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## Holmium: yttrium-aluminum-garnet (Ho:YAG) laser for resection of bladder tumor in a pediatric patient

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**Abstract** Bladder tumours are rare in children, with only 0.4% of cases occurring in the first 2 decades of life. Herein, a pediatric patient who underwent TUR-B with a holmium: yttrium-aluminum-garnet (Ho:YAG) laser is presented. Its histopathology was reported as urothelial papilloma.

**Key Words** Bladder tumor; pediatric; holmium laser; resection.

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### INTRODUCTION

Bladder cancer is a disease that affects mostly the middle-aged or the elderly people, and is rarely encountered in the pediatric age group. In the first two decades

of life, its incidence has been reported as 0.1–0.4% [1-3]. For management of bladder cancer, transurethral resections of the bladder tumor (TUR-B) with a resectoscope loop or its various technical modifications are often used [4,5]. In recent years, various studies on effectiveness and safety of laser applications for the management of bladder tumors in adult patients have been published [6]. However, the use of laser for the resection of a bladder tumor in pediatric

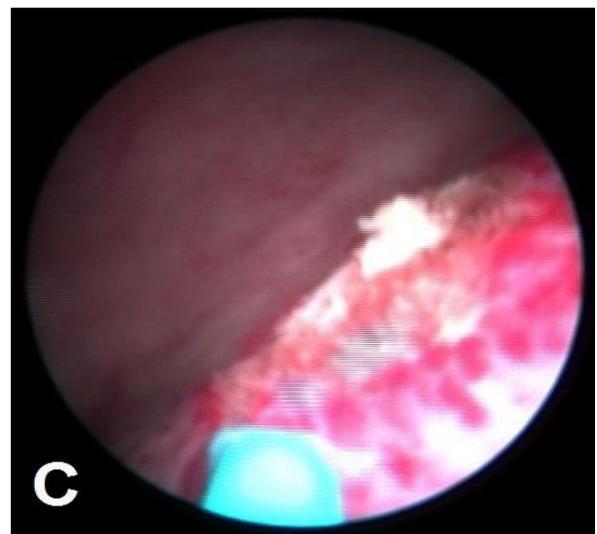
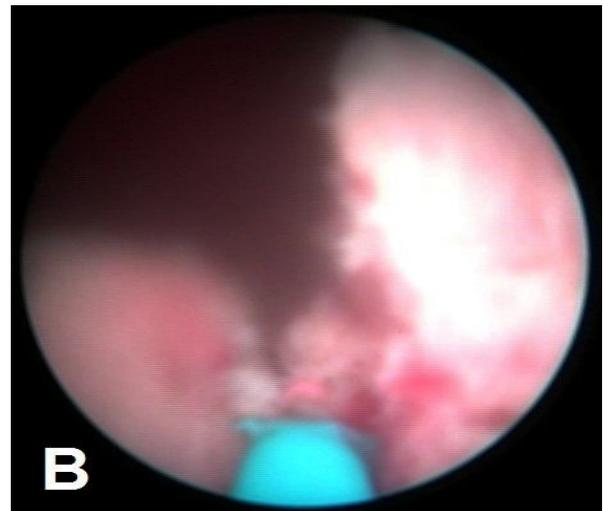
patients has not been cited in the medical literature until now. We report a pediatric patient with urothelial papilloma who underwent TUR-B with a holmium: yttrium-aluminum-garnet (Ho:YAG) laser.

### CASE REPORT

A 12-year-old boy was admitted to our department because of painless gross hematuria for the last several days. His medical history did not reveal any evidence of exposure to a chemotherapeutic or chemical agent. As a result of physical examination and routine laboratory evaluations only an erythrocyturia was reported. There was absence of growth in the culture of urine specimens. An ultrasound (US) scan revealed a mass lesion on lateral wall of the bladder. A cystoscopy was performed under general anesthesia, and a pedunculated papillary lesion, 20x10x10 mm in diameter, was observed in the lateral localization of the left ureter (Fig. 1A).

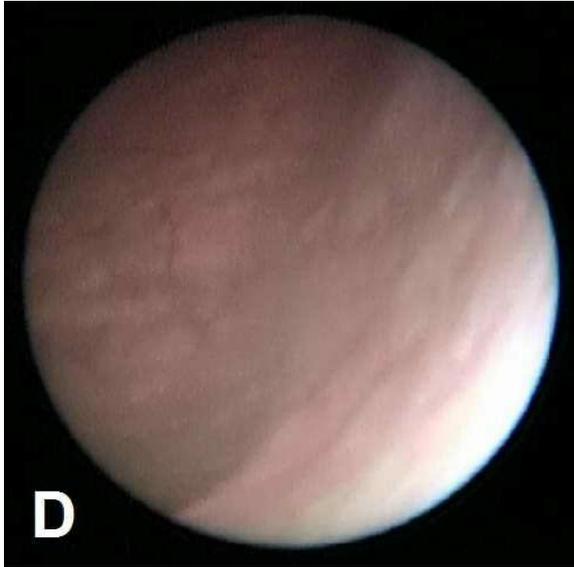


During the operation, because of a sudden malfunction of the pediatric resectoscope, we had to proceed with laser resection. A 9.5 F pediatric cystoscope was inserted via a transurethral route into the bladder cavity, and the mass was completely resected from dome of the bladder, down to its base, using a 550  $\mu$ m Ho:YAG laser probe (Fig. 1B,C).



A cold punch biopsy was taken from the base of the mass. Its histopathology was reported as an urothelial papilloma, and the base of the lesion was tumor-negative. The

cystoscopic control examination was reported as normal 3 months after the operation (Fig. 1D).



**Fig. 1.** (A) An endoscopic appearance of a papillary mass in the bladder. (B) A tumor resection with laser. (C) A fulguration of the base of the tumor. (D) Cystoscopic appearance of the intravesical cavity at the 3-month follow-up period.

## DISCUSSION

Bladder cancer most commonly comes to medical attention in the 6<sup>th</sup> and 7<sup>th</sup> decades of life. [7,8]. The worldwide age standardized incidence rate is 10.1 per 100,000 for males and 2.5 per 100,000 for females [9]. Urothelial tumors in the first 2 decades of life are unusual, most of which have been described in case reports and small series [2,3]. Additionally, experience

with treatment of bladder tumor in childhood is limited because of its uncommon incidence [10].

As it is seen in adult patients, the admission complaint of gross hematuria is generally detected in the pediatric population [10]. This case was also seen with complaints of gross hematuria. In addition to the hematuria, according to the location of the mass, symptoms related to obstruction of the bladder outlet or ureteral orifice can be seen. Assessment of gross hematuria is included a urine culture, cytological evaluation of the urine, imaging of the kidneys, upper urinary tract and bladder and cystoscopy. Ultrasonography is generally the first examination to be performed in the clinical evaluation of gross hematuria for detection of bladder tumors because it is simple and safe for the cases. However, bladder tumors are usually diagnosed with cystoscopy. In cystoscopy, the gross appearance of the tumor can be evaluated (focal vs. multiple, flat vs. papillary and nodular), and a biopsy can be obtained from the tumor.

The most frequently used resection method is a TUR-B performed with a monopolar or bipolar resectoscope loop. Moreover, in current reports, especially in adult patients, potential use of the laser energy in TUR-B procedures has been stated [4-6]. Endoscopic holmium: yttrium-aluminum

garnet (Ho:YAG) laser incision is a new method, applied in pediatric urology in recent years. YAG laser irradiation has been preferred for treatment in the majority of pediatric patients with bladder hemangioma and it provides results superior to alternative therapy [11-14]. Takemoto et al [15] reported that a case of large bladder hemangioma, in an otherwise healthy 4-year-old boy, was successfully treated with serial endoscopic yttrium aluminium garnet laser irradiation. There was no recurrence, and normal bladder function was preserved. They suggested that serial yttrium aluminium garnet laser irradiation is thus a useful, less invasive method for cases with large tumors. In another pediatric study, Futao et al [16] have evaluated endoscopic holmium:yttrium-aluminum-garnet (Ho:YAG) laser's therapeutic effect on the treatment of pediatric patients with urethral strictures and urethral atresias. They suggested that with the advantages of safety, efficacy and minimal invasion; endoscopic Ho:YAG laser incision technique could be used as a primary treatment option in patients with urethral stricture. In this case, because of technical problems related to the resectoscope, a 550

µm laser probe was used. Endoscopic holmium: yttrium-aluminum-garnet (Ho:YAG) laser can be applied in-depth tissue resection, including safe surgical margins, which could allow a histopathologic evaluation.

In the pediatric population, hematuria can be a symptom of the bladder tumor. Therefore, in the relevant assessments, a mass lesion of the bladder should be kept in mind. For the selected pediatric cases, the use of laser energy for TUR-B can be an alternative to the standard procedures. Larger-scale studies should be conducted to be able to determine the effectiveness and safety of this method in detail.

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