

doi: 10.13241/j.cnki.pmb.2020.20.020

超声联合神经刺激仪定位腰丛—骶丛神经阻滞对高龄股骨头置换术患者血流动力学、心理状态及认知功能的影响*

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摘要 目的:探讨超声联合神经刺激仪定位腰丛—骶丛神经阻滞对高龄股骨头置换术患者血流动力学、心理状态及认知功能的影响。方法:选取2017年4月~2020年3月期间我院收治的行股骨头置换术的高龄患者98例,采用随机数字表法分为对照组和研究组,各49例,对照组给予神经刺激仪定位腰丛—骶丛神经阻滞,研究组在此基础上联合超声引导,比较两组血流动力学、心理状态、认知功能、临床指标及不良反应。结果:两组T1~T4时间点收缩压(SBP)、心率(HR)、舒张压(DBP)组间及组内比较均未见明显差异($P>0.05$)。研究组阻滞起效时间、阻滞持续时间、术后镇痛持续时间长于对照组,阻滞完成时间、术后下床活动时间短于对照组($P<0.05$)。两组术后1d回忆能力、瞬时记忆力、注意力和计算力、定向力、语言能力评分均下降,但研究组高于对照组($P<0.05$),研究组的术后认知功能障碍(POCD)发生率低于对照组($P<0.05$)。两组术后1d焦虑自评量表(SAS)和抑郁自评量表(SDS)评分均下降,且研究组低于对照组($P<0.05$)。两组不良反应发生率比较无差异($P>0.05$)。结论:超声联合神经刺激仪定位腰丛—骶丛神经阻滞对高龄股骨头置换术患者阻滞效果确切,对其血流动力学影响轻微,可减轻其认知功能损害,改善其负性情绪。

关键词: 超声;神经刺激仪;腰丛—骶丛神经阻滞;高龄;股骨头置换术;血流动力学;心理状态;认知功能

中图分类号: R687; R445 **文献标识码:** A **文章编号:** 1673-6273(2020)20-3892-05

Effect of Lumbosacral Plexus Block Nerve Block by Ultrasound Combined with Nerve Stimulator on Hemodynamics, Mental State and Cognitive Function in Elderly Patients Undergoing Femoral Head Replacement*

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ABSTRACT Objective: To investigate the effect of lumbosacral plexus block nerve block with ultrasound combined with nerve stimulator on hemodynamics, mental state and cognitive function in elderly patients with femoral head replacement. **Methods:** 98 elderly patients with femoral head replacement in our hospital from April 2017 to March 2020 were selected, and divided into control group and study group by random number table method, with 49 cases in each group. The control group was given nerve stimulator to locate lumbosacral plexus block nerve block, and the study group was combined with ultrasound guidance, the hemodynamics, mental state, cognitive function, clinical indicators and adverse reactions of the two groups were compared. **Results:** Systolic blood pressure (SBP), heart rate (HR) and diastolic blood pressure (DBP) at T1-T4 between the two groups and within the group were not significantly different ($P>0.05$). The onset time of block, duration time of block and postoperative analgesia duration time of the study group were longer than those of the control group, while the completion time of the block and the postoperative ambulation time of the study group were shorter than those of the control group ($P<0.05$). The scores of recall ability, instant memory, attention and calculation ability, orientation and language ability of the two groups decreased 1d after operation, but the scores of the study group were higher than those of the control group ($P<0.05$), and the incidence rate of cognitive dysfunction (POCD) of the study group was lower than that of the control group ($P<0.05$). The self rating anxiety scale (SAS) and self rating depression Scale (SDS) of the two groups decreased 1d after operation, and the study group was lower than the control group ($P<0.05$). There was no difference in the incidence of adverse reactions between the two groups ($P>0.05$). **Conclusion:** Ultrasound combined with nerve stimulator localization of lumbosacral plexus block nerve block in elderly patients with femoral head replacement has exact block effect, slight impact on hemodynamics, can reduce cognitive function damage and improve their negative emotions.

Key words: Ultrasound; Nerve stimulator; Lumbar plexus sciatic nerve block; Elderly; Femoral head replacement; Hemodynamics; Mental state; Cognitive function

Chinese Library Classification(CLC): R687; R445 **Document code:** A

Article ID: 1673-6273(2020)20-3892-05

* 基金项目:云南省应用基础研究面上项目(2016FB146);昆明市科技计划项目(2019-1-S-25318000001291)

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(收稿日期:2020-03-28 接受日期:2020-04-24)

前言

股骨头置换术是指对多种因素造成的人体坏死股骨头采用金属材质的人工股骨头代替股骨头功能的术式^[1]。高龄人群由于钙质流失、身体机能减退等原因,股骨头更易发生病变,伴随人口老龄化的加剧,接受股骨头置换术的高龄患者也在逐渐增加^[2,3]。由于股骨头置换术是一门大型外科手术,患者需在麻醉状态下进行手术,而高龄患者常合并多种慢性基础性疾病,麻醉风险较年轻群体明显增加^[4,5]。既往临床常采用腰丛-骶丛神经阻滞应用于高龄股骨头置换术患者,但由于腰丛和骶丛神经的解剖位置较深,麻醉方式不易掌握,存在穿刺定位困难等问题,神经刺激仪辅助阻滞具有定位精准、麻醉效果较佳等优势,但仍属于盲探性操作^[6-8]。近年来,学者们发现超声技术辅助阻滞可使周围神经可视化,提高麻醉效果^[9]。鉴于此,本研究通过探讨超声联合神经刺激仪定位腰丛-骶丛神经阻滞对高龄股骨头置换术患者的临床效果,以期临床该术式麻醉方案的选择提供参考。

1 资料与方法

1.1 一般资料

选取2017年4月~2020年3月期间我院收治的行股骨头置换术的高龄患者98例,纳入标准:(1)手术均符合美国麻醉医师协会(ASA)分级标准,分为I-II级^[10];(2)均符合手术指征,择期行股骨头置换术者;(3)患者或其家属对本研究知情同意并签署知情同意书;(4)手术均由同一组医师完成;(5)年龄 ≥ 80 岁者。排除标准:(1)穿刺部位感染者;(2)有局麻药过敏史者;(3)伴有神经肌肉系统疾病者;(4)合并凝血功能障碍者;(5)合并精神疾患、沟通障碍者;(6)伴有循环系统疾病史。本研究已通过我院伦理学委员会批准进行。采用随机数字表法分为对照组和研究组,其中对照组49例,男21例,女28例,年龄80~86岁,平均 (82.49 ± 2.35) 岁;ASA分级:I级28例,II级21例;体质指数 $19 \sim 27 \text{ kg/m}^2$,平均 $(23.65 \pm 1.17) \text{ kg/m}^2$;合并症:高血压7例,高脂血症10例,糖尿病8例。研究组49例,男19例,女30例,年龄81~88岁,平均 (82.76 ± 1.69) 岁;ASA分级:I级30例,II级19例;体质指数 $20 \sim 27 \text{ kg/m}^2$,平均 $(23.51 \pm 1.28) \text{ kg/m}^2$;合并症:高血压9例,高脂血症8例,糖尿病7例。两组一般资料比较无差异($P>0.05$),具有可比性。

1.2 方法

术前两组患者禁食、禁饮,入室后建立静脉通路,监测血压、血氧饱和度、心电图等。对照组于神经刺激仪定位下行腰丛-骶丛神经阻滞。神经刺激仪购自B.BRAUN公司,型号:Stimuplex HNS11,刺激电流1.5 mA,频率为1 Hz。患者侧卧屈膝,手术部位朝向上方,利用记号笔标记穿刺点,神经刺激针垂直于皮肤刺入,缓慢前进至肌肉震颤出现,确定肌肉最佳收缩位置,电流降低至0.5 mA时,若仍可见相应的肌群活动,且回抽无血时,则注射0.5%罗哌卡因[广东嘉博制药有限公司,国药准字H20133181,规格:10 mL:50 mg(按盐酸罗哌卡因计)]2 mL,3 min后若无明显不适,再注射罗哌卡因剩余药量,其中骶丛神经阻滞30 mL,腰丛阻滞总注射药量为20 mL。研究组则在超声引导下神经刺激仪定位腰丛-骶丛神经阻滞,仪器为

Philips HDI-5000型超声诊断仪,探头频率2.0~5.0 MHz。超声扫描穿刺点附近进行定位,神经刺激仪穿刺在超声引导下进行,利用神经刺激仪引发肌肉震颤,根据获取的腰丛或骶丛神经横断面图像调整穿刺针,对穿刺针相连接的注射器进行回抽,确定无血后,采取与对照组相同的罗哌卡因注入方式。并在给药期间利用超声密切观察药物扩散情况,同时可根据情况调整针尖所处位置,以确保药液有效包绕神经。

1.3 观察指标

(1)记录两组神经阻滞前(T1)、阻滞10 min后(T2)、阻滞30 min后(T3)、阻滞60 min后(T4)的收缩压(SBP)、心率(HR)、舒张压(DBP)。(2)于术前、术后1 d采用简易精神状态检查量表(MMSE)^[11]对两组认知功能进行评价,MMSE包括回忆能力(3分)、瞬时记忆力(3分)、注意力和计算力(5分)、定向力(10分)、语言能力(9分),总分30分,当分数比术前下降 $>10\%$ 为发生术后认知功能障碍(POCD),统计两组POCD发生率。(3)记录麻醉期间两组不良反应发生率,包括神经损伤、低血压、恶心等。(4)记录两组阻滞完成时间、术后镇痛持续时间、阻滞起效时间、阻滞持续时间、术后下床活动时间。(5)于术前、术后1 d采用焦虑自评量表(SAS)^[12]和抑郁自评量表(SDS)^[12]对患者焦虑和抑郁情绪进行评价。其中SAS、SDS均由20个项目组成,每个项目评分1~4分,总分为各小项得分之和再乘以1.25。分值越高,焦虑、抑郁程度越严重。

1.4 统计学方法

采用SPSS24.0处理数据,以 $(\bar{x} \pm s)$ 表示计量资料,实施t检验,以率(%)表示计数资料,实施 χ^2 检验, $\alpha=0.05$ 为检验标准。

2 结果

2.1 两组血流动力学指标比较

两组T1~T4时间点SBP、HR、DBP组间及组内比较均未见明显差异($P>0.05$),详见表1。

2.2 两组临床指标比较

研究组阻滞起效时间、阻滞持续时间、术后镇痛持续时间长于对照组,阻滞完成时间、术后下床活动时间短于对照组($P<0.05$),详见表2。

2.3 两组认知功能评分及POCD发生率比较

两组术前回忆能力、瞬时记忆力、注意力和计算力、定向力、语言能力评分比较无差异($P>0.05$),两组术后1 d回忆能力、瞬时记忆力、注意力和计算力、定向力、语言能力评分均下降,但研究组高于对照组($P<0.05$),POCD发生率研究组低于对照组($P<0.05$),详见表3。

2.4 焦虑抑郁情况比较

术前两组SAS、SDS评分比较无差异($P>0.05$),术后1 d两组SAS、SDS评分均下降,且研究组较对照组降低($P<0.05$),详见表4。

2.5 两组不良反应发生率比较

两组不良反应发生率比较无差异($P>0.05$),详见表5。

3 讨论

高龄患者由于各器官功能及代谢已经发生显著的退行性

变化,并多伴有心肺等脏器疾患,合并多种基础性疾病,在接受股骨头置换术这样的大型手术时,除了手术刺激外,对麻醉的耐受力也不高,麻醉风险较大^[13-15]。高龄患者术前因为处于对疾病和手术的恐惧中,会引起焦虑、抑郁等负性情绪;术中由于手术刺激、麻醉刺激等引起患者血流波动,导致强烈的应激反应,降低手术治疗效果,同时,术后由于受到麻醉残留药物的影响,

还可出现认知功能损害,不仅使患者自理能力降低,还可导致并发症和病死率增加^[16-18]。据报道^[19],老年患者在行关节手术后POCD的发生率可高达70%。因此,手术中选取合适的麻醉方案以达到最佳的麻醉效果对于改善高龄股骨头置换术患者的手术效果具有积极的临床意义。

表 1 两组血流动力学指标比较($\bar{x} \pm s$)

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

Groups	Time points	SBP(mmHg)	HR(beats/min)	DBP(mmHg)
Control group(n=49)	T1	138.29± 7.32	76.22± 6.27	86.59± 6.56
	T2	139.85± 6.23	80.34± 6.25	87.64± 7.47
	T3	139.23± 7.39	80.16± 7.29	87.09± 6.27
	T4	141.66± 6.21	76.41± 6.21	86.82± 7.24
Study group(n=49)	T1	138.13± 7.95	76.73± 8.71	86.20± 6.35
	T2	139.96± 6.88	79.15± 7.64	87.28± 5.29
	T3	139.33± 6.27	79.31± 6.28	87.57± 7.36
	T4	140.75± 5.34	77.84± 7.73	86.82± 6.25

表 2 两组临床指标比较($\bar{x} \pm s$, min)

Table 2 Comparison of clinical indexes between the two groups($\bar{x} \pm s$, min)

Groups	Completion time of the block	Onset time of block	Duration time of block	Postoperative analgesia duration time	Postoperative ambulation time
Control group(n=49)	17.88± 2.78	41.34± 3.52	702.28± 15.95	337.54± 14.32	629.85± 26.56
Study group(n=49)	10.24± 1.65	49.38± 3.23	781.35± 18.73	463.56± 19.01	445.49± 35.62
t	16.543	11.781	22.499	37.065	29.045
P	0.000	0.000	0.000	0.000	0.000

表 3 两组认知功能评分及 POCD 发生率比较

Table 3 Comparison of cognitive function score and POCD incidence between the two groups

Groups	Time points	Recall ability (scores)	Instant memory (scores)	Attention and calculation ability(scores)	Orientation (scores)	Language ability (scores)	Incidence rate of POCD(%)
Control group (n=49)	Before operation	2.92± 0.03	2.82± 0.08	4.76± 0.09	9.31± 0.12	8.24± 0.13	11(22.45)
	1 d after operation	2.71± 0.05 ^a	2.69± 0.07 ^a	4.48± 0.13 ^a	8.07± 0.16 ^a	7.09± 0.19 ^a	
Study group (n=49)	Before operation	2.91± 0.03	2.84± 0.07	4.74± 0.12	9.37± 0.14	8.21± 0.12	3(6.12) ^b
	1 d after operation	2.79± 0.08 ^{ab}	2.73± 0.09 ^{ab}	4.61± 0.11 ^{ab}	8.91± 0.18 ^{ab}	7.73± 0.13 ^{ab}	

Note: compared with before operation, ^aP<0.05; compared with control group, ^bP<0.05.

表 4 两组焦虑抑郁情况比较($\bar{x} \pm s$, 分)

Table 4 Comparison of anxiety and depression between the two groups($\bar{x} \pm s$, scores)

Groups	Time points	SAS	SDS
Control group(n=49)	Before operation	38.54± 4.28	36.11± 4.23
	1 d after operation	26.51± 3.31 ^a	27.02± 4.27 ^a
Study group(n=49)	Before operation	38.26± 5.38	35.87± 4.25
	1 d after operation	21.54± 4.27 ^{ab}	20.23± 4.28 ^{ab}

Note: compared with before operation, ^aP<0.05; compared with control group, ^bP<0.05.

表 5 两组不良反应发生率比较 例(%)

Table 5 Comparison of the incidence of adverse reactions between the two groups n(%)

Groups	Hypotension	Nausea	Nerve injury	Hematoma	Total incidence rate
Control group(n=49)	3(6.12)	2(4.08)	2(4.08)	1(2.04)	8(16.33)
Study group(n=49)	2(4.08)	1(2.04)	0(0.00)	1(2.04)	4(8.16)
χ^2					1.519
<i>P</i>					0.218

以往高龄股骨头置换术的麻醉方式常选择椎管内或全身麻醉,随着医疗技术的进展,研究发现腰丛—骶丛神经阻滞用于股骨头置换术优势明显^[20]。由于腰丛—骶丛神经阻滞可维持机体血流动力学平稳,不影响机体排尿功能、胃肠道功能,术后并发症发生风险小,利于患者术后恢复^[21],但腰丛、骶丛神经的解剖结构位置较深,操作难度较大,根据解剖标志寻找异感定位,阻滞效果一般^[22]。神经刺激仪和超声引导的引入,使得神经阻滞的有效性有了提升,已成为临床的研究热点。

本次研究结果显示,两组 T1~T4 时间点血流动力学指标组间及组内比较均未见明显差异,这符合腰丛—骶丛神经阻滞麻醉方案一贯的维持血流平稳特点,与 Jaffe JD 等人^[23]研究结果一致。主要是因为该麻醉方案阻滞的区域属于神经的外周区域,对交感神经影响较轻,利于维持机体正常循环功能^[24]。与神经刺激仪定位相比,超声联合神经刺激仪定位腰丛—骶丛神经阻滞患者的阻滞完成时间、术后下床活动时间均更短,超声图像可使骨膜、神经组织及其周围肌肉、血管等清晰显示,这些图像可帮助穿刺针顺利到达神经周边,穿刺次数减少,阻滞顺利完成。此外,超声还能观察穿刺针的推进过程及其间隙中的移动过程,及时调整针尖位置,减少阻滞完成时间,而顺利的穿刺有利于患者术后恢复,缩短术后下床活动时间^[25-27]。同时研究还显示超声联合神经刺激仪定位腰丛—骶丛神经阻滞的阻滞起效时间、阻滞持续时间、术后镇痛持续时间更长,可能是因为超声动态观察局麻药扩散情况,确保局麻药神经束周围最佳弥散,实现麻醉药物精准注射,提高阻滞效果^[28]。另研究结果显示超声联合神经刺激仪定位腰丛—骶丛神经阻滞可减轻患者认知功能损害,改善患者的负性情绪。一方面是因为超声联合神经刺激仪定位能够实现可视化引导、定位,通过调整针尖位置使麻醉药物偏离神经束时再及时注入,动态观察麻醉药物扩散情况,促使药物集中于神经束周围,以使局麻药物精准注入。另一方面,麻醉可视化操作提高了患者对手术的信心,减少了患者对未知盲目操作的焦虑、抑郁心理^[29,30]。观察两组安全性可知,超声联合神经刺激仪定位腰丛—骶丛神经阻滞的不良反应发生率较低,安全性高。

综上所述,超声联合神经刺激仪定位腰丛—骶丛神经阻滞对高龄股骨头置换术患者阻滞效果确切,对其血流动力学影响轻微,可减轻其认知功能损害和焦虑抑郁情绪。

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