SKILL AND TALENT

High-pressure balloon dilatation for treatment of orthotopic ureterocele


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Received 18 July 2011; accepted 19 July 2011
Available online 14 May 2012

KEYWORDS
Ureterocele; Orthotopic; Dilatation; Balloon; Infant

Abstract
Objective: Transurethral puncture or endoscopic unroofing is the best treatment currently used for both orthotopic and ectopic ureteroceles. However, they have a high incidence of secondary vesicoureteral reflux and subsequent procedures in both groups. We present a new technique for treatment of orthotopic ureterocele.

Methods: We analyzed 4 patients with orthotopic ureterocele (9.7 ± 6.2 months old) treated by dilatation of the meatus of the ureterocele. No patient had vesicoureteral reflux or duplicate systems. The indication was pyonephrosis in 2 children and progressive worsening of hydroureter in 2. Dilatation was performed with 5 or 6 mm high-pressure balloon after inserting a stent with guidewire of 0.014 in. to the ureterocele.

Results: There were no intraoperative or postoperative complications, surgical time being 24 ± 9 min. All patients were discharged at 24 postoperative hours. Ureterohydronephrosis disappeared in all the children and they continue asymptomatically after 35 ± 22.5 months of follow-up. There were no cases of secondary vesicoureteral reflux and renal scan was unchanged after treatment.

Conclusions: High pressure balloon dilatation of the meatus in cases of orthotopic ureterocele is a fast, safe and successful surgical technique. We did not find any cases of secondary vesicoureteral reflux or subsequent procedures in our series, so we believe this may offer significant benefits over the transurethral puncture in such patients.

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PALABRAS CLAVE
Ureterocele; Ortotópico; Dilatación; Balón; Lactante

Dilatación con balón de alta presión como tratamiento del ureterocele ortotópico

Resumen
Objetivo: La punción o destechamiento endoscópico es el tratamiento más utilizado en la actualidad tanto para los ureteroceles ortotópicos como para los ectópicos. Sin embargo tienen una alta incidencia de reflujo vesicoureteral secundario y de procedimientos quirúrgicos posteriores en ambos grupos. Presentamos una nueva técnica de tratamiento de los ureteroceles ortotópicos.

* Please cite this article as: Parente A, et al. Dilatación con balón de alta presión como tratamiento del ureterocele ortotópico. Actas Urol Esp. 2012;36:117–120.
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Introduction

The key aims of the treatment of the ureterocele (UTC) are to prevent infection and its complications, to protect renal function from the ipsilateral and contralateral units, and to reduce the number of subsequent surgical procedures.\(^1\) Since the mid-1980s, endoscopic puncture or endoscopic unroofing of the UTC has been used as the initial treatment for this disease process.\(^2\) The endoscopic puncture as the initial procedure has proved useful to prevent the risk of pyelonephritis and facilitate subsequent reconstructive surgery. However, other authors have shown reluctance to initial endoscopic puncture due to the high number of secondary reconstructive surgical procedures needed later by these children.\(^3\) One of the problems which must be faced after endoscopic puncture of the UTC is the high incidence of the secondary vesicoureteral reflux and its infectious complications.

We present a new technique for UTC intravesical treatment by dilatation with high-pressure balloon of the UTC meatus. With it, we seek the same objectives described above, in addition to reducing the risk of secondary vesicoureteral reflux in the affected and in the contralateral systems.

Materials and methods

We present 4 patients with orthotopic UTC treated at our center by UTC meatal dilatation with high-pressure balloon. In 2 cases, the treatment indication was for sepsis due to pyonephrosis of the kidney (Fig. 1), whereas in the remaining 2 patients, it was progressive worsening of the ureterohydronephrosis (from grade I to IV hydronephrosis when we performed the indication for surgery) with thinning of renal parenchyma and obstructive pattern in the diuretic renogram. None of the patients had renal duplicity.

The treatment was performed by cystoscopy, visualizing the contralateral ureteral meatus, and locating the meatus of the UTC with the help of hydrophilic guides of 0.014 in. or, if necessary, of 0.035 in. After achieving meatus tutoring, we performed dilatation under direct vision of it using a 5 or 6-mm high-pressure balloon over the guide, depending on the patient’s age. After checking the tear notch that is produced in the balloon after high-pressure inflation, in some cases, we check the decompression efficiency by introducing the 9.5 Fr compact cystoscope within the ureterocele (Fig. 2). After that, we placed a 3 Fr double-J ureteral stent externalized through the urethra using a Prolene suture, which was removed in outpatient consultation one week after the intervention (Fig. 3).

At the time of diagnosis, renal ultrasound, voiding cystography, and DMSA renal scintigraphy were performed in all patients. In the patients who had progressive worsening of the ureterohydronephrosis, MAG3 diuretic renogram was performed. After balloon endoscopic decompression, the patients were studied with ultrasound and
cystography or cystosonography, as well as follow-up of the renal parenchymal function by renal scintigraphy with DMSA or MAG-3 diuretic renogram if this was performed before.

Results

In all the patients, the diagnosis was prenatal. Two of the patients suffered recurrent urinary infections after birth. The mean age at the time of endoscopic treatment was 9.7 months (±6.2 months). The mean follow-up after dilation is 35 months (±22.5 months).

The average operating time was 24 min (±9 min). There were no intraoperative or immediate postoperative complications, all the patients being discharged from hospital within 24 h after the surgery. Control ultrasound, performed at 4 weeks of the puncture, showed diminished ureterohydroureteral reflux of the system corresponding to the UTC system in all the cases (Fig. 3). In the evolution, none of the patients had any complications and remained asymptomatic in all the cases.

At the time of diagnosis, none of the patients had vesicoureteral reflux to the UTC system or the contralateral kidney system, not appearing either reflux in any of the patients after dilation. At scintigraphic follow-up, there are no changes in renal function in any of the patients, and there is normalization of the pattern of the curve in the diuretic renogram of the 2 patients in whom it was performed.

Renal ultrasound was considered normal from 6 months after the intervention to the present in all the patients, except in one who maintains a minimum residual pyelic ectasia of 3 mm anteroposterior diameter.

Discussion

Since in 1985, Monfort et al. described transurethral incision, the use of this technique or the subsequent puncture of the ureterocele has spread until today being the technique of choice for the intravesical ureterocele. The endoscopic puncture of the ureterocele aims to decompress the uri- nary tract in order to preserve renal function and reduce urinary infections, decreasing surgical complications. In addition, nowadays, the various groups try to improve the technique or find those indications in which to minimize the number of subsequent interventions. Thus, although the puncture has been proven as a useful treatment and almost free of intraoperative complications to achieve decompression of the intravesical ureterocele, there are doubts about whether the treatment is appropriate in all the cases.

Although many studies do not differentiate between the different types of UTC, many pediatric urologists consider, in their daily practice, orthotopic or intravesical UTCs and ectopic or extravesical UTCs as distinct physiopathological entities. Thus, some authors analyze the results of the different surgical techniques in UTCs differentiating the two groups. Others, like Di Renzo, find when globally analyzing the UTCs that those replicate systems with ectopic ureteroceles have a different evolution from those patients with single systems and orthotopic ureteroceles. In the physiopathology of the obstruction that occurs in the intravesical UTCs, the location of the meatus of such UTC has no influence, so we think that we do not need to perform a new one, but it would simply be sufficient to expand the existing one in order to achieve decompression. This allows us not to modify the walls of the UTC to reduce the likelihood of creating a secondary vesicoureteral reflux. Besides, we do not change its position with regard to the trigone, which could increase the risk of worsening the secondary reflux and make subsequent endoscopic treatment difficult.

In a recent large meta-analysis, Byun and Mergue- rian show that although the percentage of secondary vesicoureteral reflux and reoperation is much lower in orthotopic UTC in the ectopic, this is between 16 and 45% of patients treated with orthotopic UTC simple puncture. In the literature we find technical variations of the puncture of the UTC looking to improve these results, as a double puncture with fulguration of UTC, use of Holmium laser, etc. In our case we used the UTC meatal dilatation using high pressure balloon as an alternative technique in orthotopic
UTC, with very good results to achieve renal decompression systems in all patients. This decompression seems to be finalized after an extended period of monitoring. In our series, although short to make definitive conclusions, we found no cases of secondary vesicoureteral reflux or complications. We believe that this technique respects the normal physiology of the ureterovesical system and thus reduces complications related to puncture or aggressive techniques. We think this technique is so effective with minimal complications in those with UTC intravesical ureteral orifices.

In a recent large meta-analysis, Byun and Merguerian show that although the percentage of secondary vesicoureteral reflux and need for reoperation are much lower in the orthotopic UTCs than in the ectopic ones, this is between 16 and 45% of the patients treated with simple puncture of the orthotopic UTC. In the medical literature, we find technical variations of the UTC puncture seeking to improve these results, such as a double puncture with UTC fulguration, use of Holmium laser, etc. In our case, we used the UTC meatal dilation with high-pressure balloon as an alternative technique in orthotopic UTCs, with very good results by achieving decompression of the renal systems in all the patients. This decompression seems to be definitive after an extended period of follow-up. In our series, although short to make definitive conclusions, we found no cases of secondary vesicoureteral reflux or subsequent complications. We believe that this technique respects the normal physiology of the ureterovesical system and, thus, it reduces the complications secondary to the puncture or more aggressive techniques. We think that this technique is therefore effective and with minimal complications in those UTCs with intravesical meatus.

The treatment is simple in expert hands with endourological techniques and without complications, without interfering with any other further proceeding in the event of failure of the technique. In order to overcome the difficulty to tutor the UTC meatus, we use small-caliber guide wires, hydrophilic guide wires being especially useful. Once the ureter is tutored, the dilation can be performed under direct vision without need for radioscopic control. The placement of a double J stent makes sure that there is no acute obstruction of the ureter due to inflammation. By externalizing it through the urethra, it is possible to remove it on an outpatient basis at consultation avoiding a new anesthetic procedure without disturbing with it the welfare of the child. Not being able to tutor the uretercele does not prevent a puncture in the same proceeding or any other technique. However, in our series, there were no intraoperative or postoperative complications, this being a quick and minimally invasive technique.

**Conflict of interest**

The authors declare that they have no conflict of interest.

**References**