

Study	Study type, study period	Number of patients	Patient characteristics	Intervention	Comparison	Length of follow-up	Outcome measures and effect size	Source of funding	Additional comments																												
Donat 2004 USA	Prospective observational study 1998-2001	267 consecutive patients seen in outpatient clinic for routine surveillance cystoscopy	<table border="1"> <thead> <tr> <th></th> <th>N (%)</th> </tr> </thead> <tbody> <tr> <td>Male</td> <td>199 (75.4)</td> </tr> <tr> <td>female</td> <td>68 (25.5)</td> </tr> <tr> <td>Median age</td> <td>69.1 yrs</td> </tr> <tr> <td>Median time from diagnosis</td> <td>6.84 yrs</td> </tr> <tr> <td>Median time from last tumour</td> <td>20.4 mo</td> </tr> <tr> <td>Previous IVT</td> <td>175 (65.5)</td> </tr> <tr> <td>Previous UUT</td> <td>37 (13.9)</td> </tr> <tr> <td>History CIS</td> <td>161 (60.3)</td> </tr> <tr> <td>High risk recurrence</td> <td>202 (75.7)</td> </tr> <tr> <td>Low risk recurrence</td> <td>65 (24.3)</td> </tr> <tr> <td>Never smoked</td> <td>58 (21.7)</td> </tr> <tr> <td>Smoking</td> <td>35 (13.1)</td> </tr> <tr> <td>Quit</td> <td>174 (65.2)</td> </tr> </tbody> </table> <p>High risk = history of moderate or high grade papillary tumours, any invasion or associated CIS. Low risk= low grade papillary tumours or papilloma with no invasion (Ta or less)</p>		N (%)	Male	199 (75.4)	female	68 (25.5)	Median age	69.1 yrs	Median time from diagnosis	6.84 yrs	Median time from last tumour	20.4 mo	Previous IVT	175 (65.5)	Previous UUT	37 (13.9)	History CIS	161 (60.3)	High risk recurrence	202 (75.7)	Low risk recurrence	65 (24.3)	Never smoked	58 (21.7)	Smoking	35 (13.1)	Quit	174 (65.2)	<p>All patients considered for fulguration had completed initial treatment TUR, partial cystectomy and/or IVT and a minimum of 6 mo on surveillance without recurrence. Follow-up at regular intervals ranging from every 3mo to once yearly, included physical exam, flexible cystoscopy, and cytology.</p> <p>Criteria for fulguration were less than 5 low grade appearing papillary tumours, tumour <0.5cm, negative cytology, and patient desire.</p> <p>If cytology positive or suspicious regardless of grade then a formal bladder biopsy was performed. All patients with tumour recurrence with high grade, non-papillary, >5 tumours, or size >0.5cm. underwent TUR under GA.</p> <p>16.2Fr Olympus visera cystovideoscope was used for surveillance cystodiathermy. Lidocaine jelly (2%) in urethra for LA. Eligible tumours fulgurated with 4Fr bugbee electrode placed through a 5Fr working port in the flexible scope using a diathermy generator at 8-10 watts.</p>	No fulguration	Median 2.6 years (range 0.96 to 3.77)	<p>123 (46%) had 1 or more recurrence. 74 (60%) underwent cystodiathermy. 49 (40%) had TUR. Overall 103/267 (38.6%) had been fulgurated at least once since diagnosis.</p> <p>Progression: When stratified by risk of recurrence 202/267 (76%) at high risk with low grade papillary recurrences undergoing diathermy did not have a greater risk of progression than patients at high risk undergoing TUR (p=0.90)</p> <p>Survival: No differences in DSS or OS for patients undergoing cystodiathermy compared to those never fulgurated.</p>	NR	Location of tumour recurrence not reported.
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Syed 2013 UK	Prospective observational study 2006-2011	151 consecutive patients with recurrent NMIBC after prior TURBT. Anticoagulation was not an exclusion criteria and was not stopped before	<table border="1"> <tr><td>Mean age</td><td>73</td></tr> <tr><td>male</td><td>77%</td></tr> <tr><td>female</td><td>23%</td></tr> <tr><td>Primary tumour</td><td></td></tr> <tr><td>G1</td><td>88 (58%)</td></tr> <tr><td>G2</td><td>51 (34%)</td></tr> <tr><td>G3</td><td>12 (8%)</td></tr> <tr><td>Ta</td><td>116 (78%)</td></tr> <tr><td>T1</td><td>35 (22%)</td></tr> </table>	Mean age	73	male	77%	female	23%	Primary tumour		G1	88 (58%)	G2	51 (34%)	G3	12 (8%)	Ta	116 (78%)	T1	35 (22%)	Holmium YAG laser: 17F video flexible cystoscope with 210° /120° deflection, using LA gel per urethra. Ciprofloxacin 500mg was given 30 mins before procedure. No additional analgesics required. Using normal saline irrigation, a 230 or 360µm laser fibre passed through working channel of cystoscope. Once the exophytic component has been treated, the base was vaporized. Biopsies not routinely taken.	n/a	Median 24 months (0-58)	<p>Local recurrence rate: 10%. Of those who developed local recurrence 92% were successfully treated with further laser treatment. Only 2 patients required formal cystoscopy and diathermy under GA.</p> <p>Off-site recurrence rate: 73 (48%). Of these 203 recurrences</p>	NR																							
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		treatment.					<p>96% treated with laser.</p> <p>Mean visual pain score (range 0-7): 1</p> <p>100% were pleased with procedure. One would have preferred the GA procedure. No bladder perforation or damage to flexible cystoscope.</p>		
Biers 2009 UK	Prospective observational study	31 patients with	Previous history of G1-2pTa TCC who at follow-up flexi cystoscopy had suspicious red patch or 1-3 small tumours each <5mm were offered flexi cystoscopy, biopsy and cystodiathermy using EMDA LA. Mean age 71.5 (53-88).	EMDA LA biopsy and cystodiathermy: Each patient was catheterized. 150ml of 0.5% bupivacaine ad 1.5ml of 1/1000 epinephrine instilled into bladder. A coagulation electrode connected to a diathermy generator set by 10W coagulation. Biopsy was attempted in all cases followed by fulguration. Pathologist was blinded to the method of obtaining the biopsy.	n/a		<p>Recurrence: no pathology possible (6/33, 18%) 0% recurrence after mean 12.7mo f/up. Benign pathology (16/27, 59%) 3/16 (19%) recurrence after mean 16.4 mo f/up. TCC pathology (11/27, 41%). 1/11 (9%) recurrence – time to recurrence 15 mo.</p> <p>Progression: None</p> <p>Median pain score: 1 (range 0-5) on scale of 0 (no pain) to 10 (worst pain ever). 2/31 said they would prefer a GA next time.</p>	NR	

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							Treatment related morbidity: No intra-operative complications.																	
Syed 2001 UK	Prospective observational study 1994-1997	41 with recurrent previously documented low grade TCC NMIBC <1cm	28 men, 13 female. Mean age 67 (47-87). 6 had grade 1 lesions, 35 had grade 2. All had previous TURBT and histologic diagnosis.	Holmium laser irradiation under LA. 5F urethral catheter was used. The tumour was treated first and after visible shrinkage, the base was also irradiated. After laser coagulation, all tumours were mapped onto bladder diagram for identification at follow-up. All were treated as day cases with flexible cystoscope, none required catheterisation or hospitalisation.	Also retrospectively analysed a subgroup of 10 patients who were previously treated with cystodiathermy and had HoYAG laser treatment during the study	Mean 14 mo (3 to 33 mo)	Recurrence: 13 (18%) local recurrences, 38 (53.5%) recurring in untreated area of the bladder during study period. Local recurrence rate was lower in laser treated group than cystodiathermy treated group, p=0.39 (ns) Morbidity: No intra-operative or delayed complications. Patient reported outcomes: 33/33 patients were satisfied. Only 2 would elect to have GA for further procedures. 28/33 scored pain as 2 or less (out of 10).	NR																
Park 2013	Retrospective cohort study 2001-2012	42 consecutive fulguration patients matched with 42 TURB patients. All	<table border="1"> <thead> <tr> <th></th> <th>Fulguration</th> <th>TURBT</th> </tr> </thead> <tbody> <tr> <td>Mean age</td> <td>66.7±7.1</td> <td>67.1±3.4</td> </tr> <tr> <td>Male</td> <td>34 (81)</td> <td>36 (86)</td> </tr> <tr> <td>Female</td> <td>8 (19)</td> <td>6 (14)</td> </tr> <tr> <td colspan="3">Initial bladder tumour surgery</td> </tr> </tbody> </table>		Fulguration	TURBT	Mean age	66.7±7.1	67.1±3.4	Male	34 (81)	36 (86)	Female	8 (19)	6 (14)	Initial bladder tumour surgery			Fulguration (n=42): 10cc lidocaine. Antibiotics not routinely used, and no parenteral sedation or analgesia used. Wolf 19 Fr cystoscope. Specimens taken from all patients at the suspicious recurrence site using biopsy forceps,	Fulguration matched to a cohort of 42 Ta patients who had traditional TURBT by the	Median 27.8 months for fulguration. Median 25.1 months for TURBT	Malignant tumours: Fulguration n=22 (52%) versus TURBT n=31 (74%) Complications:	No conflicts of interest.	Groups matched by age, BMI, ASA score, and primary
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		initial treatment for Ta tumour. Excluded T1 and MIBC, ≥1cm mass at recurrence and masses at more than 3 sites, less than 1 yr follow-up.	<table border="1"> <tr> <td>Low grade</td> <td>21%</td> <td>22%</td> </tr> <tr> <td>High grade</td> <td>21%</td> <td>20%</td> </tr> <tr> <td>Mean no. TURB</td> <td>1.3±1.6</td> <td>1.7±0.9</td> </tr> <tr> <td>BCG</td> <td>21 (50)</td> <td>20 (48)</td> </tr> </table>	Low grade	21%	22%	High grade	21%	20%	Mean no. TURB	1.3±1.6	1.7±0.9	BCG	21 (50)	20 (48)	<p>and the bladder tumour fulgurated with a size 4 Fr Wolf fine electrode.</p> <p>Mean tumour size similar in two groups 0.54cm fulguration versus 0.61cm in TURBT group. All patients who had TURBT had spinal or general anesthesia and required hospital stay. None of the fulguration group had hospital stay.</p>	same surgeon.		<p>assessed with Clavien classification system. Grade 1-2: 4 with fulguration vs 6 with TURBT.</p> <p>Grade 3-4: 0 with fulguration vs. 1 with TURBT.</p> <p>Recurrence: 12 (28.5%) with fulguration vs. 11 (26.2%) with TURBT</p> <p>8 (19%) at same site with fulguration vs. 9 (21.4%) with TURBT.</p> <p>No differences in recurrence-free survival (p=0.880)</p>		tumour characteristics
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Wong 2013	Prospective observational study 2008-2011	54 elderly frail patients and patients with multiple comorbidities, for whom GA would present a risk, and small volume recurrent tumours offered OLA.	<p>Excluded first presentation of tumour, young age (<50y), large tumours (>3cm), tumours adjacent to bladder neck, MIBC, untreated UTI.</p> <p>Mean age 77 (range 52-95). Male:femal ratio 1.39:1. More than half had more than 3 comorbidities, Previous tumour histology ranged from G1pTa to T3, and all patients had low volume recurrence at time of OLA. 4/8 patients on warfarin stopped</p>	<p>Outpatient laser ablation: performed by one surgeon, assisted by a laser trained nurse. Aseptic technique 10ml instillagel administered before cystoscopy and a 16.5F flexible video cystoscope. Used to map bladder with white light. A holmium:YAG laser with 365- or 200-nm fibre at 0.6-0.8Js ebergy and rate of 10-15Hz used to ablate any tumours. Normal saline solution used as irrigation fluid. Patients asked to void before discharge.</p> <p>From 2009-2011 a subgroup underwent</p>	<p>White light versus PDD OLA</p> <p>74 OLA procedures (44 WLC, 30 PDD) in 54 patinents</p>	3 months	<p>Pain: All scored 0-2 on a scale of 0 (no pain) to 10 (worst pain).</p> <p>Complications: One patient with multiple tumours not on warfarin, had haematuria after OLA which settled spontaneously and didn't need hospital admission. No other</p>	No conflicts of interest	Comparison not relevant to PICO												

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			taking it before procedure. Other 4 continued warfarin treatment.	PDD before OLA. In these patients 50ml Hexvix instilled 1hour before OLA. Voided before procedure and a PDD-enabled 16.5 F flexible cystoscope was used with white light then blue light. Additional tumours (seen in 21% of patients) under blue light and not WLC were noted.			complications. Recurrence: At 3 months 10.6% who had OLA had recurrence vs 4.3% who had OLA with PDD. At 1 yr, recurrence rate was 65.1% and 46.9% respectively.		