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全身麻醉结合股神经及坐骨神经阻滞对下肢骨折患者术后苏醒质量、应激反应和认知功能的影响 *

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摘要 目的:观察全身麻醉结合股神经及坐骨神经阻滞对下肢骨折患者术后苏醒质量、应激反应和认知功能的影响。**方法:**选择2020年7月-2021年7月期间我院收治的103例下肢骨折手术患者,依据双色球随机分组法分为对照组(51例,接受全身麻醉)和观察组(52例,接受全身麻醉结合股神经及坐骨神经阻滞)。观察两组血流动力学、术后苏醒质量、应激反应和认知功能的变化,记录两组围术期不良反应发生情况。**结果:**两组诱导麻醉后(T2)时间点心率(HR)、平均动脉压(MAP)较麻醉前(T1)时间点下降,观察组置喉罩即刻(T3)~置喉罩后60 min(T5)时间点HR、MAP低于对照组($P<0.05$)。两组不良反应发生率对比无差异($P>0.05$)。观察组的苏醒时间短于对照组,躁动发生率低于对照组($P<0.05$)。两组麻醉苏醒期肾上腺素(E)、皮质醇(Cor)均较麻醉维持期升高,但观察组低于对照组($P<0.05$)。观察组视空间与执行、记忆、命名、注意、语言、抽象、定向力、延迟回忆维度评分及总分均高于对照组($P<0.05$)。**结论:**下肢骨折患者采用全身麻醉结合股神经及坐骨神经阻滞,可稳定血流动力学,提高术后苏醒质量,减轻应激反应和对认知功能的影响。

关键词:全身麻醉;股神经及坐骨神经阻滞;下肢骨折;术后苏醒质量;应激反应;认知功能

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Effects of General Anesthesia Combined with Femoral Nerve and Sciatic Nerve Block on Postoperative Awakening Quality, Stress Response and Cognitive Function in Patients with Lower Limb Fracture*

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ABSTRACT Objective: To observe the effects of general anesthesia combined with femoral nerve and sciatic nerve block on postoperative awakening quality, stress response and cognitive function in patients with lower limb fractures. **Methods:** 103 patients with lower limb fractures who were treated in our hospital from July 2020 to July 2021 were selected, and they were divided into control group (51 cases, general anesthesia) and observation group (52 cases, general anesthesia combined with femoral nerve and sciatic nerve block) according to the double color ball method. The changes of hemodynamics, postoperative awakening quality, stress response and cognitive function in two groups were observed, and the perioperative adverse reactions in two groups were recorded. **Results:** The heart rate (HR) and mean arterial pressure (MAP) in the two groups after induction anesthesia (T2) time points were lower than those before anesthesia (T1). There was no significant difference in the incidence of adverse reactions between the two groups ($P>0.05$). HR and MAP in the observation group were lower than those in the control group from immediately (T3) to 60min (T5) after laryngeal mask ($P<0.05$). The awakening time in the observation group was shorter than that in the control group, and the incidence of agitation was lower than that in the control group ($P<0.05$). The adrenaline (E) and cortisol (Cor) in the two groups in the anesthesia awakening period were higher than those in the anesthesia maintenance period, but the observation group was lower than the control group ($P<0.05$). The scores and total scores of visual space and execution, memory, naming, attention, language, abstraction, directional force and delayed recall in the observation group were higher than those in the control group ($P<0.05$). **Conclusion:** General anesthesia combined with femoral nerve and sciatic nerve block for patients with lower limb fracture can stabilize hemodynamics, improve postoperative awakening quality, reduce stress response and influence on cognitive function.

Key words: General anesthesia; Femoral nerve and sciatic nerve block; Lower limb fracture; Postoperative awakening quality; Stress response; Cognitive function

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前言

下肢骨折多采取手术治疗,此类手术难度大、时间长,可不同程度地影响患者的循环系统^[1]。而良好的麻醉方案则可在保障手术顺利实施的基础上,尽量减轻手术刺激、减少麻醉药物带给机体的影响^[2]。下肢骨折患者手术常采取全身麻醉的麻醉方案,但患者易发生不同程度的应激反应,进而引起血流波动,不利于手术顺利进行,且延缓患者的术后恢复速度^[3,4]。随着超声技术的快速发展,麻醉方案的选择也逐渐趋于多样化^[5]。近年来外周区域股神经及坐骨神经阻滞因其并发症少、对呼吸、循环干扰小而逐渐受到临床重视^[6]。但有关全身麻醉结合股神经及坐骨神经阻滞对下肢骨折患者术后的综合影响尚需要进一步的论证,本研究就此展开分析。

1 资料与方法

1.1 临床资料

选择 2020 年 7 月 -2021 年 7 月期间我院收治的下肢骨折手术患者($n=103$),依据双色球随机分组法分为对照组(51 例,接受全身麻醉)和观察组(52 例,接受全身麻醉结合股神经及坐骨神经阻滞)。研究方案已获得我院伦理学委员会批准。对照组患者中:女性 19 例;男性 32 例,美国麻醉协会分级:I 级 29 例,II 级 22 例;年龄 43~78 岁,平均年龄(62.79 ± 4.51)岁;体质指数 $21 \sim 31 \text{ kg/m}^2$,平均(25.64 ± 1.14) kg/m^2 ;左侧骨折 28 例,右侧骨折 23 例;髓内钉内固定 29 例,锁定钢板内固定 22 例。观察组患者中:女性 22 例,男性 30 例;美国麻醉协会分级:I 级 28 例,II 级 24 例;年龄 44~77 岁,平均年龄(62.06 ± 5.39)岁;体质指数 $22 \sim 31 \text{ kg/m}^2$,平均(25.26 ± 1.07) kg/m^2 ;左侧骨折 27 例,右侧骨折 25 例;髓内钉内固定 27 例,锁定钢板内固定 25 例。两组一般资料比较无差异($P>0.05$)。

1.2 纳入排除标准

纳入标准:(1)结合影像学表现确诊为下肢骨折;(2)ASA 分级 I~II 级;(3)患者及其家属同意进行该次研究。排除标准:(1)病理性骨折患者;(2)合并严重脏器功能不全难以耐受麻醉;(3)近期使用过糖皮质激素的患者;(4)合并精神类疾病难以配合麻醉剂手术;(5)合并全身多处骨折的患者;(6)患有内分泌疾病的患者;(7)本身存在认知障碍的患者。

1.3 麻醉方法

药物:咪达唑仑注射液购自宜昌人福药业有限责任公司,规格:2 mL:2 mg,国药准字 H20067040。枸橼酸舒芬太尼注射液购自宜昌人福药业有限责任公司,规格:按 $\text{C}_{22}\text{H}_{30}\text{N}_2\text{O}_2\text{S}$ 计 1 mL:50 μg ,国药准字 H20054171。丙泊酚乳状注射液购自北京费森尤斯卡比医药有限公司,规格:20 mL:0.2 g,国药准字 J20171055。罗库溴铵注射液购自浙江仙琚制药股份有限公司,规格:5 mL:50 mg,国药准字 H20093186。盐酸罗哌卡因注射液购自齐鲁制药有限公司,规格:10 mL:0.1 g (以 $\text{C}_{17}\text{H}_{26}\text{N}_2\text{O} \cdot \text{HCl}$ 计),国药准字 H20153780。两组患者均实施全身麻醉,依次给予 0.03 mg/kg 咪达唑仑注射液、4~6 $\mu\text{g/kg}$ 枸橼酸舒芬太尼注射液、1~1.2 mg/kg 丙泊酚乳状注射液静脉注射,观察患者有无意识,无睫毛反应后,给予 0.6 mg/kg 罗库溴铵注射液,缓慢注入,显效后,行机械通气。术中经静脉维持麻醉,麻醉用药为瑞

芬太尼 0.1 $\mu\text{g}/(\text{kg} \cdot \text{min})$ 、丙泊酚 4~6 $\text{mg}/(\text{kg} \cdot \text{h})$,手术完成前 10 min 停止用药。手术过程中,严密观察患者心率(HR)、平均动脉压(MAP)等,并适时调整给药量。观察组患者在全身麻醉诱导后,超声引导下实施股神经、坐骨神经阻滞。股神经阻滞:取仰卧位,腹股沟区常规消毒,将德国西门子公司生产的 Acuson P700 便携式超声仪的探头置于腹股沟韧带下方的股动脉搏动处,确定股神经、股静脉、股动脉。股神经阻滞:平行插入导针,穿过肌筋膜后有明显突破感,注入 10 mL 0.4%盐酸罗哌卡因注射液。坐骨神经阻滞:垫高患肢,于 Labat 点作为穿刺点。注入药量同股神经阻滞。

1.4 观察指标

(1)血流动力学:诱导麻醉前(T1)、诱导麻醉后(T2)、置喉罩即刻(T3)、置喉罩后 30 min(T4)和置喉罩后 60 min(T5),采用德国德尔格公司生产的 infinity vista 多功能心电监护仪监测并记录患者不同时间点的 HR、MAP。(2)术后苏醒质量:记录两组患者停药后苏醒时间,观察并记录躁动发生情况。(3)应激反应:采集患者麻醉维持期、麻醉苏醒期时的外周血 6 mL,采用酶联免疫法测定肾上腺素(E)、皮质醇(Cor)水平。(4)认知功能:术后 1 d 应用蒙特利尔认知评估(MoCA)^[7]量表评价两组患者的认知功能,MoCA 量表包括定向力、记忆、视空间与执行、抽象、语言、延迟回忆、注意、命名,总分 30 分,分数越高代表认知功能越高。(5)麻醉安全性:记录两组患者术中或术后不良情况。

1.5 统计学方法

采用 SPSS25.0 进行统计分析。躁动发生率、不良反应发生率等计数资料以率或比表示,采用 χ^2 检验。HR、苏醒时间、E、Cor 计量资料用($\bar{x} \pm s$)表示,两组数据比较采用 t 检验,不同时间点对比采用方差检验。将 $\alpha=0.05$ 作为检验水准。

2 结果

2.1 两组血流动力学指标对比

两组 T2 时间点 HR、MAP 均较 T1 时间点下降,对照组 T3~T5 时间点 HR、MAP 均较 T1、T2 时间点升高($P<0.05$),观察组 T3~T5 时间点 HR、MAP 较 T2 时间点升高,但与 T1 时间点比较无统计学差异($P>0.05$)。观察组 T3~T5 时间点 HR、MAP 低于对照组($P<0.05$)。两组 T2 时间点 HR、MAP 组间对比无统计学差异($P>0.05$)。见表 1。

2.2 两组术后苏醒质量对比

观察组的苏醒时间短于对照组,躁动发生率低于对照组($P<0.05$)。见表 2。

2.3 两组应激反应指标对比

两组麻醉苏醒期 E、Cor 水平均升高,但观察组较对照组更低($P<0.05$),见表 3。

2.4 两组认知功能各维度评分及总分对比

观察组视空间与执行、记忆、命名、注意、语言、抽象、定向力、延迟回忆维度评分及总分均高于对照组($P<0.05$),见表 4。

2.5 两组不良反应对比

观察组出现恶心呕吐和尿潴留各 1 例、心动过缓 2 例。对照组出现心动过缓 1 例、恶心呕吐 2 例。观察组(7.69%)、对照组(5.88%)不良反应发生率对比,未见明显差异($\chi^2=0.133$, $P=0.715$)。

表 1 两组血流动力学指标对比($\bar{x} \pm s$)

Table 1 Comparison of hemodynamic indexes between the two groups($\bar{x} \pm s$)

Groups	Time	HR(beats/min)	MAP(mmHg)
Control group(n=51)	T1	76.43± 6.46	82.39± 6.74
	T2	69.68± 5.02*	71.08± 7.81*
	T3	84.38± 6.67**	93.44± 6.82**
	T4	83.21± 6.98**	93.76± 5.83**
	T5	83.28± 5.83**	93.82± 6.02**
Observation group(n=52)	T1	76.27± 6.16	82.64± 7.81
	T2	70.52± 5.85*	71.55± 7.93*
	T3	75.86± 6.54 ^{no}	81.82± 6.43 ^{no}
	T4	75.56± 5.08 ^{no}	81.31± 7.25 ^{no}
	T5	75.53± 6.15 ^{no}	81.37± 8.12 ^{no}

Note: compared with T1 time point, * $P<0.05$. Compared with T2 time point, [#] $P<0.05$. Compared with the control group, % $P<0.05$.

表 2 两组术后苏醒质量对比

Table 2 Comparison of postoperative awakening quality between the two groups

Groups	Waking time(min)	Incidence of agitation(%)
Control group(n=51)	14.13± 1.08	7(13.73)
Observation group(n=52)	10.21± 1.36	1(1.92)
χ^2/t	16.180	5.007
P	0.000	0.025

表 3 两组应激反应指标对比($\bar{x} \pm s$)

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

Groups	Time	E(ng/L)	Cor(pmol/L)
Control group(n=51)	Anesthesia maintenance period	44.35± 5.56	84.87± 5.63
	Anesthesia awakening period	89.41± 6.32	139.05± 10.81
Observation group(n=52)	Anesthesia maintenance period	44.01± 5.53	85.17± 5.62
	Anesthesia awakening period	67.55± 6.69%	117.91± 9.68%

Note: compared with the control group during anesthesia awakening period, % $P<0.05$.

表 4 两组认知功能各维度评分及总分对比($\bar{x} \pm s$, 分)

Table 4 Comparison of scores and total scores of each dimension of cognitive function between the two groups($\bar{x} \pm s$, scores)

Groups	Visual space and execution	Memory	Naming	Attention	Language	Abstract	Directional force	Delayed recall	Total score
Control group(n=51)	3.24± 0.37	2.31± 0.32	2.84± 0.27	3.67± 0.35	3.42± 0.38	2.84± 0.32	2.58± 0.27	1.95± 0.26	22.85± 1.12
Observation group(n=52)	4.09± 0.28	3.14± 0.35	3.39± 0.30	4.05± 0.27	4.04± 0.31	3.58± 0.26	3.25± 0.33	2.41± 0.31	27.95± 1.25
t	-14.712	-14.066	-9.774	-9.427	-10.546	-11.150	-11.265	-9.038	-23.717
P	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

3 讨论

下肢骨折患者多集中于中老年群体,此类群体心血管代偿功能降低,手术、麻醉均可引起剧烈血流动力学波动^[8]。再加上

下肢骨折患者因骨折部位疼痛,侧卧位比较困难,增加了麻醉穿刺难度,风险及并发症相对较多^[9]。全身麻醉是临床上应用较为广泛的一种麻醉方式,既往用于下肢骨折患者中,也获得了一定的麻醉效果^[10]。但是全麻还同时具有影响患者血流稳定的

弊端,导致机体处于应激状态,不利于术后恢复^[11]。外周神经阻滞麻醉是近几年常用麻醉方式,腰丛、腰骶丛是下肢的主要神经支配,以坐骨神经和股神经最为常见^[12]。传统神经阻滞通常根据解剖标志、异感定位的盲探法,无法确认麻醉药物的扩散范围,操作难度大,且不可避免地损伤神经及周围血管,阻滞效果无法保证^[13,14]。而神经阻滞的效果取决于神经定位,近年来发现超声引导下能够清晰定位神经,故逐渐应用于下肢外科手术的治疗中^[15,16]。

本次研究结果显示,两组均产生了不同程度的血流波动,其中观察组的血流波动明显更小。提示全身麻醉结合股神经及坐骨神经阻滞更能促进血流动力学稳定,为手术的顺利实施提供了良好的环境。推测其可能的原因是:罗哌卡因可有效抑制手术伤害刺激向中枢神经系统传导,而股神经及坐骨神经阻滞可将局麻药物精确注入目标神经丛;加上全身麻醉抑制了下丘脑及边缘系统对大脑皮质的投射系统,两种麻醉方案从不同的作用机制减轻手术刺激,稳定机体血流动力学^[17,18]。研究结果还发现,观察组的苏醒时间短于对照组,躁动发生率低于对照组,可能是因为全身麻醉无法有效阻断术中应激的交感神经传导,而股神经及坐骨神经阻滞可弥补这一不足,进而缩短苏醒时间,降低躁动发生率^[19-21]。Cor、E 均是主要的机体应激反应观察指标,其水平异常升高可反映机体处于应激状态^[22,23]。本次研究结果发现,下肢骨折患者采用全身麻醉结合股神经及坐骨神经阻滞,可有效减轻应激反应。可能是因为股神经及坐骨神经阻滞在实施后对循环与呼吸等术中生理状态的影响小,缓解机体应激程度^[24-26]。研究结果还发现,术后 1 d,观察组的 MoCA 各维度评分及总分均高于对照组,可见复合麻醉可减轻对机体认知功能的影响。推测主要是因为超声引导下神经阻滞定位准确,可避免对组织周围神经和血管造成损害,同时还可以提高麻醉药物弥散的可控性,使局部麻醉发挥最好效果,在保证麻醉效果的同时减少了麻醉药物对机体认知功能的影响^[27-29]。而两组患者不良反应发生率比较无差异,更进一步证实了全身麻醉结合股神经及坐骨神经阻滞在下肢骨折手术中的安全性好。

综上所述,下肢骨折患者采用全身麻醉结合股神经及坐骨神经阻滞,麻醉效果较好,可稳定血流动力学,提高术后苏醒质量,减轻应激反应和对认知功能的影响。值得注意的是,超声技术也有局限,如对于某些肥胖患者,频谱信号会受到皮下肌肉层的削弱而影响数据的准确性,操作者若缺乏临床经验,将会影响超声下阻滞的效果,故临床在麻醉过程中需结合患者实际情况进行麻醉,以确保麻醉的安全性。

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