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三种输尿管镜治疗输尿管上段结石的疗效比较*

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摘要 目的:比较半硬性输尿管镜、输尿管软镜、孙氏末端可弯输尿管镜治疗输尿管上段结石的临床疗效,为临床上治疗方式的选择提供参考。**方法:**回顾性分析 2015 年 8 月到 2017 年 12 月间于上海市第十人民医院泌尿外科因输尿管上段结石行输尿管镜下软激光治疗的 515 例患者的临床资料。按照所用输尿管镜类型分为 3 组:硬镜组(给予半硬性输尿管镜治疗)297 例,软镜组 172 例(给予输尿管软镜治疗),孙氏镜组(给予孙氏末端可弯输尿管镜治疗)46 例。比较三组的手术时间、一期清石率、术后住院时间及术中、术后并发症。**结果:**硬镜组、软镜组、孙氏镜组清石率分别为 81.5%、94.2%、95.7%,其中软镜组、孙氏镜组清石率显著高于硬镜组($P<0.05$)。硬镜组、软镜组、孙氏镜组术中并发症发生率分别为 18.9%、5.8%、4.3%,其中硬镜组术中并发症发生率显著高于软镜组和孙氏镜组($P<0.05$),三组术后并发症发生率整体比较差异无统计学意义($P>0.05$)。硬镜组、软镜组、孙氏镜组平均手术时间分别为 $(28.6\pm 6.2)\text{min}$ 、 $(49.4\pm 12.4)\text{min}$ 、 $(26.1\pm 6.5)\text{min}$,软镜组平均手术时间显著高于硬镜组及孙氏镜组,差异有统计学意义(均 $P<0.05$)。硬镜组、软镜组、孙氏镜组平均住院时间分别为 $(5.4\pm 3.2)\text{d}$ 、 $(6.7\pm 5.7)\text{d}$ 、 $(5.0\pm 2.5)\text{d}$,软镜组住院时间显著高于硬镜组和孙氏镜组,差异有统计学意义(均 $P<0.05$)。**结论:**软镜清石效果和手术安全性较硬镜更有优势,但手术耗时长,患者术后住院时间长。孙氏镜有望成为治疗输尿管上段结石的更佳选择。

关键词:输尿管结石;上段;半硬性输尿管镜;输尿管软镜;孙氏末端可弯输尿管镜;疗效

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Comparison of Curative Effect of Three Ureteroscopy in the Treatment of Upper Ureteral Calculi*

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ABSTRACT Objective: To compare the clinical effect of semi rigid ureteroscopy, flexible ureteroscopy and Sun's endoscopy with ureteroscopy in the treatment of upper ureteral calculi, and provide reference for the choice of clinical treatment. **Methods:** The clinical data of 515 cases in the Department of Urology of our hospital from August 2015 to December 2017 with ureteroscopic holmium laser treatment of upper ureteral calculi were retrospective analyzed. They were divided into three groups according to the type of ureteroscopy, there were 297 cases in hard mirror group (treated with semi rigid ureteroscopy), 172 cases in soft mirror group (treated with flexible ureteroscopy), and 46 cases in Sun's mirror group (treated with Sun's endoscopy with ureteroscopy). The operation time, first stage stone clearance rate, postoperative hospitalization time, intraoperative and postoperative complications were compared between the three groups. **Results:** The stone clearing rate in hard mirror group, soft mirror group and Sun's mirror group were 81.5%, 94.2% and 95.7% respectively, and stone clearing rate in the soft mirror group and Sun's mirror group were significantly higher than that in the hard mirror group ($P<0.05$). The incidence of intraoperative complications in the hard mirror group, soft mirror group and Sun's mirror group were 18.9%, 5.8% and 4.3% respectively. The incidence of intraoperative complications in the hard mirror group were significantly higher than that in the soft mirror group and Sun's mirror group ($P<0.05$). There was no significant difference in the incidence of postoperative complications between the three groups ($P>0.05$). The average operation time in the hard mirror group, soft mirror group and Sun's mirror group were $(28.6\pm 6.2)\text{min}$, $(49.4\pm 12.4)\text{min}$, $(26.1\pm 6.5)\text{min}$ respectively. The average operation time in the soft mirror group were significantly higher than that in the hard mirror group and Sun's mirror group, the differences were statistically significant (all $P<0.05$). The average hospitalization time in the hard mirror group, soft mirror group and Sun's mirror group were $(5.4\pm 3.2)\text{d}$, $(6.7\pm 5.7)\text{d}$, $(5.0\pm 2.5)\text{d}$ respectively. The time of hospitalization in the soft mirror group were significantly higher than that in the hard mirror group and Sun's mirror group, the differences were statistically significant (all $P<0.05$). **Conclusion:** The effect of clearing stone and the safety of operation of flexible ureteroscopy is more advantageous than rigid ureteroscopy, but the operation time and the postoperative hospitalization

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time is long. Sun's endoscopy with ureteroscopy is expected to be a better choice for the treatment of upper ureteral calculi.

Key words: Ureteral calculi; Upper segment; Semi rigid ureteroscopy; Flexible ureteroscopy; Sun's endoscopy with ureteroscopy; Curative effect

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前言

尿石症是泌尿外科常见疾病,患者发病率约 1-5%,10 年复发率可达 50%,近年来发病率呈现逐年上升的趋势^[1-3]。随着腔镜泌尿外科的发展,尿石症的主流治疗方法已从传统的开放手术变为腔内碎石术^[4-6]。与传统开放手术相比,输尿管镜下钬激光碎石术具有手术创伤小、术后恢复快的优点^[6-9],是输尿管结石的首选治疗方式^[7-9]。目前输尿管上段结石常用的微创治疗方法为半硬性输尿管镜(简称硬镜),但因输尿管上段结石的特殊部位和硬镜结构的局限性,易出现一期碎石失败、输尿管损伤等并发症^[10,11]。输尿管软镜(简称软镜)和孙氏末端可弯输尿管镜(简称孙氏镜)近年使用逐渐增多,但治疗效果是否优于硬镜仍缺乏数据支持^[12-14]。因此,为探讨并比较这 3 种输尿管镜治疗输尿管上段结石的有效性和安全性,本研究对 2015 年 8 月至 2017 年 12 月上海市第十人民医院收治的 515 例行输尿管上段结石腔内碎石治疗的患者的资料进行回顾性分析,现报道如下。

1 资料与方法

表 1 三组患者临床资料比较

Table 1 Comparison of clinical data between the three groups

Groups	Gender[n(%)]		Stone position[n(%)]			Age (years old)
	Male	Female	Left side	Right side	Both side	
Hard mirror group(n=297)	206(69.4)	91(30.6)	168(56.6)	117(39.4)	12(4.0)	52.3± 13.5
Soft mirror group(n=172)	128(74.4)	44(25.6)	110(64.0)	60(34.9)	2(1.2)	54.6± 12.1
Sun's mirror group(n=46)	34(73.9)	12(26.1)	30(65.2)	12(26.1)	4(8.7)	48.7± 13.3
F/x ²	1.516		5.927			1.965
P	0.469		0.205			0.141

1.2 手术方法

1.2.1 硬镜组 患者全麻平稳生效后,置患者于截石位,常规消毒,铺单,连接视频、光源、冲洗设备。F8/9.8WOLF 半硬性输尿管镜由尿道外口置入膀胱,找到输尿管开口,置入斑马导丝,硬镜沿导丝置入输尿管内,发现结石后将钬激光光纤由操作通道置入,在功率 40W 条件下碎石。逐步碎石至 2 mm 以下。术毕留置导丝后退镜,留置 F6D-J 管和导尿管。

1.2.2 软镜组 术前准备、患者体位及麻醉方法同上。在斑马导丝引导下,用扩张鞘扩张输尿管至 10-14 F,后沿导丝置入输尿管软镜。发现结石后将钬激光光纤由操作通道置入,根据结石硬度调整功率在 10-30 W 之间,逐步碎石至 2 mm 以下。术后处理同上。

1.2.3 孙氏镜组 术前准备、患者体位及麻醉方法同上。在斑马导丝引导下,以半硬性输尿管镜方式直接进镜。发现结石后

1.1 一般资料

回顾性分析 2015 年 8 月至 2017 年 12 月诊断为输尿管上段结石入住上海市第十人民医院泌尿外科并接受输尿管镜下钬激光碎石治疗的患者共 515 例,纳入标准^[15]:(1)经 B 超、排泄性尿路造影等确诊为输尿管结石,且结石位于肾盂输尿管连接处与骶髂关节上缘之间;(2)存在体外冲击波碎石禁忌症或非手术治疗无效者。排除标准:(1)结石直径 <5 mm 者;(2)结石直径 >2 cm 者;(3)术前存在感染征象者(发热、白血细胞或 CRP 升高);(4)重度肾功能不全 (eGFR<15 mL/min·1.73 m²)者;(5)存在未纠正的凝血障碍者;(6)存在先天性或后天性输尿管狭窄,或存在同侧输尿管手术病史的患者。根据治疗采用的输尿管镜的类型将所有病例分为三组:硬镜组共 297 例,采用德国 WOLF 半硬性输尿管镜治疗;软镜组共 172 例,采用日本 Olympus 输尿管软镜治疗;孙氏镜组共 46 例,采用孙氏末端可弯输尿管镜治疗。各组间性别、年龄、结石位置无统计学差异 (P>0.05),见表 1。该研究经上海市第十人民医院伦理委员会审批通过,患者均已充分告知并签署知情同意书。

以硬镜方式击碎结石至 2 mm 以下。术后处理同上。

1.3 判定标准

临床意义残石定义目前尚缺乏统一标准,以往多数临床研究将临床意义残石定义为残石直径>3 mm 或 4 mm,亦有研究采用 2 mm 作为残石直径临界值。结合《2014 版中国泌尿外科疾病诊断治疗指南》^[16]及临床实践,本研究判定一期清石成功标准为:术后 2 周复查 KUB 无结石残留,或无临床意义残石(残石直径<4 mm),且无尿路感染或其他症状。

1.4 统计学方法

采用 SPSS 25.0 统计软件进行分析。计量资料以($\bar{x} \pm s$)表示,两组间比较采用 t 检验,计数资料用频数表示,采用卡方检验,多组间采用单因素方差分析,以 P<0.05 为差异有统计学意义。

2 结果

2.1 三组碎石效果比较

515 例患者总清石率为 87.0%，其中硬镜组共 242 例一期碎石成功，清石率为 81.5%；软镜组 162 例一期碎石成功，清石

率为 94.2%，孙氏镜组 44 例一期碎石成功，清石率为 95.7%。三组清石率整体比较差异有统计学意义 ($P<0.05$)，其中软镜组、孙氏镜组清石率显著高于硬镜组 ($P<0.05$)。见表 2。

表 2 三种输尿管镜治疗输尿管上段结石的碎石效果比较[n(%)]

Table 2 Comparison of lithotripsy effect of three ureteroscopic lithotripsy for upper ureteral calculi[n(%)]

Groups	Stone clearing	Residual stone
Hard mirror group(n=297)	242(81.5)	55(18.5)
Soft mirror group(n=172)	162(94.2)*	10(5.8)
Sun's mirror group(n=46)	44(95.7)*	2(4.3)
χ^2	18.883	
P	0.000	

Note: Compared with hard mirror group, * $P<0.05$.

2.2 三组并发症发生率比较

515 例患者中共 68 例出现术中并发症，其中硬镜组占 56 例，包括 1 例术中出血及 55 例手术失败，手术失败几乎均由结石上行至肾盂导致(46 例)，其他原因包括置入镜体失败、术中未找到结石等；软镜组术中并发症共 10 例，原因均为手术时间过长被迫终止手术；孙氏镜组共 2 例术中并发症，为结石退回肾盂所致。其中硬镜组术中并发症发生率显著高于软镜组和孙氏镜组 ($P<0.05$)。见表 3。

术后并发症共有 14 例，其中硬镜组 6 例，除 1 例 Clavien 评分 2 级并发症^[20]为需输血治疗的术后血尿外，其余 5 例均为 Clavien 评分 1 级并发症；软镜组 6 例，其中 1 例 Clavien 评分 4 级并发症为尿源性脓毒症，1 例 Clavien 评分 2 级并发症为尿路感染，其余均为 Clavien 评分 1 级并发症；孙氏镜组 2 例，均为 Clavien 评分 1 级并发症。515 例患者中无肾包膜下血肿、输尿管黏膜撕脱等术后并发症发生。三组间术后并发症发生率整体比较无统计学意义 ($P>0.05$)。见表 3。

表 3 三种输尿管镜治疗输尿管上段结石的并发症比较[n(%)]

Table 3 Comparison of complications of three ureteroscopic lithotripsy for upper ureteral calculi[n(%)]

Groups	Intraoperative complication	Postoperative complication
Hard mirror group(n=297)	56(18.9)	6(2.0)
Soft mirror group(n=172)	10(5.8)*	6(3.5)
Sun's mirror group(n=46)	2(4.3)*	2(4.3)
χ^2	19.099	0.792
P	0.000	0.673

Note: Compared with hard mirror group, * $P<0.05$.

2.3 三组手术时间和术后住院时间比较

三组手术时间和术后住院时间整体比较差异有统计学意

义 ($P<0.05$)。其中软镜组手术时间和术后住院时间显著长于硬镜组及孙氏镜组 (均 $P<0.05$)。见表 4。

表 4 三种输尿管镜治疗输尿管上段结石的手术时间及术后住院时间比较($\bar{x}\pm s$)

Table 4 Comparison of operative time and postoperative hospital stay of three ureteroscopic lithotripsy for upper ureteral calculi($\bar{x}\pm s$)

Groups	Operation time (min)	Postoperative hospitalization time (d)
Hard mirror group(n=297)	28.6 $\pm$ 6.2*	5.4 $\pm$ 3.2*
Soft mirror group(n=172)	49.4 $\pm$ 12.4	6.7 $\pm$ 5.7
Sun's mirror group(n=46)	26.1 $\pm$ 6.5*	5.0 $\pm$ 2.5*
F	335.028	6.127
P	0.000	0.002

Note: Compared with soft mirror group, * $P<0.05$.

3 讨论

输尿管镜联合钬激光碎石术具有与开放手术接近的清石率，同时创伤小、术后恢复快，现已取代开放手术成为输尿管结

石的首选治疗方法之一^[17-19]。在《2014 版中国泌尿外科疾病诊断治疗指南》中，推荐使用输尿管镜碎石术 (ureteroscopy, URS) 结合钬激光治疗输尿管上段及中段结石，但并未指出治疗上段结石最适宜的输尿管镜类型。

目前临床上半硬性输尿管镜使用最为广泛,治疗输尿管中上段结石清石率可达 90%以上,但治疗输尿管上段结石时极易发生碎石上漂进入肾盂从而导致手术失败,失败率高达 31.8%^[20-22]。在本研究中,硬镜组清石率为 81.5%,与既往报道的清石率(77%-86.3%)较为一致^[23]。55 例手术失败病例中 46 例由碎石上移导致,此结果与朱再生^[24]等人的一项纳入 677 例病例的研究较为相符,表明硬镜更适合处理输尿管下段结石,而在治疗上段结石方面无显著优势。输尿管软镜具有可弯曲的鞘,主动偏转角度可达 185°,可以观察到硬镜难以到达的肾盏,理论上可用于处理输尿管任何部位的结石^[25-27]。本研究中,软镜组清石率为 94.2%,远高于硬镜组,证明在治疗输尿管上段结石方面,软镜疗效优于硬镜。但另一方面,软镜的结构导致其操作复杂,学习周期及手术时间均较长。本研究中,软镜组平均手术时间显著高于另外两组,且差异有统计学意义。软镜组 172 例病例中共 10 例一期碎石失败,均因手术时间过长被迫停止手术。手术时间过长亦是输尿管损伤、尿源性脓毒症的重要危险因素,在本研究中,515 例患者中共 14 例出现术后并发症,6 例来自软镜组,并发症 Clavien 评分最高 4 分,来自于软镜组 1 例尿源性脓毒血症患者。但三组术后并发症率总体比较无显著差异,其原因可能包括术后并发症例数较少,术前准备较充分,及影像学检查最大限度地排除了不宜采用 URS 的病例。术后住院天数可间接反应术后并发症的严重程度,本研究中软镜组术后平均住院时间显著长于另外两组。故笔者认为在治疗输尿管上段结石方面,软镜虽在清石率方面显著优于硬镜,但因其操作复杂,学习周期较长,术后恢复慢且更易导致严重并发症,故不利于在临床上推广使用^[28]。

孙颖浩等人于 2013 年开发出第一代末段可弯输尿管镜,即孙氏镜,其具有可伸缩的硬鞘,末端为 9 cm 长的软镜部分,此结构融合了硬镜和软镜的优势,因此操作较软镜更为方便,且理论上可达到与软镜接近的治疗效果^[29,30]。本研究中孙氏镜组平均手术时间,与硬镜组接近,手术时间短可避免激光能量长时间刺激造成输尿管损伤。孙氏镜组术后平均住院时间低于软镜组,间接表明在术后恢复时间及术后并发症严重程度上孙氏镜与硬镜接近,与软镜相比更为安全。在清石率方面,孙氏镜清石率 95.7%,高于另外两组。因此孙氏镜在治疗输尿管上段结石中的使用效果仍需更多的临床数据验证,但从目前的结果看,其安全性优于软镜,清石率亦较为满意,具有较大的潜力,在临床上是一个较好的选择。

综上所述,与硬镜相比,软镜清石率更高,术中并发症发生率更低,但手术耗时更长,患者术后住院时间更长。孙氏镜有望成为治疗输尿管上段结石的更佳选择。

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