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超声引导下外周神经阻滞麻醉对老年单膝关节置换术患者血流动力学和认知功能的影响*

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摘要 目的:探究超声引导下外周神经阻滞麻醉对老年单膝关节置换术患者血流动力学和认知功能的影响。**方法:**选取 2017 年 3 月-2019 年 3 月在我院进行单膝关节置换术的老年患者 82 例,根据麻醉方式不同分为研究组和对照组,每组各 41 例。研究组采用超声引导下外周神经阻滞麻醉,对照组采用全身麻醉,对比两组的麻醉诱导时间、麻醉维持时间、手术时间等指标,两组入室麻醉前(T_0)、气管插管时(T_1)、切皮(T_2)、止血带 60 min(T_3)、松止血带 5 min(T_4)、拔除气管导管时(T_5)、术后 6 h(T_6)、术后 24 h(T_7)的收缩压(Systolic blood pressure, SBP)、舒张压(Diastolic blood pressure, DBP)、心率(Heart rate, HR)等指标,两组术前、术后 6 h、术后 12 h、术后 24 h 的认知功能评分及术后镇痛药物的使用量。**结果:**研究组的麻醉诱导时间明显长于对照组($P<0.05$);两组的麻醉维持时间、手术时间比较均无明显差异($P>0.05$);研究组 T_1 、 T_3 、 T_5 时点 HR 显著低于对照组($P<0.05$), T_2 、 T_3 时点 SBP、DBP 水平明显高于对照组, T_3 、 T_4 、 T_5 、 T_6 时点 SBP、DBP 水平显著低于对照组($P<0.05$)。两组术前、术后 24 h 的认知功能评分对比均无统计学差异($P>0.05$);但研究组术后 6 h、术后 12 h 的认知功能评分均明显高于对照组($P<0.05$), 术后 24 h、术后 48 h、术后 72 h 的镇痛药物使用量均明显低于对照组($P<0.05$)。**结论:**在老年单膝关节置换术中,超声引导下外周神经阻滞麻醉对患者血流动力学和认知功能的影响较小,且术后镇痛药物使用量更少。

关键词:外周神经阻滞麻醉;老年单膝关节置换术;血流动力学;认知功能

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Effect of Ultrasound-guided Peripheral Nerve Block Anesthesia on the Hemodynamics and Cognitive Function of Elderly Patients Undergoing Single Knee Arthroplasty*

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ABSTRACT Objective: To investigate the effects of ultrasound-guided peripheral nerve block anesthesia on hemodynamics and cognitive function in elderly patients undergoing single knee arthroplasty. **Methods:** Eighty-two elderly patients underwent single knee arthroplasty in our hospital from March 2017 to March 2019 were selected. According to the different anesthesia methods, and divided into the study group and the control group, with 41 patients in each group. The study group used ultrasound-guided peripheral nerve block anesthesia, and the control group used general anesthesia. The two groups were compared for anesthesia induction time, anesthesia maintenance time, operation time and other indicators, before the two groups were anesthetized (T_0), tracheal intubation (T_1), cut (T_2), tourniquet 60 min (T_3), loose hemostatic systolic blood pressure (SBP), diastolic blood pressure (DBP) with 5 min (T_4), tracheal tube removal (T_5), 6 h (T_6), 24 h (T_7), heart rate (HR) and other indicators. Cognitive function scores and the amount of postoperative analgesics before surgery, at 6 h, 12 h, and 24 h after surgery. **Results:** The anesthesia induction time of the study group was significantly longer than that of the control group ($P<0.05$). There was no significant difference in anesthesia maintenance time and operation time between the two groups ($P>0.05$). The HR of the study group at the T_1 , T_3 , and T_5 was significantly lower than that of the control group ($P<0.05$). The levels of SBP and DBP in the study group were higher than those in the control group at T_2 and T_3 , and the levels of SBP and DBP in T_3 , T_4 , T_5 and T_6 were lower than those in the control group ($P<0.05$). There was no significant difference in the cognitive function scores between the two groups before and after 24 hours ($P>0.05$). However, the cognitive function scores of the study group were significantly higher than those of the control group at 6 h and 12 h after the operation ($P<0.05$). The analgesic drug use of the study group was significantly lower than that of the control group at 24 h, 48 h and 72 h after operation ($P<0.05$). **Conclusion:** In the elderly

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single knee arthroplasty, ultrasound-guided peripheral nerve block anesthesia has little impact on the patients' hemodynamics and cognitive function with less postoperative analgesics.

Key words: Peripheral nerve block anesthesia; Elderly single knee arthroplasty; Hemodynamics; Cognitive function

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前言

由于老年患者身体代谢能力较差,且对麻醉药物较敏感,在单膝关节置换术中行全身麻醉后,患者易在术毕发生苏醒延迟、呼吸恢复不佳等^[12]。而对术前合并高血压病、冠心病的患者而言,术中气管插管拔管会引起剧烈的血流动力学波动,增加手术风险^[3,4]。因此,积极寻找安全、有效的麻醉方式对降低患者手术风险、改善患者生活质量尤为重要。

随着超声技术的不断发展,可清晰显示许多外周神经,因而在超声引导下可方便地行外周神经阻滞,以用于神经阻滞麻醉、疼痛治疗^[5,6],且效果确切^[7-9]。目前文献主要集中于超声引导下坐骨神经、腋路臂丛神经及股神经阻滞^[10-12],对于在老年单膝关节置换术中的应用报道相对较少。本研究通过探究超声引导下外周神经阻滞麻醉对老年单膝关节置换术患者血流动力学和认知功能的影响,旨在为老年患者探寻较为有效、安全性高的手术麻醉方式。

1 资料与方法

1.1 一般资料

选取 2017 年 3 月-2019 年 3 月在我院进行单膝关节置换术的老年患者 82 例,根据麻醉方式不同分为研究组和对照组,每组各 41 例。研究组中,男性 17 例,女性 24 例,平均年龄为 71.12 ± 6.45 岁,平均 BMI 为 27.94 ± 3.84 kg/m²,美国麻醉医师协会(ASA)分级中,II 级 32 例,III 级 9 例;对照组中,男性 19 例,女性患者 22 例,平均年龄为 70.82 ± 8.17 岁,平均 BMI 为 28.06 ± 3.71 kg/m²,ASA 分级中,II 级 31 例,III 级 10 例。两组的基础资料比较差异无显著性差异($P > 0.05$),具有可比性。本次研究获得我院医学伦理委员会的批准。

1.2 纳入标准和排除标准

纳入标准:(1)需要进行单膝关节置换术者;(2)检查无严重基础疾病者;(3)能全程配合本次研究者。排除标准:(1)合并严重心脑血管疾病者;(2)合并高血压、糖尿病等疾病者;(3)存在由中枢神经系统疾病导致的肢体功能障碍者^[13];(4)不能耐受手术者;(5)存在认知功能障碍者;(6)临床资料不完整者。

1.3 研究方法

对照组:采用全身麻醉,取平卧位,静脉注射咪唑安定 $0.03-0.05$ mg/kg 和芬太尼 $1-2$ μ g/kg,3 min 后,采用 50 mg 2% 丁卡因行气管内表面麻醉,并行气管内插管,随后,静脉注射丙泊酚 1 mg/kg、罗库溴铵 0.6 mg/kg,术中 $2-3$ mg/(kg·h)静脉泵入丙泊酚进行麻醉维持, $0.1-0.3$ μ g/(kg·min)持续泵注瑞芬太尼维持麻醉深度,行 BIS 监测并维持 BIS 值 $40 \sim 60$ 。根据需要间断追加芬太尼、罗库溴铵。

研究组:采用超声引导下外周神经阻滞麻醉,患者均取平卧位,静脉药物给予后,患者更换体位为侧卧位,静脉注射咪唑安定 1 mg 和舒芬太尼 5 μ g,采用低频凸阵的超声探头,调整探头直到显示出清晰的腰方肌、竖脊肌、横突和腰大肌,用 10 cm 的穿刺针进行穿刺,穿刺到神经根的位置后无脑脊液和血液后注射进 25 mL 0.5% 罗哌卡因,将超声探头移动到坐骨结节和股骨大转子之间,找到坐骨神经然后利用平面内进针技术进行穿刺,在坐骨神经周围注射浓度为 15 ml 0.5% 罗哌卡因。两组在术后均进行静脉镇痛泵进行镇痛。

1.4 观察指标

(1)对比两组的麻醉诱导时间、麻醉维持时间、手术时间等指标;(2)对比两组入室麻醉前(T_0)、气管插管时(T_1)、切皮(T_2)、止血带 60 min(T_3)、松止血带 5 min(T_4)、拔除气管导管时(T_5)、术后 6 h(T_6)、术后 24 h(T_7)等时刻的收缩压(Systolic blood pressure, SBP)、舒张压(Diastolic blood pressure, DBP)、心率(Heart rate, HR)等指标^[14,15];(3)采用简易精神状态量表(Mini-Mental State Examination, MMSE)对两组患者术前、术后 6 h、术后 12 h、术后 24 h 的认知功能进行评价^[16];(4)对比两组术后 24 h、 48 h、 72 h 镇痛药物使用量^[17]。

1.5 统计学分析

采用 SPSS 20.0 进行数据分析,计数资料以%表示,组间比较采用卡方检验;计量资料以均数 $\pm$ 标准差表示,组间比较采用 t 检验;以 $P < 0.05$ 差异存在统计学意义。

2 结果

2.1 两组的麻醉指标的对比

研究组的麻醉诱导时间明显长于对照组($P < 0.05$);两组麻醉维持时间、手术时间比较均无明显差异($P > 0.05$),见表 1。

表 1 两组的麻醉指标对比(分, $\bar{x} \pm s$)

Table 1 Comparison of the anesthesia indicators between the two groups (score, $\bar{x} \pm s$)

Groups	n	Anesthesia induction time	Anesthesia maintenance time	Operation time
Research group	41	$18.25 \pm 1.37^*$	$155.62 \pm 25.41^*$	101.43 ± 20.48
Control group	41	8.04 ± 0.98	165.32 ± 24.15	101.98 ± 20.67

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

2.2 两组不同时间点的血流动力学指标对比

研究组 T_1 、 T_3 、 T_5 时点 HR 均显著低于对照组($P < 0.05$);研

究组 T_2 、 T_3 时点 SBP、DBP 水平明显高于对照组, T_3 、 T_4 、 T_5 、 T_6 时点 SBP、DBP 水平显著低于对照组($P < 0.05$);研究组 T_2 时点

SBP 水平显著低于 T₀ 时间点($P<0.05$);对照组 T₂、T₃ 时点 SBP 水平显著低于 T₀ 时点,在 T₄、T₅、T₆ 时点 SBP 水平显著高于 T₀ 时点($P<0.05$);研究组 T₂、T₃、T₄、T₅、T₆、T₇ 时点的 DBP 水平显著低于 T₀ 时间点($P<0.05$);对照组 T₁、T₂、T₃ 时点 DBP 水平显著低于 T₀ 时点,在 T₅ 时点 DBP 水平显著高于 T₀ 时点($P<0.05$);研究组在 T₄、T₅ 时点 HR 水平显著低于 T₀ 时点 ($P<0.05$);对照组在 T₁、T₃、T₄、T₅、T₆ 时点 HR 水平显著高于 T₀ 时点 ($P<0.05$),见表 2。

表 2 两组不同时间点的血流动力学指标对比($\bar{x} \pm s$)

Table 2 Comparison of the hemodynamic parameters at different time points between the two groups ($\bar{x} \pm s$)

Project		T ₀	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇
SBP (mmHg)	Research group	140.53±18.56	138.24±18.45	132.75±17.52 [#]	138.34±15.56 [*]	134.58±12.34 [*]	138.54±12.47 [*]	140.74±13.75 [*]	138.58±13.94
	Control group	138.64±18.73	135.35±18.48	126.14±17.24 [#]	122.53±15.42 [#]	149.42±12.74 [#]	164.58±13.24 [#]	155.75±18.14 [#]	140.47±18.75
	Research group	82.72±8.56	76.84±8.87 [#]	71.54±8.54 [*]	66.77±8.54 [*]	65.78±8.56 [*]	69.87±8.75 [*]	66.12±9.64 [*]	64.01±10.05 ^{**}
	Control group	81.48±9.21	70.74±8.54 [#]	63.65±8.24 [#]	60.45±8.54 [#]	86.57±8.01	88.84±8.44 [#]	84.53±9.67	82.34±8.64
DBP (mmHg)	Research group	80.92±10.36	83.61±8.97 [*]	77.37±10.54	84.64±10.37 [*]	88.87±10.47 [#]	86.38±10.43 ^{**}	84.34±11.03	82.53±10.74
	Control group	80.53±10.21	88.71±9.64 [#]	78.64±10.97	91.64±10.74 [#]	92.03±10.45 [#]	92.10±11.41 [#]	85.13±10.67 [#]	82.79±10.41

Note: Compared with T₀, [#] $P<0.05$; compared with the control group, ^{*} $P<0.05$.

2.3 两组的认知功能评分对比 两组术前、术后 24 h 的认知功能评分对比均无统计学差异($P>0.05$);但研究组术后 6 h、术后 12 h 的认知功能评分均明显高于对照组($P<0.05$),见表 3。

表 3 两组认知功能评分对比(分, $\bar{x} \pm s$)

Table 3 Comparison of the cognitive function scores between the two groups (score, $\bar{x} \pm s$)

Groups	n	Cognitive function score			
		Preoperativon	At 6 h after surgery	At 12 h after surgery	At 24 h after surgery
Research group	41	27.58±1.35	26.08±1.95 [*]	25.98±1.74 [*]	25.91±1.52
Control group	41	27.31±1.42	23.25±1.87	23.84±1.67	25.88±1.44

Note: ^{*} $P<0.05$ compared with the control group.

2.4 两组术后镇痛药物使用量的对比 对照组,两组各时间点对比均有统计学意义($P<0.05$),见表 4。研究组术后 24、48 和 72 h 的镇痛药物使用量均明显低于

表 4 两组患者的术后镇痛药物使用量对比(μg , $\bar{x} \pm s$)

Table 4 Comparison of the postoperative analgesic drug use between the two groups (μg , $\bar{x} \pm s$)

Groups	n	Postoperative analgesic drug use		
		At 24 h after surgery	At 48 h after surgery	At 72 h after surgery
Research group	41	60.84±7.95 [*]	102.73±9.74 [*]	138.65±15.36 [*]
Control group	41	36.74±6.12	85.61±8.95	118.22±12.14

3 讨论

随着年龄的增长,老年人容易出现退行性骨关节病、膝关节骨关节炎等,如不及时给予治疗,可能会造成患者关节活动受限,严重影响生活质量。近年来,人工膝关节置换术逐渐成为临床上治疗此类疾病的重要手段之一^[18,19],但由于老年人往往合并多种系统疾病,全身麻醉在使用过程中,患者可能因为插

管、拔管、长时间的止血带反应,血流动力学波动较大,易产生严重的心血管不良事件,导致麻醉风险升高^[20-22]。随着超声技术的不断发展,超声引导下区域阻滞技术逐渐广泛应用于各类手术中,超声引导下区域阻滞技术是指,在区域阻滞过程中使用超声引导,其可清晰看到神经结构及其周围的血管、骨骼、肌肉及内脏结构等^[23,24]。同时,在进针过程中可提供穿刺针行进过程的实时影像,便于操作者在进针的同时随时调整进针的方向及

进针的深度,以更好的接近目标结构^[25-27]。在注药时,通过药液扩散路径,可确保局麻药均匀扩散到神经周围,使神经阻滞达到更满意的效果,相关并发症也明显减少,研究表明超声引导可缩短神经阻滞操作及起效时间、提高阻滞效果、减少阻滞相关并发症的发生,使用超声引导可缩短感觉阻滞的起效时间,提高阻滞成功率,减少穿刺次数,减少神经损伤^[28]。

本研究结果显示超声引导下外周神经阻滞麻醉可显著延长行单膝关节置换术的老年患者的麻醉诱导时间,但对其术中血流动力学影响较小。目前对行单膝关节置换术的老年患者术后恢复的影响主要有生理因素、伤害性因素、情感因素、认知功能的恢复等,多个报道显示,认知功能障碍是导致患者术后死亡的主要原因^[29,30]。本研究结果显示在老年单膝关节置换术中,超声引导下外周神经阻滞麻醉对术后患者认知功能影响较小,同时,患者术后镇痛药物使用量较低。

综上所述,在老年单膝关节置换术中,超声引导下外周神经阻滞麻醉对患者血流动力学和认知功能的影响较小,且术后镇痛药物使用量更少。同时,本研究也存在一定的不足之处,即所选病例数较少,后续可随着病例数的不断增加,对该麻醉方式的应用效果进行全面研究,有助于进一步增加临床参考数据的可靠性。

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