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喉罩通气全身麻醉与腰硬联合麻醉对输尿管镜钬激光碎石术患者麻醉效果、血流动力学和应激反应的影响*

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摘要 目的:探讨喉罩通气全身麻醉与腰硬联合麻醉对输尿管镜钬激光碎石术患者麻醉效果、血流动力学以及应激反应的影响。**方法:**回顾性分析 2018 年 2 月至 2021 年 2 月在我院行输尿管镜钬激光碎石术治疗的输尿管结石患者 114 例的资料,根据麻醉方法分组:观察组(58 例),采用喉罩通气全身麻醉;对照组(56 例),采用腰麻-硬膜外联合麻醉。比较两组麻醉效果,监测各时段患者血流动力学变化、应激反应及躁动率。**结果:**两组自主呼吸恢复时间、拔管时间、言语应答时间、睁眼时间、定向力恢复时间比较均无统计学差异($P>0.05$)。两组麻醉后气管导管插入即刻(T1)、手术开始 10 min(T2)、拔管后 10 min(T3)时的血氧饱和度(SpO_2)、平均动脉压(MAP)、心率较 T0 均有所降低($P<0.05$),而观察组 T1、T2、T3 时的 SpO_2 、MAP、心率均低于对照组($P<0.05$)。两组手术开始 10 min、术后 30 min、术后 24 h 后的去甲肾上腺素(NE)、皮质醇(COR)含量较术前均有所升高($P<0.05$),而观察组手术开始 10 min、术后 30 min、术后 24 h 后的 NE、COR 含量均低于对照组($P<0.05$)。观察组术后 6 h、术后 24 h、术后 48 h 的躁动率均低于对照组,差异有统计学意义($P<0.05$)。**结论:**喉罩通气全身麻醉、腰硬联合麻醉在输尿管镜钬激光碎石术中的麻醉效果相当,但喉罩通气全身麻醉更有助于稳定血流动力学,减轻机体应激反应,镇静效果更好。

关键词:输尿管结石;输尿管镜钬激光碎石术;喉罩通气全身麻醉;腰硬联合麻醉;血流动力学;应激反应

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Effects of General Anesthesia with Laryngeal Mask Ventilation and Combined Lumbar and Epidural Anesthesia on Anesthesia Effect, Hemodynamics and Stress Response in Patients Undergoing Ureteroscopic Holmium Laser Lithotripsy*

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ABSTRACT Objective: To explore the effects of general anesthesia with laryngeal mask ventilation and combined lumbar and epidural anesthesia on anesthesia effect, hemodynamics and stress response in patients undergoing ureteroscopic holmium laser lithotripsy. **Methods:** Data of 114 patients with ureteral calculi who were treated by ureteroscopic holmium laser lithotripsy in our hospital from February 2018 to February 2021 were retrospectively analyzed. According to the anesthesia methods, the observation group (58 cases) was treated with laryngeal mask ventilation and general anesthesia. The control group (56 cases) was treated with combined lumbar anesthesia and epidural anesthesia. The anesthetic effects of the two groups were compared, and the hemodynamic changes, stress response and agitation rate of patients in each period were monitored. **Results:** There were no significant differences in the spontaneous breathing recovery time, extubation time, speech response time, eye opening time and directional force recovery time between the two groups ($P>0.05$). The blood oxygen saturation (SpO_2), mean arterial pressure (MAP) and heart rate in the two groups immediately after tracheal tube

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insertion (T1), 10 min after operation (T2) and 10 min after extubation (T3) were lower than those at T0 ($P<0.05$), while the SpO_2 , MAP and heart rate in the observation group at T1, T2 and T3 were lower than those in the control group ($P<0.05$). The contents of norepinephrine (NE) and cortisol (COR) in both groups were increased at 10min after operation, 30min after operation and 24h after operation compared with those before operation ($P<0.05$), while the contents of NE and COR in observation group were lower than those in control group at 10min after operation, 30 min after operation and 24 h after operation ($P<0.05$). The agitation rate in the observation group was lower than that in the control group at 6 h, 24 h and 48 h after operation, with statistical significance ($P<0.05$). **Conclusion:** General anesthesia with laryngeal mask ventilation and combined lumbar and epidural anesthesia have similar anesthetic effects in ureteroscopic holmium laser lithotripsy, but general anesthesia with laryngeal mask ventilation is more conducive to stabilizing hemodynamics, reducing stress response and better sedation effect.

Key words: Ureteral calculi; Ureteroscopic holmium laser lithotripsy; General anesthesia with laryngeal mask ventilation; Lumbar and epidural anesthesia; Hemodynamics; Stress response

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前言

经流行病学调查^[1],输尿管结石发病率可随着人们生活习惯、饮食结构改变,呈上升趋势,多发生于男性。若控制不及时,可引发尿路梗阻、肾积水,影响肾脏功能,严重威胁患者身心健康,故需尽早开展手术治疗^[2]。输尿管镜钬激光碎石术能够借助钬激光强大能量,将功率达到 10 KW 高峰值,有效击碎任何成分结石,对结石粉碎效率更高,且钬激光光纤细,不会产生冲击力,可减少结石移动,更好清除结石^[3-5],但随着相关研究的深入^[6],学者发现术中麻醉不到位,可引起躁动,从而影响整体手术效果,故需选择一项安全、有效的麻醉方案。当今临床上输尿管结石术采取的麻醉方式多样,比如硬膜外麻醉、喉罩通气全麻、腰硬联合麻醉等^[7-9],以上麻醉方案孰优孰劣观点不一。本文就此展开研究,不仅对比了喉罩通气全身麻醉、腰麻-硬膜外联合麻醉的麻醉效果,还探索了两种麻醉方式对患者各时段血

流动力学、应激反应以及躁动率的影响,具体如下文报道。

1 资料与方法

1.1 一般资料

回顾性分析 2018 年 2 月至 2021 年 2 月在我院行输尿管镜钬激光碎石术治疗的输尿管结石患者 114 例的临床资料,纳入标准:①符合《软性输尿管镜术中国专家共识》^[10]中相关手术适应证;②存在不同程度膀胱刺激征、恶心呕吐、血尿、肾绞痛,且经腹部 CT、X 线检查,发现输尿管中上段结石;③临床资料齐全。排除标准:①合并尿道损伤、尿道狭窄无法进镜者;②近期因脑血管意外出现偏瘫者;③脊柱存在严重畸形或无法配合截石位术者;④合并心肺功能减退者;⑤凝血功能障碍者。本研究符合《赫尔辛基宣言》的伦理要求。根据麻醉方法分为观察组(58 例)和对照组(56 例),两组一般资料比较未见显著性差异($P>0.05$),见表 1。

表 1 对比一般资料
Table 1 Comparison of general information

Groups	n	Age(years)	Stone diameter (mm)	Gender		Lesion location	
				Male	Female	Left	Right
Observation group	58	47.32± 10.29	1.43± 0.11	39(67.24%)	19(32.76%)	28(48.28%)	30(51.72%)
Control group	56	47.58± 10.31	1.61± 0.99	40(71.43%)	16(28.57%)	30(53.57%)	26(46.43%)
χ^2/t	-	0.135	1.376	0.179		0.320	
P	-	0.893	0.172	0.672		0.572	

1.2 方法

对照组采用腰麻-硬膜外联合麻醉,取侧卧位,抱膝、屈髋、屈颈,暴露、张开棘间隙,腰背部尽量向后弓曲,选择 L2-3 间隙,局部消毒后,浸润麻醉,实施硬膜外穿刺,确定针尖抵达硬膜外间隙、阻力消失后,便可更换蛛网膜穿刺,穿刺成功后(见脑脊液外溢),将针头拔出,推入 1.5 mL 布比卡因(0.75%),并询问患者有无下肢不适感,若无异常现象,便可置入硬膜外管,固定导管备用,调整麻醉平面。对于手术时间超过 2 h,经导管推入 5-6 mL 肾上腺素 +2%利多卡因。观察组采用喉罩通气全身麻醉,取仰卧位,麻醉诱导药选择 0.3 mg/kg 依托咪酯 +2

mg/kg 丙泊酚 +2 μ g/kg 芬太尼,达到全麻效果后,置入喉罩,保持充分供氧,连接麻醉机,放置牙垫固定喉罩。静脉泵注维持每小时 8 mg/kg 丙泊酚,根据术中实际情况,适当调整麻醉泵入剂量。

1.3 观察指标

①麻醉效果:比较两组患者自主呼吸恢复时间、拔管时间、言语应答时间、睁眼时间、定向力恢复时间;②血流动力学:比较两组患者麻醉诱导前(T0)、气管导管插入即刻(T1)、手术开始 10 min (T2)、拔管后 10 min (T3)时的心率、平均动脉压(Mean arterial pressure, MAP)、血氧饱和度(pulse oxygen satu-

ration, SpO₂), 使用科曼急救转运 C30 多参数监护仪监测患者血流动力学变化; ② 应激反应: 抽取受检者 5 mL 外周静脉血, 血清分离 10 min, 维持 1500 r/min 速率, 由多功能仪器检测患者术前、手术开始 10 min、术后 30 min、术后 24 h 后的去甲肾上腺素(Norepinephrine, NE)、皮质醇(Cortisol, COR)含量; ③ 比较两组躁动率(术后 6 h、24 h、48 h), 判定标准: 出现抗医嘱行为, 表现出躁动不安、不配合、焦虑、不安情绪, 且睡眠不佳。

1.4 统计学处理

采用 SPSS21.0 统计学软件处理, 躁动率为计数资料用

(%)表示, 选择 χ^2 检验或广义方程分析, 麻醉效果、SpO₂、MAP、心率、NE、COR 为计量资料用($\bar{x} \pm s$)表示, F 交互、F 时点、F 组间运用重复测量方差分析, 涉及两两比较选用 LSD-t 检验, 当数据存在统计差异, 用 $P < 0.05$ 表示。

2 结果

2.1 两组麻醉效果比较

两组自主呼吸恢复时间、拔管时间、言语应答时间、睁眼时间、定向力恢复时间比较均无统计学差异($P > 0.05$)。如表 2 所示。

表 2 两组麻醉效果比较($\bar{x} \pm s$)

Table 2 Comparison of anesthetic effects between the two groups($\bar{x} \pm s$)

Groups	n	Eye opening time (min)	Speech response time(min)	Spontaneous breathing recovery time(min)	Extubation time (min)	Directional force recovery time (min)
Observation group	58	8.65± 2.49	10.69± 3.65	3.36± 0.28	15.59± 2.64	19.65± 2.34
Control group	56	8.56± 1.47	10.71± 2.53	3.42± 0.59	15.78± 2.41	19.73± 2.56
t	-	0.234	0.034	0.697	0.401	0.174
P	-	0.815	0.973	0.487	0.689	0.862

2.2 两组血流动力学比较

经重复测量方差分析, 两组 SpO₂、MAP、心率比较均有显著差异($P < 0.05$)。简单效应 LSD-t 成对比较, T0 时间段血流动力学无统计学差异($P > 0.05$)。两组麻醉后 T1、T2、T3 时的

SpO₂、MAP、心率较 T0 均有所降低($P < 0.05$), 而观察组 T1、T2、T3 时的 SpO₂、MAP、心率均低于对照组($P < 0.05$)。如表 3 所示。

表 3 两组血流动力学比较($\bar{x} \pm s$)

Table 3 Comparison of hemodynamics between the two groups($\bar{x} \pm s$)

Indexes	Groups	n	T0	T1	T2	T3	F _{time point}	F _{interaction}	F _{between group}
SpO ₂ (%)	Observation group	58	98.65± 0.36	96.65± 0.54*	96.58± 0.39*	97.76± 0.33*	1.481	128.979	351.712
	Control group	56	98.53± 0.44	98.02± 0.17*	98.18± 0.15*	98.11± 0.21*			
	t		1.596	18.135	28.715	6.729			
	P		0.113	<0.001	<0.001	<0.001	0.226	<0.001	<0.001
MAP (mmHg)	Observation group	58	82.46± 2.53	75.13± 2.44*	71.36± 1.15*	79.65± 2.36*	30.382	196.220	309.628
	Control group	56	82.91± 2.43	80.65± 3.26*	81.46± 2.44*	81.41± 2.78*			
	t		0.968	17.693	31.241	11.941			
	P		0.335	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Heart rate (beats/min)	Observation group	58	76.56± 5.19	72.13± 3.22*	68.63± 3.71*	73.46± 4.49*	62.446	5.031	8.756
	Control group	56	76.93± 5.46	74.46± 3.53*	71.16± 3.55*	75.65± 3.31*			
	t		0.371	3.684	3.718	2.956			
	P		0.711	<0.001	<0.001	0.004	<0.001	0.027	0.004

Note: compared with T0, * $P < 0.05$.

2.3 两组应激反应比较

经重复测量方差分析, 两组 NE、COR 比较均有显著性差异($P < 0.05$)。简单效应 LSD-t 成对比较, 术前应激反应均无统计学差异($P > 0.05$)。两组手术开始 10 min、术后 30 min、术后 24 h 后的 NE、COR 含量较术前均有所升高($P < 0.05$), 而观察组手术开始 10 min、术后 30 min、术后 24 h 后的 NE、COR 含量均低于对照组($P < 0.05$)。如表 4 所示。

2.4 两组躁动率比较

广义估计方程分析: 组别方面, Wald $\chi^2=5.196$, $P=0.023$, OR=e-1.876=-5.099, 95% 置信区间为 (e-2.232, e-0.168)=(-6.067, -0.457), 提示观察组患者术后 6 h、术后 24 h、术后 48 h 的躁动率均低于对照组($\chi^2=3.962$; $P=0.047$)、($\chi^2=4.987$; $P=0.026$)、($\chi^2=4.182$; $P=0.041$); 时点方面, Wald $\chi^2=13.453$, $P=0.001$, 差异有统计学意义($P < 0.05$)。见表 5-6。

表 4 两组应激反应比较($\bar{x} \pm s$)

Table 4 Comparison of stress responses between the two groups($\bar{x} \pm s$)

Indexes	Groups	n	Before operation	10 min after operation	30 min after operation	24 h after operation	F _{time point}	F _{interaction}	F _{between group}
NE(pmol/L)	Observation group	58	221.63±15.79	275.12±15.46*	301.12±16.74*	242.63±14.48*	1401.030	301.343	245.225
	Control group	56	221.56±15.46	326.83±19.86*	351.14±18.77*	294.44±9.24*			
	t		0.024	15.476	14.998	22.855			
	P		0.981	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Observation group	58	415.69±24.59	437.51±18.76*	478.87±22.11*	436.58±17.75*	451.275	19.161	35.816
COR (nmol/L)	Control group	56	415.82±24.17	465.46±15.48*	505.56±21.53*	455.13±18.97*			
	t		0.028	8.689	6.530	5.387			
	P		0.977	<0.001	<0.001	<0.001	<0.001	<0.001	

Note: compared with before operation, * $P < 0.05$.

表 5 两组躁动率比较

Table 5 Comparison of agitation rate between the two groups

Groups	n	Agitation rate		
		6 h after operation	24 h after operation	48 h after operation
Observation group	58	7(12.07%)	4(6.90%)	2(3.45%)
Control group	56	15(26.79%)	12(21.43%)	8(14.29%)
χ^2	-	Wald $\chi^2_{groups}=5.196$, Wald $\chi^2_{time point}=13.453$		
P	-	$P_{groups}=0.023$, $P_{time point}=0.001$		

表 6 两组躁动率广义方程参数估计值

Table 6 Parameter estimates of two groups of generalized equations of agitation rate

Parameter	B	Standard error	95% Wald confidence interval		Hypothesis test		
			Lower limit	Upper limit	Wald χ^2	Free degree	Significance
(Intercept)	-1.876	0.3814	-2.623	-1.128	24.188	1	0.000
Observation group	-1.200	0.5264	-2.232	-0.168	5.196	1	0.023
Control group	0 ^a	-	-	-	-	-	-
6 h after operation	0.946	0.2615	0.433	1.458	13.075	1	0.000
24 h after operation	0.546	0.2173	0.120	0.972	6.320	1	0.012
48 h after operation	0 ^a	-	-	-	-	-	-

Note: dependent variable:agitation rate.Model:(intercept),group,time point.a.Set to zero because the parameter is redundant.

3 讨论

输尿管结石是泌尿外科常见病,多发生于青中年男性,由于大部分输尿管结石来源于继发性肾脏结石和原发性结石,形状规则,且会沿着输尿管下落,进入膀胱,引发生理性狭窄,从而出现膀胱刺激症、恶心呕吐、血尿、疼痛等症状,若干预不及时,还可诱发肾盂肾炎、肾积水等并发症,故需尽早开展治疗^[11-13]。输尿管镜钬激光碎石术具有创伤小、手术时间短、取石率高、治疗效果确切等优势,已成为输尿管结石首选方案,虽然

效果显著,但术中可因为镇静、镇痛效果不佳,导致患者出现躁动,难以配合,极易引发输尿管穿孔,严重影响预后,对此需合理选择麻醉方案^[14-16]。

本研究中,两组自主呼吸恢复、拔管、言语应答、睁眼、定向力恢复时间均无统计学差异,说明喉罩通气全身麻醉、腰麻-硬膜外联合麻醉均具有一定麻醉效果。其中喉罩通气全身麻醉是介于气管插管和面罩之间的通气方式,作为传统通气工具,相比于气管插管,更加容易、方便,且能够减少对气道刺激,从而在保证麻醉效果基础上,提高安全性,促使患者术后自主呼

吸恢复和定向力恢复^[17-19];腰麻-硬膜外联合麻醉可通过控制麻醉用量、剂量,从而防止药物蓄积,影响术后恢复,有效缩短睁眼、语言应答、呼吸自主恢复时间^[20-22]。但两组比较血流动力学指标时,存在明显差异,观察组 SpO_2 、MAP、心率改变幅度小于对照组,说明喉罩通气全身麻醉能够稳定术中血流动力学。推测原因是腰麻-硬膜外联合麻醉通过阶段性阻止交感神经节前纤维,可导致容量血管扩张和血管受阻,引发血压下降,尤其是对中老年患者而言,极易引起呼吸无力、心悸、恶心等不适感^[23],严重影响血流动力学。而喉罩通气全身麻醉通气操作简便、易行,为不损伤侵入性操作,可降低对机体刺激,减轻对呼吸道造成的机械性损伤,有效维持术中心率、血压,减少儿茶酚胺分泌,使得整个术中血流动力学稳定^[24]。同时,有学者发现^[25],输尿管镜钬激光碎石术可受到年龄、麻醉方式、体位等因素影响,引发心血管功能改变,导致交感神经兴奋、肾上腺素上升,增加手术风险,故需注重术中、术后应激反应评估,以便了解麻醉效果。本次结果显示,观察组各时间段的 NE、COR 均低于对照组,说明喉罩通气全身麻醉在抑制应激反应中具有一定优势,这可能与选用麻醉药有关,其中丙泊酚具有消除快、半衰期短、起效快等优势,可维持术中麻醉可控性,麻醉平稳性较好^[26];依托咪酯对突出前膜-肾上腺素受体可发挥一定作用,有利于抑制交感神经活性和肾上腺素释放^[27];芬太尼属于短效阿片受体激动剂,镇痛作用强,具有起效迅速、无蓄积等优势^[28,29],三项联合,可充分发挥各自优势,获取满意镇静效果,稳定血流动力学,防止应激反应发生^[30]。而从术后影响角度分析,观察组各时间段躁动率均低于对照组,说明喉罩通气全身麻醉能够在保证镇痛、镇静基础上,提高了用药安全性,是因本次喉罩通气全身麻醉通过事先打开气囊活塞开关,让其保持自然形态,无需再充气,并将气囊放置最佳位置,可避免喉罩前端折叠,从而降低术后咽部不适、疼痛率^[31]。

综上所述,喉罩通气全身麻醉、腰硬联合麻醉在输尿管镜钬激光碎石术中均可取得一定的麻醉效果,但喉罩通气全身麻醉更有助于稳定血流动力学,减轻机体应激反应,镇静效果更好,是一种安全可行的麻醉方案。

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