

·临床研究·

儿童肾盂输尿管连接部梗阻合并同侧输尿管膀胱连接部梗阻14例诊治分析

张 晔¹, 裴文婷^{2,3}, 孙起航¹, 蒋加斌¹, 张 殷¹, 潮 敏^{2,3}

(1. 安徽省儿童医院泌尿外科, 安徽 合肥 230051; 2. 安徽医科大学儿童医学中心泌尿外科, 安徽 合肥 230051;
3. 安徽医科大学第五临床医学院泌尿外科, 安徽 合肥 230032)

摘 要:【目的】探讨儿童肾盂输尿管连接部梗阻(UPJO)合并同侧输尿管膀胱连接部梗阻(UVJO)的临床特征、诊断难点及治疗策略。【方法】回顾性分析我院2014年1月至2024年12月收治的UPJO合并同侧UVJO患儿的临床资料,包括性别、年龄、首诊诊断、侧别、影像学检查、手术方式及随访结局。【结果】首诊为UPJO者9例,UVJO者5例。术前仅MRU提示输尿管扩张者6例,其余均未明确诊断。确诊方式:术中逆行肾盂造影(RPG)5例,术后经肾造瘘管顺行造影(APG)7例,两者联合2例。首次手术:肾盂成形术9例,输尿管膀胱再植术2例,经皮肾穿刺造瘘术2例,输尿管口扩张术1例。10例术中留置肾造瘘管。中位随访5.5年,4例接受二次手术。其中仅1例因持续梗阻需分期处理双重梗阻,另3例初诊UVJO者行再植术后UPJ梗阻自行缓解。10例未二次手术者中,8例术后APG虽提示远端排空延迟,但夹管后无临床症状且肾积水持续改善。【结论】儿童UPJO合并同侧UVJO术前诊断困难,术中顺行或逆行留置输尿管支架管失败时需进一步评估。首诊UVJO者首选肾盂成形术,无需常规逆行肾盂造影,但留置肾造瘘管术后APG评估可避免不必要的输尿管再植。初诊UVJO且输尿管严重扩张者,可先行输尿管再植。

关键词:儿童;肾盂输尿管连接部梗阻;输尿管膀胱连接部梗阻;肾盂积水;手术

中图分类号:R726.9

文献标志码:A

文章编号:1672-3554(2026)04-0715-07

DOI:10.11714/jssu.med.YX20260035

Pediatric Ureteropelvic Junction Obstruction Complicated with Ipsilateral Ureterovesical Junction Obstruction: Analysis of Diagnosis and Management in 14 Cases

ZHANG Ye¹, PEI Wenting^{2,3}, SUN Qihang¹, JIANG Jiabin¹, ZHANG Yin¹, CHAO Min^{2,3}

(1. Department of Urology, Anhui Provincial Children's Hospital, Hefei 230051, China; 2. Department of Urology, Children's Medical Center of Anhui Medical University, Hefei 230051, China; 3. Department of Urology, The Fifth Clinical Medical College of Anhui Medical University, Hefei 230032, China)

Correspondence to: CHAO Min; E-mail: cm0654@sina.com

Abstract:【Objective】To investigate the clinical characteristics, diagnostic challenges, and treatment strategies in pediatric patients with ureteropelvic junction obstruction (UPJO) complicated with ipsilateral ureterovesical junction obstruction (UVJO).【Methods】A retrospective analysis was conducted on clinical data of pediatric patients admitted to our hospital between January 2014 and December 2024 with a confirmed diagnosis of UPJO complicated with UVJO. The collected clinical parameters included gender, age at presentation, initial diagnosis, lesion laterality, imaging findings, surgical procedures, and follow-up outcomes.【Results】The study cohort comprised 14 pediatric patients (male=10 and female=4) with a median age of 3.1 months at presentation. The initial diagnoses were UPJO in 9 cases and UVJO in 5

收稿日期:2026-03-05

录用日期:2026-04-20

基金项目:安徽省科技厅临床医学研究转化专项项目(202304295107020066)

作者简介:张晔,共同第一作者,研究方向:泌尿系结构畸形及尿流动力学,E-mail: zhangye81@hotmail.com;裴文婷,共同第一作者,研究方向:上尿路结构畸形,E-mail: peiwenting2022@163.com;潮敏,通信作者,主任医师,E-mail: cm0654@sina.com

cases. Preoperatively, only 6 cases showed ureteral dilation on MRU. The definitive diagnosis was confirmed by intraoperative retrograde pyelography in 5 cases, postoperative antegrade pyelography via a nephrostomy tube in 7 patients, and combined application of the two modalities in 2 patients. For primary surgical intervention, 9 patients underwent pyelo-plasty, 2 underwent ureteral reimplantation, 2 received percutaneous nephrostomy, and 1 underwent ureteral orifice dilation. Intraoperative nephrostomy tube placement was performed in 10 patients. With a median follow-up duration of 5.5 years, 4 patients required revision surgery. Of these, only 1 patient, who had an initial diagnosis of UPJO, required staged management for persistent obstruction, whereas UPJ obstruction resolved after ureteroneocystostomy in the remaining 3 patients with an initial diagnosis of UVJO. Among the 10 patients who did not undergo revision surgery, 8 showed delayed distal urinary drainage on APG, yet remained asymptomatic with continuous improvement of hydronephrosis after nephrostomy tube clamping.【Conclusions】Preoperative diagnosis of concurrent UPJO and ipsilateral UVJO in pediatric patients is clinically challenging. Further intraoperative evaluation is mandatory when antegrade or retrograde ureteral stent placement fails during surgery. For patients with an initial diagnosis of UPJO, pyeloplasty is the first-line treatment. Routine retrograde pyelography is not recommended, whereas nephrostomy tube with subsequent postoperative APG evaluation can prevent unnecessary ureteroneocystostomy. For patients with an initial diagnosis of UVJO accompanied by severe ureteral dilation, primary ureteroneocystostomy is feasible initial management strategy.

Key words: pediatric patients; ureteropelvic junction obstruction; ureterovesical junction obstruction; hydronephrosis; surgical intervention

[J SUN Yat-sen Univ(Med Sci), 2026, 47(4): 715-721]

肾盂输尿管连接部梗阻(ureteropelvic junction obstruction, UPJO)和输尿管膀胱连接部梗阻(ureterovesical junction obstruction, UVJO)是导致儿童先天性肾积水的两个最常见原因^[1-2]。然而,二者同时存在于同一侧输尿管的双重梗阻在临床上相对少见,其诊断与治疗面临特殊挑战^[3]。双重梗阻的术前确诊率文献报道差异较大,范围在21.4%至66.7%之间^[4-5]。多需逆行肾盂造影(retrograde pyelography, RPG),或在术后经肾盂造瘘管行顺行造影(antegrade pyelography, APG)时,或随访中发现持续或新出现的输尿管扩张时才得以确诊^[5]。目前,对于UPJO合并同侧UVJO的最佳治疗策略尚未形成共识。主要争议点在于初次手术的选择,以及是否应同期处理两处梗阻^[5-7]。本研究回顾性分析了我院收治的14例UPJO合并同侧UVJO患儿的临床资料,总结其人口学特征、影像学特点、治疗方式及预后,并结合文献进行讨论,为临床实践提供参考。

1 材料与方法

1.1 研究对象

采用回顾性研究,收集我院2014年1月至2024年12月期间收治的UPJO合并同侧UVJO患儿

的临床资料。纳入标准:单侧病变;至少一种造影检查(RPG或APG)诊断明确同时存在UPJO与UVJO者;临床及随访资料完整。排除标准:合并其他泌尿系畸形(重复肾输尿管、膀胱输尿管反流、后尿道瓣膜、神经源性膀胱等);因肿瘤、结石、外伤等继发性因素导致的梗阻;临床资料缺失。本研究经医院伦理委员会审批(EYLL-2023-020),所有患儿监护人均签署书面知情同意书。

1.2 资料收集

通过电子病历系统收集以下数据:一般资料:性别、年龄、住院号、联系方式;临床特征:首诊时的初步诊断(UPJO或UVJO)、病变侧别;术前影像学检查结果:泌尿系超声测量的肾盂前后径分离宽度(anteroposterior diameter of the renal pelvis, APD)、患肾皮质厚度、静脉尿路造影(intravenous urography, IVU)下输尿管是否显影、磁共振尿路成像(magnetic resonance urography, MRU)下是否存在输尿管扩张;手术相关信息:首次手术方式、术中RPG情况、术中是否留置肾盂造瘘管;治疗结局:术后病情进展、APG结果及是否接受二次手术。

1.3 统计学分析

采用描述性统计分析。符合正态分布的计量资料以均数±标准差 $\bar{x} \pm s$ 表示,否则以中位数(四分位数间距) $M(P_{25} \sim P_{75})$ 表示;计数资料以例数

(*n*)表示。所有数据分析均使用 SPSS 27.0 软件进行。

2 结果

2.1 患儿一般情况

2014年1月至2024年12月期间我院共收治首诊UPJO患儿412例,首诊UVJO患儿86例,符合纳入标准的UPJO合并同侧UVJO患儿14例。其中男性10例,女性4例。年龄23天至84月,中位年龄为3.1(1.7~9.0)月。左侧发病9例,右侧发病5例(表1)。

表1 14例UPJO合并UVJO患儿基线资料	
Table 1 Baseline Characteristics of 14 Children with UPJO Complicated with UVJO	
[($\bar{x} \pm s$), $M(P_{25}-P_{75})$, n]	
Variable	Value
Sex	
Male	10
Female	4
Age/month	3.1 (1.7-9.0)
Affected Side	
Left	9
Right	5
Initial Diagnosis	
UPJO	9
UVJO	5
Preoperative APD/mm	33.5(28.0-64.5)
Renal cortex thickness on affected Side/mm	3.78 (2.79-4.58)

UPJO: ureteropelvic junction obstruction; UVJO: ureterovesical junction obstruction; APD: anteroposterior diameter of the renal pelvis.

2.2 术前影像学特征

所有患儿术前均行泌尿系超声(表1)、IVU及MRU检查(表2)。

2.3 手术治疗与结局

2.3.1 初次诊疗情况 在14例患儿中,术中RPG确诊5例,术后APG确诊7例,术中RPG联合术后APG确诊2例。所有患儿均接受了手术治疗,首诊

为UPJO的9例患儿,均行Anderson-Hynes离断式肾盂成形术,8例术中使用3Fr双J管自肾盂顺行向膀胱置入时,多次尝试(≥ 3 次)调整角度或更换导丝仍无法通过,行肾盂造瘘;1例在术中顺行留置3Fr双J管入膀胱失败,转而探查盆腔发现输尿管末端迂曲,将其松解后顺利置入双J管。首诊为UVJO者5例,2例行输尿管膀胱再植术,其中1例术中RPG检查提示合并同侧UPJO,同时行肾造瘘术;1例因年龄较小(3月龄)行输尿管口扩张后逆行留置3Fr双J管;1例术中逆行置管失败改行肾盂造瘘术;1例因肾盂严重扩张(APD 85 mm)且分肾功能 $<10\%$,MRU提示双重梗阻可能,行经皮肾穿刺造瘘术。

2.3.2 二次手术情况 术后随访程中共有4例患儿接受了二次手术。病例2在初次术后7年出现腹痛、发热等症状,MRU检查(图1A)发现远端持续梗阻;病例8、9、12均在术后早期(1周至3个月)出现发热性尿路感染或肾积水加重,APG/RPG证实远端器质性梗阻无改善,故行输尿管膀胱再植术。其中病例8初次行输尿管口扩张后一周出现发热性尿路感染(图1B);病例9、12在初次手术时仅行肾造瘘,术后APG明确双重梗阻后行输尿管膀胱再植术(图1C)。其余患儿随访期内无手术干预指征。

2.3.3 术后随访 所有患儿均接受术后定期随访,14例患儿随访1.5年至10年,中位随访时间5.5(3.0~7.8)年。在10例未行二次手术的患儿中,8例留置造瘘管的患儿于术后1~3个月APG见UPJ(病例13)或UVJ(病例1、4、5、6、7、10、11)处鼠尾状改变,拔管前行美蓝通畅实验,结果均显示尿液蓝染时间超过2 h[中位时间3.5(2.5~12) h],但夹管期间无发热、腹痛等不适,且连续随访超声显示肾盂前后径较术前逐渐减小,输尿管扩张程度亦逐渐减轻或稳定。2例未留置造瘘管的患儿(病例3、14)术后6周拔除双J管后,随访超声亦显示肾积水稳定或改善。

3 讨论

儿童UPJO合并同侧UVJO的双重梗阻是一个具有挑战性的临床问题。本研究通过对14例双重梗阻患儿的回顾,结合既往文献,分析临床特点,总结诊疗经验。

表2 14例UPJO合并UVJO患儿的病例特征与诊疗情况
Table 2 Characteristics and treatment details of 14 cases with UPJO complicated with UVJO

No.	Sex	Age	Initial diagno- sis	Side	Preop. APD / mm	IVU (ureter visualization)	MRU (ureter dilation)	Confirmation method	Primary surgical procedure	Neph- rostomy	Reoper- ation
1	M	1 m 17 d	UPJO	R	33	No	No	Postoperative APG	LaparoscopicA-H	Yes	No
2	F	1 m 23 d	UPJO	L	72	No	Yes	Postoperative APG	OpenA-H	Yes	Yes
3	M	1 m 11 d	UPJO	L	33	No	No	Intraoperative Findings	Robot-assisted A- H + terminal ureter- olysis	No	No
4	M	1 m 3 d	UPJO	L	68	No	Yes	Postoperative APG	LaparoscopicA-H	Yes	No
5	F	3 m 6 d	UPJO	L	28	No	Yes	Intraoperative RPG	LaparoscopicA-H	Yes	No
6	F	7 yr	UPJO	L	39	No	No	Postoperative APG	LaparoscopicA-H	Yes	No
7	M	2 m 18 d	UPJO	L	32	No	No	Postoperative APG	LaparoscopicA-H	Yes	No
8	M	3 m 25 d	UVJO	R	30	Yes	Yes	Intraoperative RPG	Cystoscopic ureteral orifice dilation	No	Yes
9	M	5 m 8 d	UVJO	L	25	Yes	Yes	Intraoperative RPG	Pyelostomy	Yes	Yes
10	M	4 m 13 d	UPJO	L	26	No	No	Postoperative APG	LaparoscopicA-H	Yes	No
11	M	1 m 26 d	UPJO	L	61	No	Yes	Postoperative APG	LaparoscopicA-H	Yes	No
12	M	23 d	UVJO	R	85	No	Yes	Intraoperative RPG+ Postop- erative APG	Pyelostomy	Yes	Yes
13	M	9 m 7 d	UVJO	R	95	No	Yes	Intraoperative RPG+ Postop- erative APG	Laparoscopic ure- teroneocystos-tomy + nephrostomy	Yes	No
14	F	13 m	UVJO	R	26.3	Yes	Yes	Intraoperative RPG	Laparoscopic ure- teroneocystos-tomy	No	No

F: female, M: male; m: month(s); d: day(s); yr: year(s); R: right; L: left; A-H: Anderson-Hynes dismembered pyeloplasty; APD: anteroposterior diameter of the renal pelvis; IVU: intravenous urography; MRU: magnetic resonance urography; RPG: retrograde pyelography; Preop.: preoperative; Intraop.: intraoperative.



A: MRU reveals hydronephrosis and ureteral dilation. B: RPG confirms dual-level obstruction. C: APG demonstrates ureteral dilation with distal obstruction.

图1 二次手术患儿影像学资料

Fig. 1 Imaging Findings in pediatric patients who underwent reoperation

本研究中患儿男性略多于女性(10 vs. 4),左侧发病略多于右侧(9 vs. 5),与 McGrath 等^[4]和 Duarsa 等^[8]的报道相似。患儿年龄分布广,以婴幼儿为主,常在产前或生后早期因肾积水被发现^[9]。本研究中9例患儿首诊临床诊断为UPJO,这与UPJO更常见,且其影像学表现往往更突出有关。严重的UPJO可能限制尿液流入输尿管,导致输尿管无法扩张,从而在超声、IVU甚至MRU上均不显示典型的远端梗阻征象^[6,10]。

UPJO合并同侧UVJO的术前诊断主要依赖影像学检查,但常用的术前影像学检查各有其局限性。超声虽能敏感发现肾积水,但难以判断不扩张的输尿管是否合并远端狭窄,其肾盂前后径或肾皮质厚度亦无法对诊断提供帮助,但在肾盂扩张程度与输尿管扩张程度不符时则可考虑存在双重梗阻。而IVU时,因通过梗阻的UPJ处的造影剂太少,不足以将远端的输尿管充盈扩张,所以在影像上就无法显示出输尿管的全貌和扩张状态,造成“输尿管无扩张”的假象,从而忽略远端的UVJO^[10-11]。相对来说,MRU可显示输尿管扩张,对双重梗阻的诊断更加敏感。在Lee等^[5]的研究中,术前确诊率为66.7%,但其同时指出当超声未见输尿管扩张时,UVJO极易漏诊。Moodley等^[6]和Cay等^[10]强调了术前或术中RPG在显示全程输尿管、明确诊断方面的价值,特别是在一些复杂病例中,UVJO合并更罕见的输尿管中段狭窄时,MRU也可能漏诊,术中RPG成为明确诊断不可或缺的手段^[12]。但考虑到RPG的有创性、可能引起水肿以及部分病例逆行置管失败^[10],我们认为对于术前影像学(尤其是

MRU)未提示输尿管扩张的典型UPJO病例,术中不必强行追求RPG确诊。

对于可疑双重梗阻患儿,多数学者主张先行肾盂成形术,因UVJO有较高的自发缓解率^[8,13]。本研究发现,在经造影确诊的双重梗阻患儿中,10例在仅行肾盂成形术后远端梗阻自行缓解,无需二次手术,与既往文献推荐一致^[4,14]。根据组织学研究,UPJO和UVJO的梗阻段存在Cajal间质细胞减少和胶原比例增高,提示这些部位存在先天性蠕动功能缺陷^[9]。当近端严重梗阻时,长期的低流量状态可能抑制远端输尿管蠕动功能的发育。因此,解除近端梗阻后,远端输尿管的蠕动功能可能逐渐恢复,无需再次手术。这种选择可避免同期处理两处梗阻可能带来的输尿管血供受损风险^[8,15]。但有学者提出对于输尿管严重扩张(>10 mm)的患儿,可优先处理UVJO^[3,7,9]。本研究中5例初诊为UVJO的患儿,均于术中或术后证实存在双重梗阻,在接受了输尿管再植手术后均未处理近端梗阻,提示其UPJ处的梗阻更可能为继发性梗阻。近年来,以球囊扩张或内切开术为代表的微创内镜技术对于年龄小的患儿作为处理UVJO的初始手段展现出良好前景^[16-17]。值得注意的是,机器人辅助下同期完成肾盂成形术与输尿管再植术也已被证实是安全可行的方案^[18],这为患儿提供了一种新的治疗选择。

与既往文献类似^[11,14],本研究中多名患儿术中双J管置入困难。此时应高度怀疑合并同侧的UVJO^[15],但无法以此作为确诊依据。Wang等认为置管困难可能因双J管尺寸不合适或反复插管引

起输尿管远端一过性水肿有关^[19],而此时造瘘是保证尿液引流的关键。更重要的是,术后可经造瘘管进行APG检查或美蓝通畅实验直观地评估输尿管远端是否通畅^[20-21]。在本研究中,病例9及病例12经APG检查证实了输尿管远端的持续梗阻。其余患儿术后1~3月经肾造瘘管行APG检查,此时输尿管远端的一过性水肿应已消退,但仍可见UVJ处呈鼠尾状。美蓝通畅实验中尿液蓝染时间均较长,依据既往报道^[22-23],延迟排空提示可能存在功能性梗阻或轻度狭窄,但夹管后患儿无发热、腹痛等临床症状,且在后续随访中未因梗阻问题接受二次手术。

文献报道的二次手术率差异较大,从6.4%到68.3%不等^[4,14,16]。本研究中二次手术率为28.6%(4/14),但考虑到4例患儿中仅有1例(病例2)首诊UPJO后分期处理了远近端的梗阻,另3例首诊为UVJO的患儿均为选择微创治疗失败后行输尿管再植,UPJ处梗阻自行缓解,故实际二次手术率仅7.1%(1/14)。二次手术的决策应基于临床症状及明确的影像学梗阻证据,若患者出现反复感染或疼

痛等临床症状,同时影像学检查提示持续或加重的输尿管扩张,或经APG/RPG证实存在明确的梗阻,则需考虑再次手术治疗^[24]。

综上所述,儿童UPJO合并同侧UVJO多于术中顺行或逆行留置输尿管支架管困难发现,但最终须通过RPG或APG确诊。术前MRU提示UPJO同侧输尿管扩张或术前影像学检查发现肾盂积水严重程度与输尿管扩张程度不符时高度怀疑此诊断。对于首诊为UPJO且术前影像学未明确提示UVJO的患儿,无需术前常规行RPG检查,但术中发现输尿管扩张或顺行留置双J管困难时,应果断留置肾盂造瘘管便于术后APG检查;首诊UVJO的输尿管严重扩张的患儿,可选择输尿管再植术。术后长期的、系统的影像学随访是确保治疗成功的关键。

本研究存在一定的局限性。首先,本项单中心回顾性研究纳入的病例数量有限,可能存在选择偏倚。其次,患者随访时间长短不一,可能对远期结局及二次手术率的评估准确性产生影响。未来还需要通过多中心、大样本的前瞻性研究,进一步明确最佳的诊断路径与治疗策略。

参考文献

- [1] Isac GV, Danila GM, Ionescu SN. Spontaneous resolution and the role of endoscopic surgery in the treatment of primary obstructive megaureter: a review of the literature [J]. *Pediatr Med Chir*, 2023, 45(2). doi:10.4081/pmc.2023.327.
- [2] 阿布都赛米·阿布都热衣木, 王俊, 秦双利, 等. 腹腔镜手术治疗小儿副肾动脉压迫引起肾积水的临床体会[J]. *中华腔镜泌尿外科杂志(电子版)*, 2022, 16(1): 73-76.
Abudusaimi A, Wang J, Qin SL, et al. Clinical experiences of laparoscopy for children with hydronephrosis caused by compression of accessory renal artery [J]. *Chin J Endourol (Electr Ed)*, 2022, 16(1): 73-76.
- [3] Di Fabrizio D, Tavarolo I, Rossi L, et al. Combined minimally invasive treatment of pyeloureteral junction obstruction and primary obstructive megaureter in children: case report and literature review [J]. *Children (Basel)*, 2024, 11: 407.
- [4] McGrath MA, Estroff J, Lebowitz RL. The coexistence of obstruction at the ureteropelvic and ureterovesical junctions [J]. *AJR Am J Roentgenol*, 1987, 149: 403-406.
- [5] Lee YS, Im YJ, Lee H, et al. Coexisting ureteropelvic junction obstruction and ureterovesical junction obstruction: Is pyeloplasty always the preferred initial surgery? [J]. *Urology*, 2014, 83: 443-449.
- [6] Moodley P, Demaria J, Lorenzo AJ, et al. Concurrent ureteropelvic and ureterovesical junction obstruction in children: the value of retrograde pyelography [J]. *J Pediatr Urol*, 2010;6: 117-121.
- [7] Halder P, Shukla RM, Mandal KC, et al. Double obstruction of ureter: a diagnostic challenge [J]. *J Indian Assoc Pediatr Surg*, 2014, 19: 129-132.
- [8] Duarsa GWK, Ari Pandita MB, Putri DAIP, et al. Multilevel congenital ureteral obstruction in a two-year-old child: staged reconstruction with neo-implantation and V-Y pyeloplasty [J]. *Urol Case Rep*, 2026, 65: 103358.
- [9] Babu R, Vittalraj P, Sundaram S, et al. Pathological changes in ureterovesical and ureteropelvic junction obstruction explained by fetal ureter histology [J]. *J Pediatr Urol*, 2019, 15: 240. e1-240.e7.
- [10] Cay A, Imamoglu M, Bahat E, et al. Diagnostic difficulties in children with coexisting pelvi-ureteric and vesico-ureteric junction obstruction [J]. *BJU Int*, 2006, 98: 177-182.
- [11] 朱小江, 董隽, 马耿, 等. 肾盂输尿管连接部梗阻合并输尿管膀胱连接部梗阻的诊断与治疗 [J]. *中华实用儿科临床杂志* 2017, 32(23): 1797-1799.

- Zhu XJ, Dong J, Ma G, et al. Diagnosis and treatment of ureteropelvic junction obstruction combined with ureterovesical junction obstruction [J]. *Chin J Appl Clin Pediatr*, 2017, 32(23): 1797-1799.
- [12] El Masri M, Mantash M, Abou-Malhab C, et al. More than meets the eye: intra-operative retrograde pyelography when more than one ureteral obstruction is suspected—a case report [J]. *J Pediatr Surg Case Rep*, 2023, 93: 102645.
- [13] Ranawaka R, Hennayake S. Resolution of primary non-refluxing megaureter: an observational study [J]. *J Pediatr Surg*, 2013, 48: 380-383.
- [14] 姜大朋, 唐炳强, 王礼国, 等. 肾盂输尿管连接部梗阻合并同侧膀胱输尿管连接部梗阻的诊断与治疗[J]. *中华小儿外科杂志*, 2017, 38: 129-133.
- Jiang DP, Tang BQ, Wang LG, et al. Diagnosis and treatment of ureteropelvic junction obstruction combined with ipsilateral ureterovesical junction obstruction [J]. *Chin J Pediatr Surg*, 2017, 38(2): 129-133.
- [15] Stanciu OO, Moga A, Balanescu R, et al. Dual-level ureteral obstruction in children: a systematic review highlighting diagnostic challenges and optimal surgical strategy [J]. *Children (Basel)*, 2026, 13: 305.
- [16] Ebadi M, Kajbafzadeh AM, Tourchi A, et al. Endoureterotomy as the initial management of concurrent ureteropelvic and ureterovesical junction obstruction after failed conservative therapy[J]. *Urology*, 2013, 82: 214-219.
- [17] 蒋加斌, 张殷, 张晔, 等. 输尿管扩张术和输尿管膀胱再植术治疗儿童原发性巨输尿管症疗效分析[J]. *中山大学学报(医学科学版)*, 2025, 46(4): 686-692.
- Jiang JB, Zhang Y, Zhang Y, et al. Efficacy of ureteral dilation versus ureteral reimplantation for primary obstructed megaureter in children[J]. *J Sun Yat-sen Univ (Med Sci)*, 2025, 46(4): 686-692.
- [18] Kumar S, Khanna A, Parmar KM. Robot-assisted simultaneous pyeloplasty and ureteric reimplantation for unilateral double obstruction of the ureter: technical feasibility, tips and tricks[J]. *Urology*, 2020, 139: 118-121.
- [19] Wang X, Li J, Fan S, et al. Failure in Double-J stent inserting in laparoscopic pyeloplasty of ureteropelvic junction obstruction: the clinical features and outcomes [J]. *BMC Urol*, 2023, 23: 192.
- [20] Mahenthiran AK, Ferari C, King S, et al. The utility of the Whitaker test in the modern era of pediatric urology: a retrospective cohort study[J]. *J Pediatr Urol*, 2026, 22(2): 105737.
- [21] Veenboer PW, de Jong TPVM. Antegrade pressure measurement as a diagnostic tool in modern pediatric urology [J]. *World J Urol*, 2011, 29: 737-741.
- [22] Truesdale MD, Elmer-Dewitt M, Sandri M, et al. Methylene blue injection as an alternative to antegrade nephrostography to assess urinary obstruction after percutaneous nephrolithotomy[J]. *J Endourol*, 2016, 30: 476-482.
- [23] Pegolo PT de C, Miranda ML, Kim S, et al. Antegrade pressure measurement of urinary tract in children with persistent hydronephrosis [J]. *Int Braz J Urol*, 2012, 38: 448-455.
- [24] Lopez PJ, Calvillo-Ramirez A, Sancaktutar A, et al. Redo laparoscopic pyeloplasty in children: results from a multicentric series [J]. *Int Braz J Urol*, 2025, 51(5): e20250077.

(编辑 余 菁)