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不同浓度罗哌卡因腰硬联合麻醉用于人工髋关节置换手术对患者麻醉效果和术后运动功能的影响*

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摘要 目的:探讨不同浓度罗哌卡因腰硬联合麻醉用于人工髋关节置换手术对患者麻醉效果和术后运动功能的影响。**方法:**2017年2月至2019年12月选择在本院进行人工髋关节置换手术的患者84例,根据随机数字表法把患者分为观察组与对照组各42例。两组都给予腰硬联合麻醉,对照组采用常规浓度0.5%罗哌卡因麻醉,观察组采用低浓度0.375%罗哌卡因麻醉,记录患者麻醉效果和术后运动功能变化情况。**结果:**观察组的麻醉持续时间、运动恢复时间和感觉运动时间都显著短于对照组($P<0.05$)。观察组麻醉后10 min、30 min、60 min的Bromage评分都低于对照组($P<0.05$)。观察组术后7 d的低血压、恶心呕吐、头晕头痛、尿潴留等不良反应发生率为7.1%,显著低于对照组的19.0%($P<0.05$)。两组所有患者在术后2 h、术后4 h、术后24 h的呼吸、心率均在正常范围内波动,组间与组内对比都无统计学意义($P>0.05$)。**结论:**低浓度罗哌卡因腰硬联合麻醉用于人工髋关节置换手术能改善患者的麻醉效果和运动功能,提高麻醉效果,并不影响患者的生命体征,且能减少术后不良反应的发生。

关键词:罗哌卡因;腰硬联合麻醉;人工髋关节置换;麻醉效果;运动功能

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Effects of Different Concentrations of Ropivacaine Combined Spinal-epidural Anesthesia on Artificial Hip Replacement Surgery on Patients' Anesthesia Effect and Postoperative Motor Function*

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ABSTRACT Objective: To investigate the effects of different concentrations of ropivacaine combined spinal-epidural anesthesia on artificial hip replacement surgery on patients' anesthesia effect and postoperative motor function. **Methods:** From February 2017 to December 2019, 84 cases of patients underwent artificial hip replacement surgery in our hospital were selected and were equally divided into observation group and control group accorded to random number table method. Both groups were given combined spinal-epidural anesthesia. The control group were anesthetized with conventional concentration of 0.5 % ropivacaine. The observation group were anesthetized with low concentration of 0.375 % ropivacaine. **Results:** The duration of anesthesia, motor recovery time and sensorimotor time in the observation group were significantly shorter than those in the control group ($P<0.05$). The Bromage scores of the observation group at 10 min, 30 min, and 60 min after anesthesia were lower than those of the control group ($P<0.05$). The incidence of low blood pressure, nausea and vomiting, dizziness and headache, urinary retention and other adverse reactions in the observation group were 7.1 % at 7 days after operation, which were significantly lower than 19.0 % in the control group ($P<0.05$). The breathing and heart rate of all patients in the two groups at 2 h, 4 h and 24 h postoperatively fluctuated within the normal range, and there were no statistically significant difference compared between the groups and within the group ($P>0.05$). **Conclusion:** Low-concentration ropivacaine combined spinal-epidural anesthesia for artificial hip replacement surgery can improve the patient's anesthesia and motor function, improve the anesthesia effect, it does not affect the patient's vital signs, and it can reduce the incidence of postoperative adverse reactions.

Key words: Ropivacaine; Combined spinal-epidural anesthesia; Artificial hip replacement; Anesthesia effect; Motor function

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前言

随着老龄化程度不断加深,髋部疾病如骨关节炎、骨坏死、

骨折等发病率逐年增加。其中髋关节炎在临床上主要表现为活动不便、疼痛等症状,严重影响患者的身心健康^[1]。该病的治疗原则是控制病情,重建关节,矫正畸形,恢复或改善原本受损的

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关节功能^[23]。人工髋关节置换术是临床上比较成熟的治疗方法,具有微创、快捷、患者术后恢复快等特点^[4]。因此,为髋关节置换患者提供安全、有效的麻醉,成为影响患者预后的重要因素^[5]。传统人工髋关节置换多以全身麻醉的方式进行,并具有易于呼吸管理、镇静、催眠迅速等优势,但是很多患者在麻醉期间的血流动力学变化较大,在一定程度上可影响手术安全^[6]。腰硬联合麻醉属于一种椎管内阻滞技术,具有腰麻与硬膜外麻醉的双重功效,也具有镇静效果好、起效时间短、麻醉平面易控制等优势^[7,8]。罗哌卡因为腰硬联合麻醉常用的药物,其属于一种长效酰胺类麻醉药,可减轻对中枢神经系统、心血管系统的负面作用^[9,10]。其中低浓度罗哌卡因可达到完善的镇痛效果,但是也可能诱发低血压,影响麻醉手术安全^[11,12]。高浓度罗哌卡因虽然麻醉效果更好,但是对患者血流动力学有一定的负面作用^[13]。本文具体探讨了不同浓度罗哌卡因腰硬联合麻醉用于人工髋

关节置换手术对患者麻醉效果和术后运动功能的影响,希望为今后的临床应用提供参考依据。现总结报道如下。

1 资料与方法

1.1 研究对象

2017年2月至2019年12月选择在本院进行人工髋关节置换手术的患者84例,纳入标准:年龄55~75岁;单侧病变;愿意参加本研究调查,能签署知情同意者;ASA分级为II~III级;本院伦理委员会批准了此次研究。排除标准:拒绝签署知情同意书;具有脑血管事件和脑外伤病史者;有外周神经系统疾病者;穿刺部位感染患者;凝血功能障碍者。

根据随机数字表法把患者分为观察组与对照组各42例,两组患者的年龄、体重指数、性别、ASA分级等一般资料对比差异无统计学意义($P>0.05$),见表1。

表1 两组一般资料对比

Table 1 Comparison of two sets of general information

Groups	n	Age(years)	BMI (kg/m ²)	Gender (Male/Female)	ASA classify(II/III)
Observation group	42	62.15± 1.52	22.98± 1.42	22/20	32/10
Control group	42	62.82± 2.14	22.87± 1.22	21/21	33/9

1.2 麻醉方法

两组都给予腰硬联合麻醉,对照组采用常规浓度0.5%罗哌卡因(辰欣药业股份有限公司,1 mL生理盐水+0.75%罗哌卡因2 mL)麻醉,患肢朝上,在L3-4进行间隙穿刺,将腰穿针插入后,回抽脑脊液无异常注射罗哌卡因,总剂量3 mL,注射速度0.12 mL/s,注射后退出腰麻针。观察组:采用低浓度0.375%罗哌卡因麻醉(使用2 mL生理盐水+0.75%罗哌卡因2 mL),麻醉方式与对照组相同。

1.3 观察指标

(1)记录两组的麻醉持续时间、运动恢复时间和感觉运动时间。(2)生命体征监测:所有患者在术后2 h、术后4 h与术后24 h进行心率(Heart rate, HR)与呼吸频率(Respiratory Rate, RR)的监测。(3)在麻醉后10 min、30 min、60 min进行Bromage评分

(可反映患者的运动功能),0分:无运动阻滞,1分:不能抬腿为1级,2分:不能弯曲膝部,3分:不能弯曲踝关节。(4)记录两组术后7 d出现的低血压、恶心呕吐、头晕头痛、尿潴留情况。

1.4 统计方法

选择SPSS 19.00统计学软件进行分析,计量资料以均数±标准差表示,对比为t检验;计数数据以百分比表示,对比采用 χ^2 检验, $P<0.05$ 为差异有统计学意义。

2 结果

2.1 麻醉效果对比

观察组的麻醉持续时间、运动恢复时间和感觉运动时间都显著短于对照组($P<0.05$),见表2。

表2 两组麻醉效果对比(min, $\bar{x} \pm s$)

Table 2 Comparison of anesthesia effect between two groups(min, $\bar{x} \pm s$)

Groups	n	Duration of anesthesia	Exercise recovery time	Sensory exercise time
Observation group	42	85.61± 4.55*	106.28± 11.44*	160.28± 10.22*
Control group	42	103.29± 8.11	128.98± 12.01	197.88± 12.52

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

2.2 Bromage 评分对比

观察组麻醉后10 min、30 min、60 min的Bromage评分都

低于对照组($P<0.05$),见表3。

表3 两组不同时间点的Bromage评分对比(分, $\bar{x} \pm s$)

Table 3 Bromage score comparison between two groups at different time points (scores, $\bar{x} \pm s$)

Groups	n	10 min after anesthesia	30 min after anesthesia	60 min after anesthesia
Observation group	42	1.92± 0.32*	2.10± 0.11*	2.45± 0.03*
Control group	42	4.24± 2.53± 0.18	2.67± 0.09	2.87± 0.12

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

2.3 不良反应情况对比

观察组术后 7 d 的低血压、恶心呕吐、头晕头痛、尿潴留等

不良反应发生率为 4.8 %，显著低于对照组的 19.0%($P<0.05$)，见表 4。

表 4 两组术后不良反应情况对比(例,%)

Table 4 Comparison of postoperative adverse reactions between the two groups (n,%)

Groups	n	Low blood pressure	Nausea and vomiting	Dizziness and headache	Urinary retention	Total
Observation group	42	1	0	0	1	2(4.8)*
Control group	42	1	3	2	2	8(19.0)

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

2.4 生命体征变化对比

两组所有患者在术后 2 h、术后 4 h、术后 24 h 的呼吸、心

率均在正常范围内波动，组间与组内对比都无统计学意义($P>0.05$)，见表 5。

表 5 两组患者术后不同时间点的生命体征变化对比(次/min, $\bar{x} \pm s$)

Table 5 Comparison of vital signs changes of two groups of patients at different time points after operation (times / min, $\bar{x} \pm s$)

Groups	n	Index	2 h postoperatively	4 h postoperatively	24 h postoperatively
Observation group	42	HR	85.98 $\pm$ 4.22	86.22 $\pm$ 4.19	79.74 $\pm$ 3.18
Control group	42		87.94 $\pm$ 5.02	85.42 $\pm$ 2.84	81.03 $\pm$ 2.84
Observation group	42	RR	14.53 $\pm$ 1.11	16.12 $\pm$ 1.11	16.42 $\pm$ 1.18
Control group	42		15.02 $\pm$ 1.32	15.82 $\pm$ 1.32	16.32 $\pm$ 1.39

3 讨论

人工髋关节置换为髋关节炎的主要治疗方法,但是患者多为老年人,其身心状况比较差,对手术耐受性较差,在临床上需要合理选择麻醉方法^[14]。特别是很多老年患者血管代偿能力减退,对麻醉药物的使用较为敏感,其使用可增加不良反应发生的风险,甚或导致永久性神经系统损伤^[15,16]。全身麻醉在诱导期间,患者的血流动力学变化较大,在临床上的应用具有比较大的风险^[17]。腰硬联合麻醉具有无明显交感阻滞作用、操作简便、成功率高等优点,也可显著减少人工髋关节置换术中出血量和减少术后疼痛;还有利于患者早期功能锻炼,缩短住院时间^[18]。罗哌卡因是酰胺类纯 S 型左旋光学异构体,属于酰胺类长效局部麻醉药,能够减少神经纤维膜对钠离子的通透性,减慢去极化速度,减轻对心脏、中枢神经系统的抑制性,减少神经纤维膜对钠离子的通透性,具有较好镇痛效果^[19,20]。本研究显示观察组麻醉后 10 min、30 min、60 min 的 Bromage 评分都低于对照组,表明低浓度罗哌卡因的应用能促进并改善其运动功能,有利于患者麻醉后恢复,与国内学者纪秀波^[21]的研究类似,该学者发现小剂量的罗哌卡因麻醉在老年髋关节置换术中患者的 Bromage 评分低于高剂量,且麻醉持续时间、运动恢复时间和感觉恢复时间明显缩短。分析其原因为,低浓度罗哌卡因更有利于改善患者下肢运动神经阻滞,加快运动、感觉神经恢复时间;并且其也可持续发挥作用,减轻对心脏的负荷性,更有利于机体产生神经阻滞,减轻患者疼痛^[22,23]。

人工髋关节置换术后患者容易出现急性缺氧,而麻醉药物应用不当是导致患者缺氧的常见原因^[24,25]。特别是在麻醉恢复期,老年患者多伴随有血浆清除率减少、心输出量降低,为此拔

管后易发生低氧血症^[26,27]。本研究显示观察组的麻醉持续时间、运动恢复时间和感觉运动时间都显著短于对照组,王亮^[28]等学者的研究也说明小剂量罗哌卡因麻醉在老年髋关节置换中,麻醉持续时间(85.48 $\pm$ 6.71) min,运动恢复时间(106.37 $\pm$ 10.90) min,感觉恢复时间(160.93 $\pm$ 13.42) min 均显著低于高剂量罗哌卡因麻醉 (103.29 $\pm$ 10.39) min, (127.21 $\pm$ 14.36) min, (195.68 $\pm$ 15.46) min, 表明低浓度罗哌卡因腰硬联合麻醉用于人工髋关节置换手术能改善患者的麻醉效果,主要在于罗哌卡因能够可逆性降低神经纤维膜对钠离子的通透性,提高患者的应激阈值,能维持更加稳定的血流动力学,从而改善患者的麻醉效果^[29,30]。

理想的腰硬联合麻醉需要理想的麻醉用药,罗哌卡因的化学结构和布比卡因相似,但安全性大于布比卡因。罗哌卡因作为一种长效局部麻醉药物,对下肢手术尤为适用,不过麻醉药都有一定程度的神经毒性。有研究认为罗哌卡因减少血供作用可能加重或诱发神经内血供失代偿,这可能会进一步加重神经损伤,延缓功能恢复^[29]。本研究显示两组所有患者在术后 2 h、术后 4 h、术后 24 h 的呼吸、心率均在正常范围内波动,组间与组内对比都无统计学意义,表明不同浓度罗哌卡因腰硬联合麻醉用于人工髋关节置换手术都不会影响患者的生命体征指标。但是此结果与涂琴琴^[31]的研究存在差异,该学者发现 0.15 %罗哌卡因与 0.25 %罗哌卡因组在麻醉前,麻醉后及术毕的呼吸、心率均无统计学差异,0.5 %罗哌卡因组麻醉后及术毕的呼吸、心率显著高于 0.15 %罗哌卡因组与 0.25 %罗哌卡因组,分析其原因可能与患者自身的年龄,合并疾病影响有关。并且罗哌卡因是一种长效酰胺类局部麻醉药,有研究表明罗哌卡因在低剂量时可产生感觉阻滞且仅伴有局限性,高剂量时则可达到

显著的镇痛作用,但是注入大量局麻药物,增加了局麻药中毒的风险。同时罗哌卡因是一种新型左旋体长效酰胺类局麻药,可以延缓神经冲动的扩散,通过升高神经动作电位的阈值,发挥阻断神经冲动的产生和传导作用,罗哌卡因的大量用药可影响患者的下床活动,不利于术后运动功能恢复。本研究显示观察术后 7 d 的低血压、恶心呕吐、头晕头痛、尿潴留等不良反应发生率为 7.1 %,显著低于对照组的 19.0 %,与 Zhu M^[32]和 Wohlrab P^[33]等研究类似,该学者还发现腰硬联合麻醉造成的不良反应与麻醉药物浓度、剂量密切相关,减少麻醉药物浓度可能会降低不良反应的发生率,但也可能会影响麻醉阻滞效果。本研究表明低浓度罗哌卡因有很强的感觉-运动分离特性,能减少不良反应的发生。并且罗哌卡因通过阻断钠离子流入神经纤维细胞膜内,对沿神经纤维冲动的传导产生可逆阻滞,具有麻醉和镇痛的双重效应,可使平滑肌短期内松弛,降低迷走神经兴奋性^[34,35]。同时罗哌卡因对循环动力学影响较小,对中枢神经系统无抑制作用,能阻断神经冲动的传导,也能抵制触觉和痛觉^[36]。不过本研究没有进行定期跟踪及随访分析,也没有阐述患者术后认知功能变化情况,将在后续研究中深入探讨。

总之,低浓度罗哌卡因腰硬联合麻醉用于人工膝关节置换手术能改善患者的麻醉效果和运动功能,同时并不影响患者的生命体征,有助于提高麻醉效果,且能减少术后不良反应的发生,值得临床推广应用。

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