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臂丛神经阻滞复合静脉全麻进行锁骨骨折手术对患者疼痛阈值和术后谵妄的影响 *

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摘要 目的:探讨臂丛神经阻滞复合静脉全麻进行锁骨骨折手术对患者疼痛阈值和术后谵妄的影响。**方法:**选取本院 2018 年 4 月-2021 年 5 月收治的 100 例锁骨骨折患者作为研究对象,随机将其分为观察组(n=50)和对照组(n=50)。观察组采用臂丛神经阻滞复合静脉全麻进行手术,对照组单独采用静脉全麻进行手术,对比两组患者手术时间、住院时间以及唤醒时间;不同时间生命体征;麻醉效果和术后疼痛阈值;术后谵妄发生率、谵妄持续时间以及每天睡眠时间。**结果:**观察组患者的术后住院时长以及唤醒时间明显低于对照组($P<0.05$)。观察组 T₁ 到 T₄ 时间血氧饱和度(SPO₂)、收缩压(SBP)、舒张压(DBP)、平均动脉压(MAP)、心率(HR)无明显波动,对照组 T₁ 到 T₄ 时间上述指标波动明显,且两组患者 T₂、T₃ 时间 SPO₂、SBP、DBP、MAP、HR 对比差异显著($P<0.05$);观察组患者的 COR、NE 在 T₂、T₃ 明显下降,而对照组的 COR 在 T₂、T₃ 呈上升趋势($P<0.05$)。观察组运动神经阻滞时间以及感觉神经阻滞时间明显高于对照组($P<0.05$),术后 2 h、12 h、24 h 疼痛阈值明显低于对照组($P<0.05$)。观察组术后谵妄发生率和谵妄持续时间明显低于对照组($P<0.05$)。**结论:**对锁骨骨折手术患者进行臂丛神经阻滞复合静脉全麻,有效降低患者手术时间、住院时间以及唤醒时间,同时稳定患者生命体征,提升麻醉效果,降低术后疼痛阈,并且谵妄发生率、谵妄持续时间以及每天睡眠时间相对较低。

关键词:臂丛神经阻滞;静脉全麻;锁骨骨折手术;疼痛阈值;术后谵妄

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Effect of Brachial Plexus Block Combined with Intravenous General Anesthesia on Pain Threshold and Postoperative Delirium in Patients Undergoing Clavicular Fracture Surgery*

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ABSTRACT Objective: To investigate the effect of brachial plexus block combined with intravenous general anesthesia on pain threshold and postoperative delirium in patients with clavicular fracture. **Methods:** 100 patients with clavicular fracture treated in our hospital from April 2018 to may 2021 were randomly divided into observation group (n=50) and control group (n=50). The observation group was operated by brachial plexus block combined with intravenous general anesthesia, and the control group was operated by intravenous general anesthesia alone. The operation time, hospital stay and wake-up time of the two groups were compared; Vital signs at different times; Anesthetic effect and postoperative pain threshold; Postoperative delirium incidence, delirium duration and daily sleep time. **Results:** The length of postoperative hospital stay and wake-up time in the observation group were lower than those in the control group ($P<0.05$). There were no significant fluctuations in blood oxygen saturation (SpO₂), systolic blood pressure (SBP), diastolic blood pressure (DBP), mean arterial pressure (map) and heart rate (HR) in the observation group from T₁ to T₄. The above indexes fluctuated significantly in the control group from T₁ to T₄, and there were differences in SpO₂, SBP, DBP, map and HR between the two groups at T₂ and T₃ ($P<0.05$); Cor and NE in the observation group decreased significantly in T₂ and T₃, while cor in the control group increased in T₂ and T₃ ($P<0.05$). The motor nerve block time and sensory nerve block time in the observation group were higher than those in the control group ($P<0.05$), and the pain thresholds at 2 h, 12 h and 24 h after operation were lower than those in the control group ($P<0.05$). The incidence and duration of postoperative delirium in the observation group were lower than those in the control group ($P<0.05$). **Conclusion:** Brachial plexus block combined with intravenous general anesthesia for patients undergoing clavicular fracture surgery can effectively reduce the operation time, hospital stay and wake-up time, stabilize the vital signs of patients, improve the anesthetic effect,

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reduce the postoperative pain threshold, and the incidence of delirium, delirium duration and daily sleep time are relatively low.

Key words: Brachial plexus block; Intravenous general anesthesia; Clavicle fracture surgery; Pain threshold; Postoperative delirium
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前言

锁骨是上肢与躯干的连接和支撑装置,呈 "S" 型,锁骨后方有锁骨下血管、臂丛神经穿过^[1]。锁骨骨折在肩部创伤中最为常见,多发生在儿童及青壮年,多为间接暴力引起^[2]。发生率占全身骨折的 5%~10%,占肩关节损伤的 44%。其中男女比例约为 2:1^[3]。锁骨骨折多指由间接暴力外伤导致的锁骨完整性和连续性中断,锁骨骨折时可引起局部肿胀、瘀斑、疼痛及活动障碍,同时可导致神经血管损伤。患者锁骨骨折后,由于位置较浅,且保守治疗较困难^[4]。因此,大部分患者均需通过手术进行治疗,因手术时极度疼痛临床会对患者进行麻醉,但麻醉过后会产生多种并发症,如术后谵妄等^[5,6]。术后谵妄大多是由于麻醉剂代谢不全,或病人对药物的敏感性过高而产生,也可能与肝性脑病等因素有关^[7]。术后谵妄状态是常见的麻醉并发症,其主要表现为突出的感知障碍以及幻觉和梦境不能入睡,有惊厥倾向。术后谵妄治疗,首先应针对引起术后谵妄状态的潜在或已存在的诱发因素进行治疗分析^[8]。臂丛神经阻滞和静脉全麻是临床上常用麻醉方式,但臂丛神经阻滞会导致患者出现神经损伤、局部出血血肿,以及阻滞部位发生感染等情况^[9]。静脉全

麻会出现记忆力下降、多梦、呼吸抑制等现象,甚至造成呼吸停止而危及生命^[10]。为寻找更有效的锁骨骨折手术方法来缓解患者疼痛阈值和术后谵妄,本研究探讨了臂丛神经阻滞复合静脉全麻进行锁骨骨折手术对患者疼痛阈值和术后谵妄的影响,现做出如下报告。

1 资料与方法

1.1 一般资料

选取本院 2018 年 4 月-2021 年 5 月收治的 100 例锁骨骨折患者作为研究对象,随机将其分为观察组(n=50)和对照组(n=50)。

纳入标准:符合锁骨骨折并进行手术患者;美国麻醉医师协会(ASA)分级 1-2 级^[11];对本研究知情并签署同意书;经本院医学伦理委员会批准。

排除标准:合并精神疾病或严重认知失调患者;合并意识不清或沟通障碍患者;对本研究药物过敏患者;合并心、肺、肾等重要器官疾病患者;有肩部手术史患者。

两组患者一般资料对比无明显差异($P>0.05$),如表 1 所示。

表 1 一般资料
Table 1 General information

Groups	n	Gender (Male/female)	Age (years)	ASA sizing		Causes		
				Level 1	Level 2	Hurt	Car accident	Other
The observation group	50	21/29	49.31± 0.24	24	26	16	20	14
The control group	50	22/28	49.53± 0.36	23	27	18	19	13

1.2 方法

对照组:采用静脉全麻进行手术,具体方法为:药物包括 0.02 mg/kg 咪达唑仑注射液(江苏恩华药业股份有限公司;国药准字 H10980025)、2.0 mg/kg 丙泊酚(西安力邦制药有限公司;国药准字 H20010368)、0.3 μg/kg 舒芬太尼(宜昌人福药业有限责任公司;国药准字 H20054171)全麻诱导。5-8 mg/kg·h 丙泊酚、8-15 μg/kg·h 瑞芬太尼(宜昌人福药业有限责任公司,国药准字 H20030197)维持麻醉深度。术中根据患者实际情况调整药物用量使 Bis 值维持于 40-60。必要时维持心率及血压稳定选择应用盐酸麻黄碱注射液(成都倍特药业股份有限公司;国药准字 H32021530)、盐酸乌拉地尔注射液(西安利君制药有限公司;国药准字 H20000254)等。

观察组:采用臂丛神经阻滞复合静脉全麻进行手术,具体方法为:1)麻醉前准备:对患者进行各项指标检查,如心电图,血压,脉搏血氧饱和度,吸氧气,并准备好抢救措施。备好相关药物及器材,在 B 超指引下,确定患者臂丛神经所在位置。2)麻醉诱导及维持:准确确定患者臂丛位置后穿刺进针,给予 0.35% 罗哌卡因 20 mL 进行神经阻滞,阻滞成功后为患者进行全麻,并给予静脉麻醉维持,药物包括 0.02 mg/kg 咪达唑仑、

2.0 mg/kg 丙泊酚、0.3 μg/kg 舒芬太尼诱导。给予 3-5 mg/kg·h 丙泊酚维持。3)术中根据患者实际情况调整药物用量使 Bis 值维持在 40-60 之间。必要时维持心率及血压稳定选择应用盐酸麻黄碱注射液、盐酸乌拉地尔注射液等。4)麻醉恢复:当手术即将结束时,麻醉医生逐渐减少麻醉药物用量,直至麻醉药物停止使用,患者进入苏醒期,意识逐渐恢复。麻醉医生采用有效措施方法保障患者安全,必要时进行疼痛治疗。

1.3 观察指标与评定标准

观察指标:观察并记录两组患者入室时的基础值(T_1),麻醉诱导后(T_2),插管时(T_3),手术结束即刻(T_4)的血氧饱和度(Pulse oxygen saturation, SpO_2)、收缩压(Systolic blood pressure, SBP)、舒张压(Diastolic blood pressure, DBP)、平均动脉压(Mean arterial pressure, MAP)、心率(Heart rate, HR)水平;麻醉效果和术后疼痛阈值,其中麻醉效果包括运动神经阻滞时间以及感觉神经阻滞时间;采用谵妄评定方法(Confusion Assessment Method, CAM)^[12]从患者的意识、定向、精神以及认知等方面评定术后谵妄发生率以及谵妄持续时间。

术后疼痛程度评定标准:应用自拟术后疼痛量表,记录两组患者术后 2 h、12 h、24 h 的疼痛评分,满分为 5 分,得分越高

表明疼痛程度越强。

1.4 统计学方法

本研究采取 SPSS 23.0 进行分析, 计数资料以例数 / 百分比(n%)表示, 进行 χ^2 检验; 计量资料以符合正态分布则用均数 $\pm$ 标准差($\bar{x} \pm s$)表示, 组间比较采用 t 检验; 以 $P < 0.05$ 为差异有统计学意义。

2 结果

2.1 术后住院时长以及唤醒时间比较

观察组患者的住院时间以及唤醒时间明显低于对照组 ($P < 0.05$), 如表 2 所示。

2.2 各时间点生命体征对比

观察组 T_1 到 T_4 时间 SPO_2 、SBP、DBP、MAP、HR 无明显波动 ($P > 0.05$), 对照组 T_1 到 T_4 时间上述指标波动明显, 且两组患者 T_2 、 T_3 时间 SPO_2 、SBP、DBP、MAP、HR 对比差异显著 ($P < 0.05$), 如表 3 所示。

2.3 麻醉效果和术后疼痛阈值对比

观察组运动神经阻滞时间以及感觉神经阻滞时间明显高于对照组, 术后 2 h、12 h、24 h 疼痛阈值明显低于对照组 ($P < 0.05$), 如表 4 所示。

2.4 术后谵妄发生率和谵妄持续时间比较

观察组术后谵妄发生率和谵妄持续时间明显低于对照组 ($P < 0.05$), 如表 5 所示。

表 2 术后住院时长以及唤醒时间对比 ($\bar{x} \pm s$)

Table 2 Comparison of postoperative hospital stay and wake up time ($\bar{x} \pm s$)

Groups	n	Length of postoperative hospital stay (d)	Wake up time (min)
The observation group	50	5.56 $\pm$ 2.64*	9.36 $\pm$ 3.78*
The control group	50	6.95 $\pm$ 2.98	25.84 $\pm$ 6.03

Note: compared with the control group, * $P < 0.05$.

表 3 各时间点生命体征对比

Table 3 Comparison of vital signs at each time point

Time	SPO_2 (%)		SBP(mmHg)		DBP(mmHg)		MAP(mmHg)		HR(times/min)	
	Observation group	Control group	Observation group	Control group	Observation group	Control group	Observation group	Control group	Observation group	Control group
T_1	98.42 $\pm$ 1.53	98.35 $\pm$ 1.64	122.53 $\pm$ 14.63	121.68 $\pm$ 11.53	68.36 $\pm$ 11.63	69.52 $\pm$ 10.57	93.58 $\pm$ 11.48	93.45 $\pm$ 10.79	84.28 $\pm$ 10.53	83.92 $\pm$ 11.46
	98.84 $\pm$ 1.67*	93.52 $\pm$ 2.52	121.73 $\pm$ 13.53*	108.37 $\pm$ 11.53	67.92 $\pm$ 13.53*	61.82 $\pm$ 9.82	93.74 $\pm$ 10.84*	85.91 $\pm$ 7.92	84.82 $\pm$ 9.56*	93.76 $\pm$ 10.54
T_3	98.95 $\pm$ 1.56*	93.12 $\pm$ 1.53	123.53 $\pm$ 12.63*	136.83 $\pm$ 12.57	68.28 $\pm$ 12.53*	76.82 $\pm$ 8.45	93.87 $\pm$ 12.56*	81.98 $\pm$ 11.42	85.14 $\pm$ 11.45*	104.62 $\pm$ 12.63
	98.56 $\pm$ 1.63	98.25 $\pm$ 1.84#	120.86 $\pm$ 15.36	120.75 $\pm$ 11.63#	68.64 $\pm$ 11.56	68.92 $\pm$ 10.62#	94.05 $\pm$ 11.35	93.64 $\pm$ 11.23#	84.37 $\pm$ 12.53	83.67 $\pm$ 11.75#

Note: compared with the control group, * $P < 0.05$; Comparison between groups at the same time, # $P < 0.05$.

表 4 麻醉效果和术后疼痛阈值对比 ($\bar{x} \pm s$)

Table 4 Comparison of anesthesia effect and postoperative pain threshold ($\bar{x} \pm s$)

Groups	n	Anesthesia effect		Postoperative pain threshold		
		Motor nerve block time (min)	Sensory nerve block time (min)	2 h	12 h	24 h
The observation group	50	456.36 $\pm$ 23.12*	453.12 $\pm$ 31.25*	2.31 $\pm$ 0.26*	2.79 $\pm$ 0.56*	2.38 $\pm$ 0.76*
The control group	50	403.26 $\pm$ 32.45	364.23 $\pm$ 25.36	3.56 $\pm$ 1.32	4.79 $\pm$ 1.56	3.84 $\pm$ 1.08

Note: compared with the control group, * $P < 0.05$.

表 5 术后谵妄发生率和谵妄持续时间对比 ($\bar{x} \pm s$)

Table 5 Comparison of postoperative delirium incidence and delirium duration ($\bar{x} \pm s$)

Groups	n	Incidence of postoperative delirium (%)	Duration of delirium (h)
The observation group	50	6(12%)	4.85 $\pm$ 2.52
The control group	50	15(30%)	13.89 $\pm$ 3.52

Note: compared with the control group, * $P < 0.05$.

3 讨论

锁骨骨折在肩部创伤中最为常见,多指由间接的暴力外伤导致的锁骨的完整性和连续性中断。骨折手术目前有两种麻醉方式,分为全麻和神经阻滞^[1]。全麻是通过静脉或呼吸道使麻醉药物进入患者体内,进而使患者达到无痛、无意识的麻醉状态。有研究表明:将丙泊酚静脉麻醉复合局部浸润麻醉应用到老年髌骨骨折患者当中,麻醉效果显著,不产生强烈的应激反应^[14]。神经阻滞是采取臂丛或颈丛的麻醉方式,在这一类手术过程中患者会保持清醒,这一特征也造成患者因心理因素较紧张,针对此可辅助镇静药,进而最大程度的避免手术和麻醉并发症。另有研究表明:将臂丛神经阻滞复合全麻应用到肱骨干中下段骨折患儿中,可稳定血流动力学,减轻机体应激反应的发生^[15]。锁骨骨折作为临床上常见骨折,大多患者因惧怕手术和疼痛,会选取全麻进行手术^[16]。为了选取更优质的麻醉措施,减轻患者术后疼痛和并发症发生情况。本研究针对臂丛神经阻滞复合静脉全麻进行锁骨骨折手术对患者疼痛阈值和术后谵妄的影响,为临床提供参考意见。

本研究结果表明,观察组患者的术后住院时长以及唤醒时间明显低于对照组。该结果表明,应用臂丛神经阻滞复合静脉全麻进行锁骨骨折手术术后住院时长以及唤醒时间要优于采用静脉全麻进行锁骨骨折手术。这一结果与 Kumari P^[17]以及 McHardy PG^[18]的结果具有相似性。进一步分析其原因可知:臂丛神经阻滞复合静脉全麻在 B 超的指引下进行操作,保证术野清晰,可提高手术效率。术中依据患者的具体情况调节麻醉药物用量,使得患者在手术结束后能尽快清醒,且术后恢复较快,缩短了术后住院时间^[19-21];观察组 T₁ 到 T₄ 时间 SPO₂、SBP、DBP、MAP、HR 无明显波动,对照组 T₁ 到 T₄ 时间上述指标波动明显,且两组患者 T₂、T₃ 时间 SPO₂、SBP、DBP、MAP、HR 对比差异显著。该结果表明,臂丛神经阻滞复合静脉全麻可以有效减低患者术中应激物质的释放。这一结果与 Brenner D^[22]以及 Dhande K^[23]的结果具有一致性。其原因为:全麻术中为患者进行频繁冲洗,将会增加患者发生水肿以及应激反应的概率。而臂丛神经阻滞复合静脉全麻,注射麻醉药后可阻断神经性疼痛,更利于手术操作,穿刺时安全可靠,又可取得良好的麻醉效果,进而改善患者各项生命体征。以上操作可减轻患者 SPO₂、SBP、DBP、MAP、HR 波动,降低应激物质的释放^[24-25];观察组运动神经阻滞时间以及感觉神经阻滞时间明显高于对照组,术后 2 h、12 h、24 h 疼痛阈值明显低于对照组。由此说明,臂丛神经阻滞复合静脉全麻相对于静脉全麻的麻醉效果较好,术后疼痛阈值低。这一结果与 Kang R^[26]以及 Yuan L^[27]结果具有一致性。分析其原因可知:臂丛神经阻滞复合静脉全麻舒适度较高,镇痛时间相对较长,术后患者即使不使用镇痛泵,也有长时间无痛状态。患者全麻后会产生多种不适症状,这与机体内麻醉药残余有一定相关性。而臂丛神经阻滞复合静脉全麻使用的麻醉药物大量减少,因此进一步降低了不适症状的发生以及疼痛阈值^[28,29]。所以若手术采用神经阻滞联合静脉全麻,可减少麻醉药物用量吗,降低术后患者疼痛以及其它不适症状;观察组术后谵妄发生率和谵妄持续时间明显低于对照组。这一结果与 Vlisides P^[30]以及 Goins AE^[31]的报道具有一致性。其原因为:术后谵妄属于急性认知功能障碍,臂丛神经阻滞复合静脉全麻降

低谵妄发生率、谵妄持续时间是因为:在患者麻醉过程中持续关注患者麻醉情况,并及时配合相关药物,防治患者术后出现麻醉药物代谢不全和药物过敏,进而降低了患者谵妄发生率,并且谵妄持续时间相对较短^[32]。但本研究仍存在一定的不足,如样本量较小及麻醉方式对术后谵妄的具体缓解机制研究不够深入,将在后续研究中继续探究。

综上,对锁骨骨折手术患者进行臂丛神经阻滞复合静脉全麻,可有效降低患者手术时间、术后住院时间以及唤醒时间,同时稳定生命体征,提升麻醉效果,降低术后疼痛阈,且有助于改善术后谵妄,可为临床提供参考意见。

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