz professional image enhancement system (SPIES) improve carcinoma in situ (CIS) detection. We conducted a prospective study on 35 patients of both sexes who have fulfilled the inclusion criteria from December 2019 to May 2020. Preoperatively, we collected urine samples from all patients amenable for cystoscopy for urine analysis and urine cytology. Contrast enhanced abdomen and pelvic computerized tomography (CT) was done for all patients. Under spinal anaesthesia white light cystoscopy (WLC) was done first, then SPIES camera was used by the same operator to detect any other suspicious lesions. TURBT was done for all lesions and specimens were sent for histopathology assessment. Our results showed that there was statistically significant difference between the SPIES and WLC regarding the number of lesions detected, as the total number of lesions detected by the SPIES was 37 lesions, three of these lesions were CIS, but the WLC detected only 27 lesions, no CIS was detected by WLC (*p value* 0.001). Pathological recurrence was confirmed in 6/35 (17.1%) patients at 3 months follow up.

Keywords : CIS, TURBT, SPIES.

1. Introduction:

Bladder cancer is the seventh most common cancer in male worldwide and the third most common cancer in Egypt after liver and breast cancers (1, 2). Approximately 75% of bladder cancer patients present with NMIBC (3). WLI

cystoscopy and TURBT are considered the cornerstone in treatment of NMIBC.

Recurrence rates are common due to the following:

- (a) Regrowth of residual tumor after incomplete tumor resection.
- (b) Implantation and growth of circulating tumor cells at time of TURBT.
- (c) Aggressive tumor biology
- (d) lesion that has been overlooked during initial WLI TURBT as CIS (6,7).

Due to high rates of tumor recurrence (39–47%) in patients with NMIBC the European Association of Urology recommends repeat TURBT after two to six weeks for patients at high risk of recurrence (4,5). We believe that the rate of recurrence after TURBT could be decreased by providing better quality initial TURBT.

Limitations of WLI cystoscopy led to the emergence of new optical imaging techniques such as photo dynamic diagnosis (PDD), narrow band imaging (NBI) and SPIES. Many studies compared WLI versus PDD and NBI. These trials showed that both technologies can improve the diagnosis of NMIBC and carcinoma in situ (CIS) compared to standard WLI cystoscopy, they can reduce the recurrence rate of bladder cancer accordingly (8,9,10). SPIES is one of the new technologies that attracted much interest because of its image enhancement abilities. We aim to assess if the use of SPIES technology can improve CIS detection hence decrease the recurrence rate after TURBT for NMIBC.

2. Materials and Methods:

Our study was a prospective study carried out after the approval of Beni-Suef faculty of medicine ethical committee. All patients were informed about and consented for the study in advance. The study included 35 patients of both sexes from December 2019 to May 2020.

- **Inclusion criteria:** All TURBT candidate patients, patients complain of dysuria /haematuria without obvious cause, patients with haematuria /dysuria with positive urine cytology without detected masses and patients who are candidate for check cystoscopy after TURBT.

- **Exclusion criteria:** Prostate cancer, previous radiation, associated urinary bladder stone and active urinary tract infection.

- **Equipment and operative technique:**

- a) Storz camera TH110 Image 1 HX
- b) Hopkins forward-oblique telescope 30.
- c) Storz resectoscope 26fr with xenon light source.
- d) Storz Flexible cystoscopy 11272 VP.

Preoperatively, we collected urine samples from all patients amenable for cystoscopy for urine analysis and urine cytology. Contrast enhanced abdomen pelvic CT was done for all patients. Under spinal anaesthesia conventional cystoscopy was done first by one urologist, then SPIES camera was used by the same urologist to detect any other suspicious lesions. TURBT was done for all

lesions and all Specimens were sent for histopathological examination. Lesions that were detected by SPIES were marked.

3. Results:

We studied 35 patients to assess if the use of SPIES can improve CIS detection. The demographic data are presented in **Table 1**. More than half of the studied patients presented by hematuria (54.3%) and (40%) were complaining of LUTs. CT characteristics of the suspected lesions are shown in **Table 2**. By WLC, 22.9 % of the studied patients didn't have any lesions but 77.1 % showed single lesion and all lesions were villous shaped, no CIS was detected by WLI. By SPIES camera 17.1 % of the studied patients

didn't have any lesions, 60 % showed single lesion, 22.8 % showed multiple flat lesions. SPIES could detect 8 flat lesions, three of them was CIS. Benign lesions were found in 42.9 % and 57.1% had malignant neoplasms by the histopathological examination. Our results also showed that there were 17% of patients who underwent SPIES assisted TURBT were discovered to have tumor recurrence at 3 months follow up, non of them had CIS in the first cystoscopy. The total number of lesions detected by the SPIES was 37 lesions but the WLC detected only 27 lesions, our results showed that there was statistically significant difference between the SPIES and WL regarding the number of lesions detected, (p value 0.001) as shown in **Table 3**.

Table (1) Demographic characteristics of the studied patients:

Characteristics	No=35(%)
<u>Age of patient:</u>	
Mean ± SD	56.5±14.5
Range (min-max)	23-84
Median	60
<u>Sex</u>	
Males	26 (74.3)
Females	9 (25.7)
<u>Risk factors</u>	
Smoking	27 (77.1)
Bilharziasis	6 (17.1)
No risk factors	2 (5.7)
<u>Past history</u>	
No previous cancer bladder	27 (77.1)
Previous TURBT	8 (22.8)

Table 2: CT characteristics of the suspected lesions:

CT	No=35(%)
<u>Site of lesions</u>	
No lesion detected	8 (22.9)
Right	9(25.7)
Left	6 (17.1)
Trigonal	2 (5.7)
Posterior	2 (5.7)
Domal	3 (8.5)
Anterior	5 (14.2)
<u>Size of lesions (26)</u>	
Mean ± SD	1.8±0.55
Range (min-max)	1-3
Median	2

Table 3:comparison between WLC and SPIES regarding number of lesions detected:

Recurrence	WL	SPIES	P-value
Number of lesions/total number of lesions	27/37(72.9%)	37/37 (100%)	0.001**

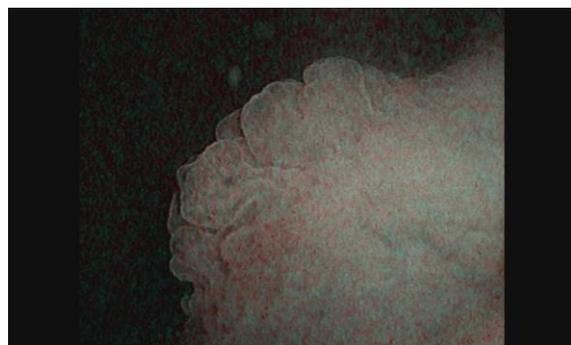
4. Discussion:

Despite WLI cystoscopy is considered the gold standard method for TURBT, small and flat lesions like CIS can be overlooked during WLI cystoscopy. In fact, this can explain the high recurrence rate of NMIBC at first follow up cystoscopy (6,13). Limitations of WLI have led to the emergence of new optical imaging techniques such as PDD and NBI and SPIES. We conducted our study to assess the efficacy of SPIES in detection of bladder

lesions as CIS that can be overlooked by WLI and subsequently lead to tumor recurrence. We found that SPIES is superior to WLI in detection of flat lesions. In our study WLI and SPIES cystoscopy identified 27 lesions (77.1%) in 35 patients and 37 lesions in 35 (88.2%) patients, respectively (P=0.002). Superiority of SPIES in detection of flat lesions is attributed to enhanced image quality that enabled the

operator to detect the flat lesions that were overlooked by WLI cystoscopy, such lesions are responsible for early recurrence. Our results are similar to Chondros et al. study which showed that WLI and SPIES cystoscopy were able to identify lesions in 47.4% and 61.5% of patients, respectively (P=0.003). They recruited 78 patients with NMIBC and they have been enrolled and completed their first 3-mo follow-up (14). We found that recurrence rate after SPIES assisted TURBT at 3 months follow up was 17%. Also, Chondros et al. showed that recurrence was 16.7% at 3 months follow up. Therefore we both suggest SPIES to be used in follow up of NMIBC patients (14). Our study has one arm (SPIES assisted TURBT) without a control group. However, our results can be considered in light of experiences at one of the centers (Western General Hospital), which offers a control group of patients who underwent good quality WLI TURBT (Mariappan et al., 2012). Mariappan et al. study demonstrated that recurrence rate of

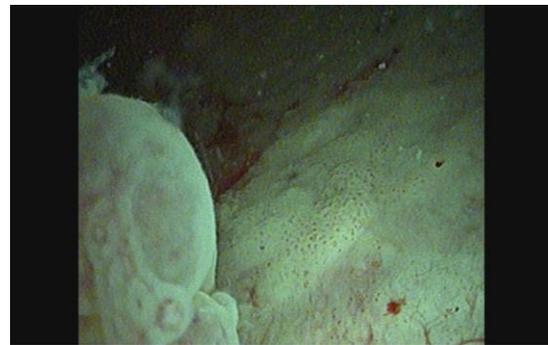
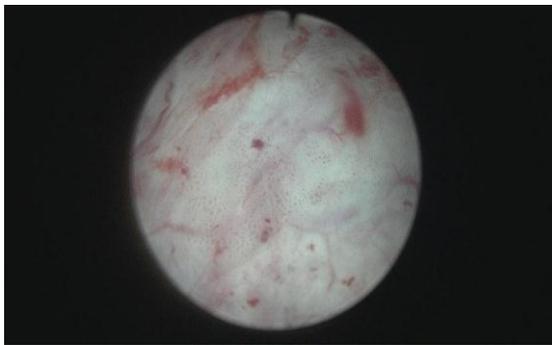
NMIBC at 3 months follow up cystoscopy after good quality WLI TURBT was 39% (15). Brausi et al. demonstrated that recurrence rate of NMIBC 6 weeks after WLI TURBT was up to 45.8% (6). This reduction in recurrence rate to 17% by SPIES assisted TURBT could be attributed to the high level of experience of the surgeon performing TURBT with overall improved attention to details and tumor margins due to image enhancement modalities of SPIES. With such potential to improve detection and resection with SPIES, we hypothesize that the number of cases requiring early re-TURBT could be decreased and therefore decrease the burden of repeat surgery and its costs. This approach if validated by further research could represent a new method to reduce the burden of NMIBC management on patients and health-care service.



High grade Ta TCC by SPIES using spectra B mode on left and spectra A on right



The same above lesion by white light cystoscopy



CIS by spectra B on right and white light cystoscopy on left

5. Conclusion:

We found that SPIES can improve detection of CIS that may be overlooked by WLC.

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