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超声引导下竖脊肌平面阻滞与胸椎旁神经阻滞用于乳腺癌根治术 术后镇痛效果的比较*

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摘要 目的:比较超声引导下竖脊肌平面阻滞(ESPB)和胸椎旁神经阻滞(TPVB)用于乳腺癌根治术后镇痛的效果。**方法:**2015年5月至2019年12月在山西医科大学第二医院接受乳腺癌根治术的64例患者,随机数字表法分为 ESPB 组和 TPVB 组,每组 32 例。在常规全身麻醉基础上,ESPB 组行 ESPB,TPVB 组行 TPVB,术后给予患者自控静脉镇痛(PCIA)。比较两组术后 2、6、12、24、48 h 静息与咳嗽时视觉模拟评分(VAS)评分;比较两组患者术后 PCIA 首次按压时间,术后 24 h PCIA 镇痛泵按压次数、PCIA 舒芬太尼用量,补救镇痛以及不良反应的发生率。**结果:**两组患者术后各时间点静息和咳嗽时 VAS 评分间差异无统计学意义($P>0.05$); 两组患者术后 PCIA 首次按压时间、术后 24 h PCIA 舒芬太尼用量以及补救镇痛的发生率间差异无统计学意义($P>0.05$); ESPB 组患者术后 24 h PCIA 镇痛泵按压次数低于 TPVB 组,差异有统计学意义($P<0.05$); ESPB 组和 TPVB 组术后恶心呕吐、皮肤瘙痒、呼吸抑制和头晕的发生率显比较差异无统计学意义($P>0.05$)。**结论:**超声引导下 ESPB 相较于 TPVB 用于乳腺癌根治患者术后镇痛效果相似,且不会增加不良反应的发生率,安全性较高,可替代 TPVB 为乳腺癌根治术患者提供良好的术后镇痛。

关键词:乳腺癌根治术;竖脊肌平面阻滞;胸椎旁神经阻滞;镇痛

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Comparison of Erector Spinae Plane Block and Thoracic Paravertebral Block Guided by Ultrasound on Postoperative Analgesia Effect after Radical Mastectomy*

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ABSTRACT Objective: To compare the postoperative analgesia effect between erector spinae plane block (ESPB) and thoracic paravertebral block (TPVB) guided by ultrasound after radical mastectomy. **Methods:** From May 2015 to December 2019, 64 patients who underwent radical mastectomy in The Second Hospital of Shanxi Medical University were randomly divided into ESPB group and TPVB group, 32 cases in each group. On the basis of general anesthesia, ESPB group was given EspB, TPVB group was given TPVB, and patient-controlled intravenous analgesia (PCIA) was given after operation. The visual analogue scale (VAS) scores at rest and coughing at 2 h, 6 h, 12 h, 24 h and 48 h after operation were compared between the two groups. The first pressing time of PCIA, PCIA analgesia pump pressing times and dosage of PCIA sufentanil 24 h after operation, rescue analgesia and incidence of adverse reactions were compared between the two groups. **Results:** There was no significant difference in VAS scores between the two groups at rest and coughing at different time points after operation ($P>0.05$); There was no significant difference in first pressing time of PCIA, PCIA sufentanil 24 h after operation and the incidence of rescue analgesia between the two groups ($P>0.05$); The PCIA analgesia pump pressing times 24 h after operation in ESPB group were lower than those in TPVB group, the difference was statistically significant ($P<0.05$); There was no significant difference in the incidence of postoperative nausea and vomiting, skin itching, respiratory depression and dizziness between ESPB group and TPVB group ($P>0.05$). **Conclusion:** Compared with TPVB, ESPB guided by ultrasound has similar analgesic effect in patients with radical mastectomy, and it does not increase the incidence of adverse reactions. It has higher safety and can replace TPVB to provide good postoperative analgesia for patients with radical mastectomy.

Key words: Radical mastectomy; Erector spinae plane block; Thoracic paravertebral block; Analgesia

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前言

乳腺癌根治术是治疗乳腺癌的主要方式,由于手术范围广、创伤大,因此手术术后疼痛的发生率很高。有研究发现,约40%的接受乳腺癌根治手术的患者术后急性疼痛评分超过5分^[1-3]。严重的术后疼痛可能会导致患者出现应激反应,如血压升高、心率增快,从而进一步延长住院时间,增加住院费用^[4-6]。此外,乳腺癌根治手术术后患者慢性疼痛的发生率和长期使用阿片类药物的风险分别为29%和11%,严重影响患者的生活质量^[7-10]。目前,胸椎旁阻滞(thoracic paravertebral block, TPVB)被认为是乳腺癌手术术后镇痛模式的金标准,且已成为围手术期多模式镇痛的重要组成部分^[11,12]。然而,其解剖上接近胸膜和脊神经根,对于实施TPVB操作者的技术要求较高,并且发生霍纳综合征、硬膜外注射和气胸等并发症的风险较高^[13-15]。竖脊肌平面阻滞(erector spinae plane block, ESPB)是一种新型的区域镇痛技术,有研究报道^[16-19],将ESPB应用于乳腺癌手术,可以

提供良好的术后镇痛效果。本研究旨在比较ESPB与TPVB用于乳腺癌根治手术术后镇痛的有效性和安全性。

1 资料与方法

1.1 一般资料

选取本院自2015年5月至2019年12月收治的经乳腺外科行手术后病理确诊的乳腺癌手术患者64例,纳入标准:(1)经病理确诊并且符合乳腺癌根治术适应征;(2)美国麻醉医师协会(ASA)分级为I~II级;(3)年龄40~65岁。排除标准:(1)严重心、肝、肾功能及凝血功能障碍患者;(2)对局麻药物过敏的患者;(3)妊娠期、哺乳期妇女;(4)无法耐受手术及麻醉的患者。采取随机数字表法分为ESPB组与TPVB组,每组各32例,两组患者的一般情况差异均无统计学意义($P>0.05$),见表1。本研究经我院医学伦理委员会审核通过,并与所有患者或家属签署知情同意书。

表1 ESPB组与TPVB组患者一般情况比较($\bar{x}\pm s$)

Table 1 Comparison of baseline data between ESPB group and TPVB group

Groups	n	Age(years)	Height(cm)	Weight(Kg)	ASA(I/II)	Operative time(min)
ESPB group	32	49.88±3.19	161.19±4.55	53.31±5.04	15/17	120.69±4.24
TPVB group	32	50.91±5.02	159.94±4.00	52.16±4.55	16/16	120.34±3.30
t/χ^2		-0.981	1.175	0.962	0.062	0.363
P		0.331	0.259	0.348	0.802	0.725

1.2 麻醉方法

术前常规禁食禁饮。入室后常规监测血压(NIBP)、心率(HR)、心电、血氧饱和度(SpO_2)和脑电双频指数(BIS),开放健侧外周静脉通路。患者均行静吸复合麻醉,诱导方式为静脉注射咪达唑仑2 mg、舒芬太尼 $0.5 \mu g \cdot kg^{-1}$ 、丙泊酚 $2 mg \cdot kg^{-1}$ 和顺苯磺酸阿曲库铵 $0.15 mg \cdot kg^{-1}$,满足插管条件后,行气管插管和机械通气,潮气量 $6-8 mL \cdot kg^{-1}$,频率为12-20次/分,吸呼比为1:2,术中呼吸末二氧化碳($ETCO_2$)维持在35~45 mmHg之间。使用丙泊酚 $2 \sim 8 mg \cdot kg^{-1} \cdot h^{-1}$ 、瑞芬太尼 $0.1 \sim 0.3 \mu g \cdot kg^{-1} \cdot min^{-1}$ 、七氟醚1%~2%进行麻醉维持,间断追加顺苯磺酸阿曲库铵 $0.05 mg \cdot kg^{-1}$ 维持肌肉松弛。维持BIS在40~60范围内。手术完成待患者符合拔管条件后拔除气管插管。所有患者均安装自控镇痛泵实施PCIA。其配方为舒芬太尼100 μg 、氟哌利多2.5 mg溶于98 mL 0.9%氯化钠注射液。设置单次剂量为0.5 mL,背景输注量 $2 mL \cdot h^{-1}$,锁定时间为15 min。

1.3 镇痛方法

在麻醉诱导后,ESPB组患者行超声引导下竖脊肌平面阻滞,患者取健侧卧位,穿刺部位消毒铺巾,于第5胸椎水平、向后中线手术侧旁开3 cm处进针,穿刺回抽无空气、血液和脑脊液后,将0.375%罗哌卡因20 mL注入横突和竖脊肌筋膜间隙。TPVB组患者行超声引导下胸椎旁神经阻滞,患者取健侧卧位,探头定位于T3和T5胸椎旁间隙,清晰显示横突和胸膜的超声图像,缓慢进针突破肋横突韧带,穿刺进针至椎旁间隙回抽无血液、脑脊液后,注射0.375%罗哌卡因20 mL。

1.4 观察指标

由一名对分组不知情的麻醉医生记录两组患者术后2 h、6 h、12 h、24 h、48 h的静息和咳嗽时VAS评分(VAS评分:0分:无痛;>0分, ≤ 3 分:轻微疼痛,且尚能忍受;4~6分:疼痛影响睡眠,但尚能忍受;7~10分:疼痛剧烈,影响食欲和睡眠)^[20]。当患者VAS评分大于4分时,静脉注射曲马多50 mg作为补救镇痛治疗,记录补救患者例数;记录两组患者术后PCIA首次按压时间、术后24 h PCIA按压次数、PCIA舒芬太尼用量;记录两组患者术后不良反应的发生率。

1.5 统计分析

采用SPSS 22.0统计软件对数据进行统计分析。正态分布计量资料以均数±标准差($\bar{x}\pm s$)表示,组间比较采用成组t检验;计数资料以[n(%)]表示,使用 χ^2 检验, $P<0.05$ 为差异有统计学意义。

2 结果

2.1 两组各时间点下静息时VAS评分比较

两组患者术后2 h、6 h、12 h、24 h、48 h静息VAS评分无明显差异($P>0.05$),见表2。

2.2 两组各时间点下咳嗽时VAS评分比较

两组患者术后2 h、6 h、12 h、24 h、48 h咳嗽VAS评分无明显差异($P>0.05$),见表3。

2.3 两组术后24 h内PCIA的应用以及补救镇痛

两组术后24 h PCIA镇痛泵按压次数比较,ESPB组低于TPVB组,差异有统计学意义($P<0.05$),而两组术后PCIA首次按压时间、术后24 h PCIA舒芬太尼累计用量及术后补救镇

痛无统计学差异($P<0.05$),见表4。

2.4 不良反应的情况

术后不良反应发生情况比较,ESPB组术后恶心呕吐3例,

皮肤瘙痒2例,呼吸抑制2例,头晕1例。TPVB组术后恶心呕吐4例,皮肤瘙痒1例,呼吸抑制2例,头晕2例,差异均无统计学意义($P>0.05$),见表5。

表2 ESPB组与TPVB组患者术后不同时间点静息时VAS评分的比较($\bar{x}\pm s$)

Table 2 Comparison of VAS scores at rest between ESPB group and TPVB group at different time points after operation($\bar{x}\pm s$)

Groups	n	2h	6h	12h	24h	48h
ESPB group	32	1.73±0.65	2.78±0.43	3.33±0.24	3.22±0.21	3.07±0.31
TPVB group	32	1.67±0.56	2.74±0.35	3.24±0.28	3.29±0.29	3.0±0.30
t		0.431	0.322	1.293	-0.961	0.855
P		0.665	0.752	0.201	0.343	0.402

表3 ESPB组与TPVB组患者术后不同时间点咳嗽时VAS评分的比较($\bar{x}\pm s$)

Table 3 Comparison of VAS scores at coughing between ESPB group and TPVB group at different time points after operation($\bar{x}\pm s$)

Groups	n	2h	6h	12h	24h	48h
ESPB group	32	2.37±0.31	3.03±0.14	3.57±0.20	3.50±0.22	3.39±0.23
TPVB group	32	2.24±0.24	3.17±0.27	3.50±0.24	3.57±0.19	3.35±0.18
t		1.901	-2.543	1.333	-1.164	0.711
P		0.604	0.143	0.794	0.256	0.824

表4 ESPB组与TPVB组患者术后24h内PCIA的应用以及补救镇痛

Table 4 The application of PCIA and salvage analgesia within 24 hours after operation between ESPB group and TPVB group

Groups	n	First pressing time of PCIA(h)	PCIA analgesia pump pressing times 24h after operation(n)	Dosage of PCIA sufentanil 24h after operation(ug)	Rescue analgesia[n(%)]
ESPB group	32	8.97±2.92	4.97±1.64	20.06±2.96	3(9.37)
TPVB group	32	10.00±3.25	6.09±1.59	20.25±2.83	5(15.62)
t/ χ^2		-1.332	-2.795	-0.266	0.572
P		0.193	0.007	0.068	0.713

表5 ESPB组与TPVB组患者不良反应发生率比较[n(%)]

Table 5 Comparison of adverse reaction rates between EspB group and TPVB group

Groups	n	Nausea and vomiting	Skin itching	Respiratory depression	dizziness
ESPB group	32	3(9.38)	2(6.25)	2(6.25)	1(3.12)
TPVB group	32	4(12.5)	1(3.12)	2(6.25)	2(6.25)
χ^2		0.163	0.352	0.001	0.353
P		0.695	1.006	1.005	0.552

3 讨论

临床对乳腺癌的治疗方式以腋窝淋巴结清扫术和全乳房切除根治术为主,常影响到乳腺周围各种神经,致使术后的静脉镇痛效果欠佳。另外,20%~68%的乳腺癌患者术后疼痛可以发展成慢性疼痛,此类慢性疼痛主要由外周感受器损伤所致,表现为神经痛^[21,22]。目前临床上可以通过阻滞外周神经从而阻断外周伤害性刺激信号向中枢神经的传递通道,有术后镇痛和辅助麻醉的疗效。乳腺癌根治手术术后镇痛方式多样,TPVB被认为是乳腺手术术后镇痛的金标准。然而,研究认为TPVB存在潜在的并发症,如气胸、局麻药误入硬膜外腔^[23-25]。近年来,新兴的超声引导下筋膜平面阻滞技术在乳腺手术中得到了广泛的应用,主要包括ESPB、前锯肌平面阻滞和胸筋膜平面阻

滞。ESPB由Forero M等^[23]在2016年首次报道用于胸背部神经疼痛治疗,随后应用于乳腺手术围术期镇痛。尽管研究认为ESPB在技术上相比于TPVB更容易实施,但ESPB的相对有效性和安全性尚未完全被证实^[26,27]。

袁炳林等^[28]研究表明TPVB对乳腺癌改良根治术后4h和术后12h的VAS评分均低于对照组患者。既往报道显示^[29],胸神经II阻滞乳腺癌改良根治术后镇痛效果可维持8h以上,同时其还能够较单纯全身麻醉降低病人VAS评分,减少阿片类药物用量,但目前尚少研究对ESPB与TPVB静息及咳嗽VAS评分进行比较,本研究结果表明ESPB在乳腺癌根治术后2h、6h、12h、24h、48h静息和咳嗽时VAS评分方面与TPVB是相似的,说明两种神经阻滞在乳腺癌根治术后镇痛上无差异。

本研究表明两组术后PCIA首次按压时间、术后24h PCIA

舒芬太尼用量以及补救镇痛的发生率间差异无统计学意义,但 ESPB 组患者术后 24 h PCIA 镇痛泵按压次数低于 TPVB 组,这表明 ESPB 较 TPVB 阻滞时间更持久,可更有效地抑制暴发性疼痛,这可能与椎旁神经阻滞直接浸润包裹神经,椎旁间隙通过内侧的椎间孔与硬膜外腔相通有关,部分局麻药可进入硬膜外腔致对应节段的硬膜外阻滞等相关。Gürkan Y 等^[30]研究表明,ESPB 组与 TPVB 组术后 24 h 阿片类药物累计消耗量无明显差异,这与我们的研究结论是一致的。本研究将 0.375% 罗哌卡因 20 mL 注射到竖脊肌筋膜间隙和横突表面,可产生 T3-T8 的前胸、后部及侧胸壁的皮区感觉阻滞,阻断了脊神经的背侧支和腹侧支。目前,关于竖脊平面阻滞的作用机制尚存在争议。Schwartzmann A 等^[14]的尸体解剖研究表明,造影剂在竖脊肌下方的头尾方向广泛扩散,可以扩散到硬膜外间隙、椎旁间隙和肋间间隙,最终沉积在靠近横突尖端的竖脊肌下方。然而, Ivanusic J 等^[13]在研究中发现,在被染料注射的 10 具尸体中,仅有 2 具尸体解剖中有染料扩散到背侧支,其作用机制可能与肋间神经外侧皮支的神经元传递中断有关。

本研究中,两组术后恶心与呕吐、呼吸抑制、皮肤瘙痒和头晕发生率比较无明显差异。结果提示,超声引导下 ESPB 用于乳腺癌根治手术后镇痛安全性高,镇痛效果好。Swisher MW 等^[31]研究相同结果显示,超声引导下 ESPB 和 TPVB 用于乳腺手术后镇痛的不良反应和补救镇痛例数无差异。本研究中,两种镇痛方法均未出现操作不当引起的并发症,但有报道称,当实施 TPVB 阻滞时,由于穿刺针靠近胸膜和椎管,有发生气胸和蛛网膜阻滞风险。因此,大多数学者认为 TPVB 技术难度系数较高且风险较大^[32-34]。相反,ESPB 位置表浅,竖脊肌和横突在超声下容易识别,且 ESPB 远离重要器官和血管。因此,在两种阻滞镇痛效果相似的基础上,ESPB 可以作为 TPVB 的一种替代方法,安全的用于乳腺癌手术后镇痛。

综上所述,超声引导下 ESPB 相较于 TPVB 用于乳腺癌根治患者术后镇痛效果相似,且不会增加不良反应的发生率,安全性较高,可替代 TPVB 为乳腺癌根治术患者提供良好的术后镇痛。

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