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术前超声引导下腰方肌阻滞联合全身麻醉对肾移植患者术后血清应激反应和疼痛相关指标的影响*

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摘要 目的:探讨术前超声引导下腰方肌阻滞(QLB)联合全身麻醉对肾移植患者术后血清应激反应和疼痛相关指标的影响。**方法:**选择我院2019年9月~2021年8月期间收治的行肾移植手术的患者82例作为观察对象。根据随机数字表法分为A组和B组,分别为41例。A组给予全身麻醉,B组给予术前超声引导下QLB联合全身麻醉,对比两组静息视觉疼痛模拟(VAS)评分、自控静脉镇痛中的舒芬太尼使用量、有效按压次数,对比两组术后血清应激反应和疼痛相关指标变化,对比两组不良反应发生情况。**结果:**B组术后6h、12h、24h、48h静息VAS评分低于A组($P<0.05$)。B组自控静脉镇痛中的舒芬太尼使用量少于A组,有效按压次数少于A组($P<0.05$)。B组拔管后、术后24h血糖(Glu)、皮质醇(Cor)低于A组($P<0.05$)。两组术后24h P物质(SP)、前列腺素E₂(PGE₂)及5-羟色胺(5-HT)均升高,但B组低于A组($P<0.05$)。两组的不良反应发生率对比无差异($P<0.05$)。**结论:**术前超声引导下QLB联合全身麻醉用于肾移植手术患者,可有效减轻疼痛和应激反应,减少自控静脉镇痛中的舒芬太尼使用量、有效按压次数,且不增加不良反应发生率。

关键词:术前;超声引导;腰方肌阻滞;全身麻醉;肾移植;应激反应;疼痛

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Effect of Preoperative Ultrasound-Guided Quadratus Lumborum Block Combined with General Anesthesia on Serum Stress Response and Pain Related Indexes in Patients with Renal Transplantation*

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ABSTRACT Objective: To investigate the effect of preoperative ultrasound-guided quadratus lumborum block (QLB) combined with general anesthesia on serum stress response and pain related indexes in patients with renal transplantation. **Methods:** 82 patients undergoing renal transplantation in our hospital from September 2019 to August 2021 were selected as the observation objects. According to the random number table method, they were divided into group A and group B, 41 cases respectively. Group A was given general anesthesia, and group B was given preoperative ultrasound-guided QLB combined general anesthesia. The resting visual pain simulation (VAS) score, the dosage of sufentanil in patient-controlled intravenous analgesia, the number of effective compressions were compared between the two groups, the changes of serum stress response and pain related indexes were compared between the two groups, and the incidence of adverse reactions were compared between the two groups. **Results:** The resting VAS scores at 6 h, 12 h, 24 h and 48 h after operation in group B were lower than those in group A ($P<0.05$). The dosage of sufentanil in patient-controlled intravenous analgesia in group B was less than that in group A, and the number of effective compressions was less than that in group A ($P<0.05$). Blood glucose (Glu) and cortisol (Cor) in group B after extubation and 24 h after operation were lower than those in group A ($P<0.05$). Substance P (SP), prostaglandin E₂ (PGE₂) and serotonin (5-HT) increased 24 h after operation in the two groups, but group B was lower than group A ($P<0.05$). There was no significant difference in the incidence of adverse reactions between the two groups ($P<0.05$). **Conclusion:** Preoperative ultrasound-guided QLB combined with general anesthesia for patients with renal transplantation can effectively reduce pain and stress response, reduce the dosage of sufentanil in patient-controlled intravenous analgesia and the number of effective compressions, and do not increase the incidence of adverse reactions.

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Key words: Preoperative; Ultrasound-guided; Quadratus lumborum block; General anesthesia; Renal transplantation; Stress response; Pain

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前言

肾移植手术是目前治疗终末期肾病的最佳方法,可有效延长患者的生存期^[1]。由于终末期肾病患者病情复杂,且多数患者合并症较多,致使其身体条件较差,而肾移植手术过程中采用的麻醉方式为全身麻醉,可导致患者术中出现一定程度的应激反应^[2,3]。腰方肌位于腹后壁脊柱的两侧,内侧通过小肌腱附于L1-L4横突尖,上界通过腱膜附着于第12肋骨下缘,下界附着于髂腰韧带和髂嵴内缘^[4]。超声引导下腰方肌阻滞(QLB)是一种将局部麻醉药注射在腰方肌周围,进而产生腹部镇痛的区域阻滞技术,既往广泛应用于多种不同类型的腹部手术中,镇痛效果较好^[5]。而有关超声引导下QLB在肾移植手术中的应用仍有待验证。本次研究通过观察术前超声引导下QLB联合全身麻醉对肾移植患者术后血清应激反应和疼痛相关指标的影响,以期对肾移植手术患者的麻醉方案选择提供数据参考。

1 资料与方法

1.1 一般资料

选择我院2019年9月~2021年8月期间收治的行肾移植手术的患者82例作为观察对象。本研究经医院伦理委员会批准。纳入标准:(1)性别不限,年龄18~55岁;(2)均经临床检查确诊为符合肾移植手术指征者;(3)美国麻醉医师协会(ASA)分级I-II级者;(4)血电解质及凝血常规处于正常范围;(5)患者及其家属签署知情同意书。排除标准:(1)合并严重的心肝肺疾病;(2)合并麻醉药物过敏史者;(3)合并免疫系统异常;(4)伴有精神疾病;(5)存在毒品及药物滥用史者;(6)穿刺部位感染者。82例患者根据随机数字表法分为A组和B组,分别为41例。A组中男患者24例,女患者17例;ASA分级:I级22例,II级19例;年龄18~55岁,平均年龄 (38.91 ± 5.37) 岁。B组中男患者26例,女患者15例;ASA分级:I级23例,II级18例;年龄20~54岁,平均年龄 (38.52 ± 4.92) 岁。两组患者的性别、ASA分级、年龄比较无差异($P>0.05$),具有可比性。

1.2 方法

术前常规禁饮2h,禁食6h,入室后开放上肢静脉通路,常规面罩吸氧,监测无创血压、心率等生命体征指标。A组患者接受全身麻醉,B组患者接受超声引导下QLB联合全身麻醉,B组患者在麻醉诱导前进行超声引导下QLB,平面测试完成后常规诱导。麻醉诱导方式:静脉注射枸橼酸舒芬太尼注射液[批准文号:国药准字H20054172,生产厂家:宜昌人福药业有限责任公司,规格:2 mL:100 μ g(按 $C_{20}H_{30}N_2O_5S$ 计)]0.5 μ g/kg、依托咪酯注射液(批准文号:国药准字H32022992,生产厂家:江苏恩华药业股份有限公司,规格:10 mL:20 mg)0.3 mg/kg、注射用苯磺顺阿曲库铵[批准文号:国药准字H20090202,生产厂家:浙江仙琚制药股份有限公司,规格:5 mg(以顺阿曲库铵计)]0.2 mg/kg,3 min后置入导管行机械通气,呼吸频率12次/min,潮气量7~8 mL/kg,维持二氧化碳分压35~45 mmHg。麻醉维持:

吸入2.0%~2.5%的七氟醚、注射用盐酸瑞芬太尼[批准文号:国药准字H20123421,生产厂家:国药集团工业有限公司廊坊分公司,规格:2 mg(以瑞芬太尼 $C_{20}H_{28}N_2O_5$ 计)]0.1~0.2 μ g/kg $\cdot$ min,间断静脉注射顺苯磺酸阿曲库铵0.05 mg/kg维持肌肉松弛,维持BIS 40~60。术毕均给予舒芬太尼自控静脉镇痛。自控静脉镇痛配方:托烷司琼8 mg,舒芬太尼150 μ g,用生理盐水稀释至150 mL,自控剂量2 mL,背景输注速度0.5 mL/h,锁定时间为10 min。根据患者具体疼痛情况判断是否需要补镇痛治疗,疼痛难忍时肌注哌替啶1 mg/kg,重复用药1~2次。

QLB方式:选择高频线阵探头(飞利浦公司的IU22型彩色超声诊断仪),探头置于髂前上棘水平,找到腰方肌。超声引导下采用平面内技术,穿刺针从患者腹侧向背侧穿刺,到达腰方肌的后侧、竖脊肌的外侧缘,回抽无血后注射0.4%注射用盐酸罗哌卡因[批准文号:国药准字H20052666,生产厂家:成都天台山制药有限公司,规格:75 mg(以盐酸罗哌卡因计)]20 mL。给药后可见腰大肌被局部麻醉药下压移动,表示为阻滞成功。

1.3 观察指标

(1)记录两组术后2 h、6 h、12 h、24 h、48 h的静息视觉疼痛模拟(VAS)^[6]评分,其中VAS评分1~10分,其中7~10分为重度疼痛,4~6分为中度疼痛,1~3分为轻度疼痛,0分为无痛。(2)观察两组自控静脉镇痛中的舒芬太尼使用量、有效按压次数。(3)于麻醉诱导前、拔管后、术后24 h取患者静脉血4~5 mL,室温静置,经3600 r/min离心12 min,取上层血清部分,用己糖激酶法测定血糖(Glu)水平,试剂盒购自北京凯诗源生物科技有限公司;另取同时点患者静脉血4 mL左右,经抗凝处理后,通过3200 r/min离心11 min,离心沉淀获取血浆,采用化学发光免疫法测定血浆皮质醇(Cor)水平,试剂盒购自上海羽喙生物科技有限公司。(4)术前、术后24 h抽取两组患者外周静脉血4 mL,抗凝、离心、提取上清液。采用放射免疫法检测血清P物质(SP)、前列腺素 E_2 (PGE₂)及5-羟色胺(5-HT)水平,试剂盒购自天津阿斯尔生物科技有限公司。(5)记录术后48 h内恶心呕吐、皮肤瘙痒、呼吸抑制及阻滞相关并发症(局部麻醉药中毒、腹腔脏器损伤、血肿、感染等)等不良反应的发生情况。

1.4 统计学方法

使用SPSS23.0进行研究资料分析。计量数据均通过正态性检验,以均值 $\bar{x} \pm SD$ 描述,两组间的比较为成组t检验或校正t'检验,组内前后比较为配对t检验,重复观测资料行重复测量方差分析。计数资料以例数及率描述,两组比较为卡方检验。统计检验水准 $\alpha=0.05$,均为双侧检验。

2 结果

2.1 两组静息VAS评分对比

两组术后6 h、12 h、24 h、48 h静息VAS评分呈升高后降低趋势,组内不同时间点对比差异有统计学意义($P<0.05$)。B组术后6 h、12 h、24 h、48 h静息VAS评分低于A组($P<0.05$)。见表1。

表 1 两组静息 VAS 评分对比($\bar{x} \pm s$, 分)Table 1 Comparison of resting VAS scores between the two groups($\bar{x} \pm s$, scores)

Groups	Time	VAS score
Group A(n=41)	T1: 2 h after operation	1.58± 0.39
	T2: 6 h after operation	2.26± 0.32 [‡]
	T3: 12 h after operation	2.75± 0.33 [‡]
	T4: 24 h after operation	3.42± 0.46 [‡]
	T5: 48 h after operation	3.14± 0.38 ^t
Group B(n=41)	T1: 2 h after operation	1.62± 0.41
	T2: 6 h after operation	1.93± 0.37 ^{ad}
	T3: 12 h after operation	2.37± 0.31 ^{ad}
	T4: 24 h after operation	2.96± 0.43 ^{ad}
	T5: 48 h after operation	2.58± 0.26 ^{ad}
Overall comparison	HF correction factor	0.9520
	Inter group F, P	75.424, 0.000
	In group F, P	243.896, 0.000
Fine comparison between groups (LSD-t, P)	Interaction F, P	8.009, 0.000
	T1 time point	0.450, 0.654
	T2 time point	4.353, 0.000
	T3 time point	5.338, 0.000
	T4 time point	4.644, 0.000
Intra group fine comparison (Difference test t, P)	T5 time point	4.073, 0.000
	Group A: T2 vs T1	10.310, 0.000
	Group A: T3 vs T1	20.522, 0.000
	Group A: T4 vs T1	25.554, 0.000
	Group A: T5 vs T1	19.884, 0.000
	Group B: T2 vs T1	4.589, 0.000
	Group B: T3 vs T1	12.492, 0.000
	Group B: T4 vs T1	19.556, 0.000
	Group B: T5 vs T1	18.362, 0.000

Note: a was compared with group A $P < 0.05$. t was compared with the first time point in the group $P < 0.05$.

2.2 两组自控静脉镇痛中的舒芬太尼使用量、有效按压次数对比

B 组自控静脉镇痛中的舒芬太尼使用量少于 A 组,有效按压次数少于 A 组($P < 0.05$),见表 2。

表 2 两组自控静脉镇痛中的舒芬太尼使用量、有效按压次数($\bar{x} \pm s$)Table 2 Dosage of sufentanil and number of effective compressions in patient-controlled intravenous analgesia in the two groups($\bar{x} \pm s$)

Groups	Dosage of sufentanil(μg)	Number of effective compressions(times)
Group A(n=41)	84.81± 6.28	29.87± 5.34
Group B(n=41)	56.79± 7.53	14.72± 2.33
t	18.298	16.650
P	0.000	0.000

2.3 两组应激反应指标对比

两组麻醉诱导前、拔管后、术后 24 h Glu、Cor 升高后下降, 组内不同时间点对比差异有统计学意义($P < 0.05$)。B 组拔管后、术后 24 h Glu、Cor 低于 A 组($P < 0.05$),见表 3。

表 3 两组应激反应指标对比($\bar{x} \pm s$, mmol/L)
Table 3 Comparison of stress response indexes between the two groups($\bar{x} \pm s$, mmol/L)

Groups	Time	Glu	Cor
Group A(n=41)	T1: Before anesthesia induction	4.83± 0.37	375.14± 24.29
	T2: after extubation	6.45± 0.52 ^t	485.78± 29.41 ^t
	T3: 24 h after operation	5.91± 0.38 ^t	452.83± 24.46 ^t
Group B(n=41)	T1: Before anesthesia induction	4.88± 0.41	375.51± 28.50
	T2: after extubation	5.97± 0.46 ^{at}	449.65± 30.42 ^{at}
	T3: 24h after operation	5.41± 0.39 ^{at}	416.40± 23.21 ^{at}
Overall comparison	HF correction factor	0.9339	0.9483
	Inter group F, P	30.551, 0.000	48.023, 0.000
	In group F, P	217.694, 0.000	252.475, 0.000
	Interaction F, P	10.937, 0.001	12.897, 0.000
Fine comparison between groups (LSD-t, P)	T1 time point	0.484, 0.629	0.063, 0.950
	T2 time point	4.401, 0.000	5.468, 0.000
	T3 time point	5.833, 0.000	6.917, 0.000
Intra group fine comparison (Difference test t, P)	Group A: T2 vs T1	20.356, 0.000	23.451, 0.000
	Group A: T3 vs T1	17.086, 0.000	15.142, 0.000
	Group B: T2 vs T1	12.419, 0.000	13.553, 0.000
	Group B: T3 vs T1	6.216, 0.000	9.966, 0.000

Note: a was compared with group A $P < 0.05$. t was compared with the first time point in the group $P < 0.05$.

2.4 两组疼痛介质指标对比

两组术前 SP、PGE2、5-HT 组间对比无统计学差异($P > 0$).

05)。两组术后 24 h SP、PGE2、5-HT 均升高,但 B 组低于 A 组

($P < 0.05$),见表 4。

表 4 两组疼痛介质指标对比($\bar{x} \pm s$)
Table 4 Comparison of pain mediators between the two groups($\bar{x} \pm s$)

Groups	Time	SP(μ g/mL)	PGE2(pg/mL)	5-HT(ng/mL)
Group A(n=41)	Before operation	2.14± 0.38	121.29± 14.78	146.33± 17.12
	24 h after operation	4.08± 0.57	219.57± 25.29	236.54± 29.65
	D-value	1.94± 0.63	98.28± 29.66	90.21± 50.07
	Paired t, P	19.718, 0.000	21.217, 0.000	11.536, 0.000
Group B(n=41)	Before operation	2.17± 0.42	119.56± 15.12	148.90± 25.08
	24 h after operation	3.34± 0.51	157.03± 20.82	184.21± 26.85
	D-value	1.17± 0.85	37.47± 17.45	35.31± 55.30
	Paired t, P	8.814, 0.000	13.749, 0.000	4.089, 0.000
Comparison of two groups (Group t, P)	Before operation	0.339, 0.735	0.524, 0.602	0.542, 0.589
	24 h after operation	6.195, 0.000	12.225, 0.000	8.377, 0.000

2.5 两组不良反应发生情况对比

A 组有 3 例患者出现恶心呕吐,B 组有 1 例,两组均未见皮肤瘙痒与呼吸抑制的发生,B 组未见阻滞相关不良反应发生。A 组(7.32%)、B 组(2.44%)的不良反应发生率组间对比差异无统计学意义($\chi^2=0.263$, $P=0.608$)。

3 讨论

迄今为止,同种异体肾移植术是实施例数最多、成功率最高的器官移植手术,可帮助患者延长生存期^[7]。但肾移植手术过程中手术切口较大,手术时间较长,可导致患者不同程度的应激反应,引起患者血流动力学波动^[8]。此外,对于手术患者而言,疼痛贯穿于整个肾移植手术的全过程,甚至术后很长一段时间^[9]。疼痛可引起多方面的影响,包括患者呼吸受限和活动不

便,造成移植肾功能恢复的延缓^[10]。因此,选择可有效减轻肾移植手术患者应激反应和疼痛的麻醉方式,有利于患者顺利度过围术期,增加肾移植术的成功率。

全身麻醉在肾移植术中较为常见,但肾移植手术患者的麻醉管理具有一定的特殊性,由于肾移植患者大多经过慢性肾病、尿毒症、透析等一系列过程,致使患者接受手术时机体处于代谢紊乱、免疫功能低下的状况^[11-13]。使用全身麻醉方式,若麻醉药物使用过少,易导致镇痛不足,应激反应强烈,不利于手术的顺利进行;但若麻醉药物使用过多,又会引起药物蓄积,易导致镇静过度和呼吸抑制^[14-16]。临床实践中多提倡多模式镇痛麻醉管理,何君会等^[17]将 QLB 技术,并用于剖宫产等手术,可获得良好的镇痛效果。同时发现 QLB 镇痛范围为 T7-L1,适合用于各种腹部手术。因此,越来越多的研究尝试将 QLB 用于肾移植术患者中。

本次研究结果显示,术前超声引导下 QLB 联合全身麻醉用于肾移植手术患者,可有效减轻围术期疼痛,同时还可减少舒芬太尼使用量,减少有效按压次数。其中 VAS 评分是临床常用的评估患者疼痛情况的主观指标,信效度良好。而 SP、PGE2 及 5-HT 均是临床常见的疼痛介质,SP 是存在于神经纤维内的神经肽,受到疼痛刺激后可大量释放^[18];PGE2 通过影响神经末梢敏感度来增加疼痛感受^[19];5-HT 也是常见的致痛物质,其水平高表达可导致疼痛度提高^[20]。分析镇痛效果显著的原因可能是因为 QLB 注药点于腰方肌后侧,能与药物浸透至胸腰筋膜可有效阻滞脊神经分支,进而发挥良好的镇痛作用^[21-23]。研究结果还显示,术前超声引导下 QLB 联合全身麻醉可有效减轻肾移植术患者围术期的应激反应,Glu 是人的重要组成成分,也是能量的重要来源,其水平异常变化可影响人体组织、脏器的正常运作^[24]。Cor 是判断人体应激反应强度的常用指标,Cor 可促进蛋白质分解和肝糖元异生,从而抑制细胞对葡萄糖的利用,升高 Glu,因为 Cor 的分泌量对判断应激状况尤为重要^[25,26]。分析减轻应激反应的主要原因是超声引导下 QLB 联合全身麻醉镇痛作用显著,可有效减轻气管插管、拔管、手术牵拉操作等刺激,从而减轻应激反应,进而减少对机体循环的影响,有利于患者术后恢复^[27,28]。观察两组安全性可知,两组的不良反应发生率组间对比差异无统计学意义,可见 QLB 联合全身麻醉安全可靠,且术中未见 QLB 相关不良反应的发生,可能是因为麻醉医师阻滞技术较好,加上在超声引导下具有良好的可视效果,阻滞成功率高,进而减少不良反应发生风险^[29,30]。

综上所述,术前超声引导下 QLB 联合全身麻醉用于肾移植手术患者,可有效减轻疼痛和应激反应,减少自控静脉镇痛中的舒芬太尼使用量、有效按压次数,是一种安全有效的镇痛模式。本研究样本量有限,且未单中心研究,研究对象为成年人且未包括老年人,有关 QLB 在未成年群体以及老年群体中的有效性及安全性还需进一步研究探讨。

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