

Holmium:YAG laser ablation of upper urinary tract transitional cell carcinoma with new Olympus digital flexible ureteroscope

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Abstract Upper urinary tract transitional (UUTT) cell carcinoma is a relatively uncommon urologic tumor. The traditional treatment approach for them is radical nephroureterectomy. However, in recent years, less-invasive treatments, including different nephron-sparing procedures, have become increasingly popular. We report a case of laser ablation of UUTT cell carcinoma using new Olympus digital flexible ureteroscope (URF-V).

Key Words: Holmium:YAG laser, upper tract urothelial carcinoma, ureteroscope

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INTRODUCTION

Nephroureterectomy with bladder-cugg removal is still the standard treatment for UUTT because of the high recurrence rates in the remaining distal ureter, the multi-centricity on the same side, and the low incidence of bilateral tumours. In order to preserve renal function, therapeutic approaches have evolved from complex open surgery to minimally invasive ureteroscopic therapy in selected cases.^[1]

This option has been greatly facilitated by the modern development of fine-bore, actively deflectable ureteroscopes in addition to ablative and coagulative laser technologies.^[2]

CASE REPORT

A 62-year-old male with a history of tuberculosis and left

nephroureterectomy in 1992 because mastic kidney was admitted to our hospital presenting repeated microscopically haematuria.

Initially, IVU and CT were performed, without conclusive findings in the collecting system. Due to higher resolution image and diagnostic ability, endoscopy is commonly used to diagnose upper urinary tract tumors by our group in selected cases. Then, using an access sheath 12/14 Flexor TM (Cook) and with the help of a hydrophilic guide wire (Terumo 0.035"), we performed a flexible ureteroscopy, revealing a small papillary tumor in the right kidney middle calyx. A biopsy of the tumor was obtained by 2.4 Fr tipless nitinol basket. The result of the biopsy was a low-grade urothelial tumor. Cytology was negative.

After discussion regarding ureteroscopic treatment of this lesion, including the theoretical risk of tumor recurrences we decided ureteroscopic management of the tumor using Holmium:YAG laser ablation.

A new 8.5 F Olympus® digital ureteroscope (ODF-URS): URF-V was used to locate the urothelial tumor [Figure 1] and ablation of the tumor was performed by 200 µm laser Stone Light 15 W Ho: YAG fiber [Figures 2 and 3] set at 1.0 J and 10 Hz.

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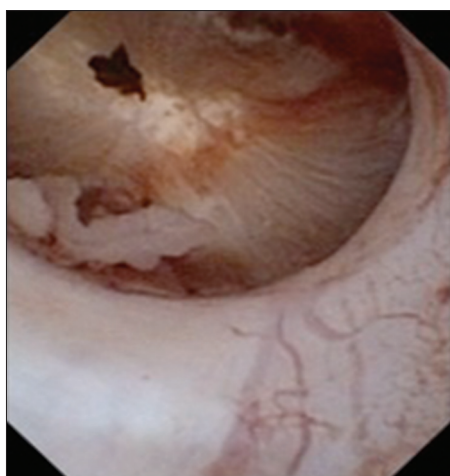


Figure 1: High quality endoscopic image from calyceal tumor with new Olympus digital flexible ureteroscope (URF-V)

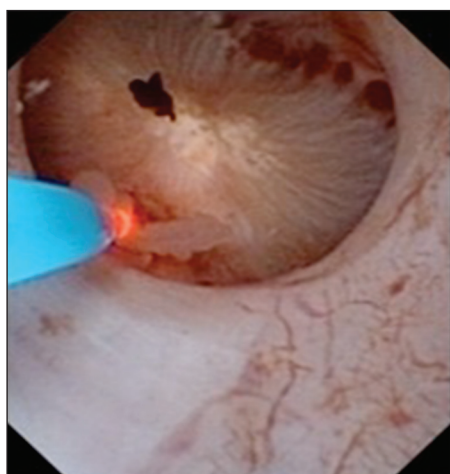


Figure 2: Tumor ablation with 200 µm Ho:YAG laser fiber

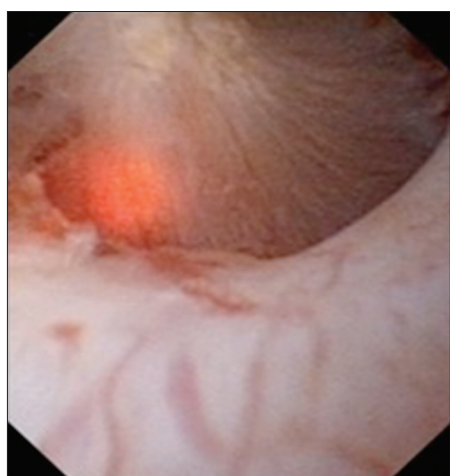


Figure 3: Complete ablation of the calyceal tumor

The procedure was completed in 30 min, and the estimated blood loss was less than 50 mL. A Foley catheter was placed after surgery up to 12 h.

Patient hospital stay was 24 h without any post-operative complication. The patient has been followed for 6 months without evidence of recurrence on surveillance ureteroscopy, cytology, cystoscopy or IVU.

DISCUSSION

Ureteroscopy makes you to visualize the tumour directly to improve the diagnosis accuracy for upper tract lesions compared with that of the conventional evaluation with imaging and urinary cytology.

UUTT cell carcinoma is a relatively uncommon urologic tumor accounting for 5-6% of all urothelial malignancy and 5-10% of all renal cancers. Ureteral tumors occur in about 25% of UUTT cases; most occur in the distal ureter (70%), followed by the middle ureter (25%) and the remainder occur in the proximal ureter. Bilateral disease is rare and occurs in 2-4% of cases. A bladder lesion develops in 30-75% of patients with UUTT.^[1]

Based on the established endoscopic treatment of bladder tumors, the application of endoscopic techniques became limited only by the instrumentation available. This concept became a reality as appropriate ureteroscopes became available.

The first instruments used for endoscopic antegrade resection of the UUTT were electric coagulators but the energy needed for resection was high and they could cause stricture or perforation. With the development of progressively smaller and more durable rigid and flexible ureteroscopes, retrograde endoscopic procedures have become more practical and effective, furthered by the use of different lasers (Ho:YAG and Neodimium:YAG [Nd:YAG]). Ho:YAG laser can evaporate, coagulate, and resect tumors. Can be used safely since its radiation affects only surface (<0.4 mm).^[3,4] The Nd:YAG laser is better for larger areas of tumor ablation (> 2cm), but it is more dangerous tool, with a greater potential for renal pelvic and ureteric perforation than the Ho:YAG laser.^[5]

Majority of this surgical procedures performed with flexible devices have the technical drawback of a poor optic image provided by fiberoptic endoscope. New 8.5 Fr Olympus® digital flexible ureteroscope (ODF-URS): URF-V with EndoEYE technology (CCD camera located at the distal tip of the endoscope) allows for focus-free high quality imaging. ODF-URS: URF-V is compatible with Ho: YAG laser for treatment within the kidney through 3.6 Fr working channel, allowing for clear image capture without any image distortion during treatment, 180° and 275° (up/down) optimal deflection for easy access to all areas of the kidney and Olympus' exclusive insertion tube rotation function allows the

user to make fine manipulations of the endoscope tip while keeping the control hand in a neutral position. This could potentially reduce user fatigue due to excessive hand movement.

The indications for endoscopic treatment for UUTT are not yet well defined. Patients for whom endoscopic tumour ablation is indicated include those with a solitary kidney, renal insufficiency, bilateral UC of the upper urinary tract, or those with a high risk of medical complication associated with poor operative risk.^[6]

Elliot *et al.* used the following selection criteria for definitive endoscopic treatment of UUTT: (a) Normal contralateral kidney was present, (b) All lesions were papillary and superficial in appearance, (c) Complete visualisation was possible, (d) Complete resection was possible, (e) Lesion was <2 cm in diameter, (f) There was no computed tomographic evidence of parenchymal invasion and (g) Patient was responsible and deemed capable of adhering to a strict schedule of follow-up evaluations.^[7]

Recurrence rates are reported in 9.5–45% of cases. The mechanism of recurrence has not been elucidated, but multifocal recurrence, where the source of tumor development remains, is believed to be the cause. High-grade tumors and pre-operative urinary cytology-positive cases are more likely to have recurrence.^[3]

Careful, lifelong follow-up is mandatory after endoscopic treatment of all UUTT cell carcinomas.

A well-established surveillance schedule was presented by Ho and Chow, consisting of cystoscopy and cytology every 3 months alternating with cystoscopy, retrograde pyelogram, cytology, and flexible ureteroscopy every 6 mo. for the first 2 years, then cystoscopy every 6 months, and annually ureteroscopy.^[8]

Transurethral endoscopy with the Ho:YAG laser, as nephron-sparing surgery for UUTT is safe and effective during a long period of observation. Good long-term results can be expected in elective cases if the indications are carefully selected. The initial stage and grade of the tumor is the key to defining the ultimate success of treatment.^[1,3]

However, there are still significant limitations to ureteroscopic treatment, such as inadequate staging, possible risks of local recurrence and the possibility of causing tumour progression after endoscopic treatment.

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