·临床研究·

超声引导下髂筋膜间隙联合骶丛神经阻滞在老年髋部手术中的应用

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【摘 要】 **目的** 探讨超声引导下髂筋膜间隙联合骶丛神经阻滞在老年髋部手术中的应用价值。**方法** 选取2018年8月至2021年8月就诊于武汉中西医结合骨科医院178例行髋部手术的老年患者为研究对象。根据麻醉方法将患者分为联合阻滞组(行超声引导下髂筋膜间隙联合骶丛神经阻滞麻醉,$n=92$)及轻比重单侧腰麻(HUSA)组($n=86$)。采用1∶1倾向性评分匹配法筛选出52对基线资料均衡可比的匹配序列。比较两组患者神经阻滞时间、疼痛程度、血流动力学、应激指标及并发症情况。采用SPSS 22.0统计软件进行数据分析。根据数据类型,组间比较分别采用t检验、重复测量方差分析或χ^2检验。**结果** 联合阻滞组多巴胺使用率及多巴胺平均用量均显著低于HUSA组(均$P<0.05$)。联合阻滞组感觉阻滞起效时间及完善时间均长于HUSA组,运动阻滞起效时间及完善时间均长于HUSA组,差异均有统计学意义(均$P<0.05$)。联合阻滞组摆侧卧位(T1)、术后12h及术后24h时点疼痛视觉模拟评分(VAS)分别低于HUSA组,切皮(T2)及术毕(T4)时点疼痛VAS分别高于HUSA组,差异均有统计学意义(均$P<0.05$)。联合阻滞组术后0~24 h及术后24~48 h吗啡用量分别小于HUSA组,差异均有统计学意义(均$P<0.05$)。联合阻滞组T1时点MAP小于HUSA组($P<0.05$),手术开始30 min(T3)、T4时点大于HUSA组($P<0.05$)。联合阻滞组T2、T3、T4时点MAP均较进入手术室(T0)时点下降($P<0.05$);HUSA组T1时点MAP较T0时点显著升高($P<0.05$),T2、T3、T4时点MAP均较T0时点显著下降($P<0.05$)。联合阻滞组T1时点HR小于HUSA组($P<0.05$)。HUSA组T1时点HR较T0显著升高($P<0.05$)。联合阻滞组术后24h血糖与血浆皮质醇分别低于HUSA组,差异均有统计学意义($P<0.05$)。联合阻滞组术后尿潴留、恶心呕吐、头晕头痛发生率分别低于HUSA组,差异均有统计学意义($P<0.05$)。**结论** 超声引导下髂筋膜间隙联合骶丛神经阻滞可维持术中血流动力学稳定、控制术后疼痛、减少应激反应和术后并发症。

【关键词】 老年人;髋部手术;超声引导;髂筋膜间隙阻滞;骶丛阻滞
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Application of ultrasound-guided fascia iliac block combined with sacral plexus block during elderly hip surgery

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【**Abstract**】 **Objective** To explore the application value of ultrasound-guided fascia iliac block combined with sacral plexus block during elderly hip surgery. **Methods** A total of 178 elderly patients undergoing hip surgery in our hospital from August 2018 to August 2021 were enrolled and served as the study subjects. According to anesthesia methods, they were divided into combined block group (ultrasound-guided fascia iliac block combined with sacral plexus block anesthesia, $n=92$) and hypobaric unilateral spinal anesthesia (HUSA) group ($n=82$). Propensity score matching was used to select 52 pairs of patients with matched baseline data in a ratio of 1∶1. Nerve block time, pain degree, hemodynamic parameters, stress indicators and incidence of complications were compared between the two groups. SPSS statistics 20.0 was used for data analysis. Depending on data type, student's t test, repeated measures analysis of variance, or χ^2 test was employed for intergroup comparison. **Results** The rate of dopamine use and its average dosage were significantly lower in the combined blockade group than the HUSA group (both $P<0.05$). The combined block group had obviously longer onset times and durations of analgesic effect for both sensory block and motor block than the HUSA group (both $P<0.05$). The pain visual analog scale (VAS) scores at T1 (lateral position), and 12 and 24 h after surgery were notably lower, while the scores at T2 (skin incision) and T4 (end of surgery) were remarkably higher in the combined block group than the HUSA group (all $P<0.05$). The morphine dosage in the combined blockade group was less than that in the HUSA group at 0-24 h and 24-48 h after

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surgery (all $P<0.05$). The combined block group had lower mean arterial pressure (MAP) at T1, and higher MAP at T3 (30min after operation) and T4 when compared with the HUSA group ($P<0.05$). The MAP at T2, T3, and T4 in the combined block group were decreased than that at T0 (enter the operating room) ($P<0.05$); The MAP at T1 in the HUSA group was significantly higher than that at T0 ($P<0.05$), while the MAP at T2, T3, and T4 were significantly lower than that at T0 ($P<0.05$). The heart rate (HR) at T1 in the combined block group was lower than that in the HUSA group ($P<0.05$). The HR of HUSA group at T1 was significantly higher than that at T0 ($P<0.05$). The blood glucose and plasma cortisol levels were lower in the combined block group than the HUSA group in 24 h after surgery ($P<0.05$). The incidences of postoperative urinary retention, nausea and vomiting, dizziness and headache in the combined block group were lower than those in the HUSA group ($P<0.05$). **Conclusion** Ultrasound-guided fascia iliac block combined with sacral plexus block can maintain intraoperative hemodynamic stability, control postoperative pain, and reduce stress response and postoperative complications.

【Key words】 aged; hip surgery; ultrasound-guided; fascia iliaca block; sacral plexus block

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髋部手术对技术要求高,对麻醉的要求也较严格[1]。全麻在老年患者中引发心肺并发症的风险较高,硬膜外麻醉和腰麻是髋关节置换术中常用的麻醉方式,但可致低血压、头痛及尿潴留等并发症[2]。随着超声技术的发展,超声引导下的神经阻滞技术逐渐成为热门选择。超声引导下的髂筋膜间隙和骶丛阻滞,可实现髋部精准麻醉,与传统的全麻、硬膜外麻醉相比,并发症风险更低,有明显优势[3]。轻比重单侧腰麻(hypobaric unilateral spinal anesthesia,HUSA)是指经腰椎间隙注入比重较轻的局麻药,从而阻断部分脊神经传导功能的一种麻醉方法,其对回心血量的影响较小,也是髋部手术的常见麻醉选择。本研究旨在探讨超声引导下髂筋膜间隙联合骶丛阻滞在老年髋部手术中的应用价值,并与 HUSA 作对比,详述如下。

1 对象与方法

1.1 研究对象

回顾性分析 2018 年 8 月至 2021 年 8 月就诊于武汉中西医结合骨科医院麻醉科的 178 例行老年髋部手术患者的临床资料。根据麻醉方法,将患者分为联合阻滞组(行超声引导下髂筋膜间隙联合骶丛神经阻滞麻醉,$n=92$)及 HUSA 组($n=86$)。采用 1∶1 倾向性评分匹配法筛选出 52 对匹配序列,两组基线资料均衡可比。纳入标准:年龄≥60 岁;在我院行髋部手术[4];临床资料和检查数据完整。排除标准:中枢神经系统疾病、精神病史;凝血功能障碍;脊柱畸形。本研究经武汉中西医结合骨科医院伦理委员会批准(批号:WZM-GKMH-2023-015)。

1.2 麻醉方法

所有患者麻醉前均予以芬太尼 50 μg、咪达唑仑 2 mg,术中予以输液加温、保温毯以维持体温。联合阻滞组:仰卧位,头微侧向非手术侧,使用超声定位髂筋膜间隙,注入 0.375%罗哌卡因 20~30 ml;调整至侧卧位,术侧在上,超声定位骶丛神经区(为骶骨和髂骨之间的高回声结构,内部高回声线或可呈现出“蜂巢”或“葡萄串”状),注入 0.375%罗哌卡因 15~20 ml。HUSA 组:侧卧,术侧朝上,在 L2~L3 腰椎间隙注入 2%利多卡因 2~3 ml,确保麻醉平面在 T10 以下。若术中持续低血压,予以多巴胺静脉注射,起始剂量 2~5 μg/(kg · min),视情况调整。恢复意识后连接患者自控镇痛(patient-controlled analgesia,PCA)泵,泵内 1mg/ml 吗啡,背景输注 0.5 ml/次,自控剂量 1 ml/次,锁定 15 min,4 h 限量 30 ml,至术后 48 h。

1.3 观察指标

(1)记录患者手术时间、术中出血量、多巴胺使用情况;(2)通过感觉阻滞测试、运动阻滞测试获取阻滞起效和完善的时间;(3)分别于进入手术室时(T0)、摆侧卧位时(T1)、切皮时(T2)、手术开始 30 min(T3)、术毕(T4)、术后 12h、术后 24h 采用疼痛视觉模拟评分(visual analogue scale,VAS)[5]评估患者疼痛程度;(4)记录 T0~T4 平均动脉压(mean arterial pressure,MAP)及心率(heart rate,HR);(5)分别于术前、术后 24 h 采集静脉血,采用己糖激酶法测定血糖(glucose,Glu)水平,采用酶联免疫吸附法测定血浆皮质醇(cortisol,Cor)水平;(6)记录术后尿潴留、恶心呕吐及头晕头痛发生情况。

1.4 统计学处理

采用 SPSS 22.0 软件进行统计分析。计量资料中呈正态分布者以均数±标准差($\bar{x}\pm s$)表示,组间比较采用独立样本 t 检验,同组手术前后比较采用配对样本 t 检验;组内多时点测量数据比较采用重复测量方差分析。计数资料以例数(百分率)表示,组间比较采用 χ^2 检验。以 $P<0.05$ 为差异有统计学意义。

2 结 果

2.1 两组患者一般资料比较

两组患者性别、年龄、体质量指数、疾病类型及手术方式比较,差异均无统计学意义($P>0.05$;表1)。

表1 两组患者一般资料比较

Table 1 Comparison of general data between two groups ($n=52$)

Item	Combined block group	HUSA group	χ^2/t	P value
Gender[n(%)]			0.000	1.000
Male	20(38.46)	20(38.46)		
Female	32(61.54)	32(61.54)		
Age(years, $\bar{x}\pm s$)	74.08±11.49	72.48±11.72	0.703	0.484
BMI(kg/m^2, $\bar{x}\pm s$)	26.47±3.42	26.23±3.57	0.360	0.727
Disease type[n(%)]			3.138	0.371
Intertrochanteric fracture	8(15.39)	4(7.69)		
Femoral neck fracture	20(38.46)	26(50.00)		
Femoral head necrosis	23(44.23)	22(42.31)		
Femoral head fracture	1(1.92)	0(0.00)		
Surgical method[n(%)]			3.514	0.319
Total hip arthroplasty	34(65.39)	35(67.31)		
Artificial femoral head replacement	18(34.62)	14(26.92)		
Total knee arthroplasty	0(0.00)	2(3.85)		
Femoral external fixation	0(0.00)	1(1.92)		

BMI: body mass index; HUSA: hypobaric unilateral spinal anesthesia.

2.2 两组患者手术一般情况比较

联合阻滞组多巴胺使用率、多巴胺平均用量均显著低于HUSA组,差异均有统计学意义(均$P<0.05$;表2)。

2.3 两组患者麻醉效果比较

联合阻滞组感觉阻滞及运动阻滞起效时间与完善时间均显著长于HUSA组,差异均有统计学意义(均$P<0.05$;表3)。

2.4 两组患者疼痛VAS评分及镇痛药物使用情况比较

联合阻滞组T1、术后12 h、术后24 h时点疼痛VAS评分显著低于HUSA组,T2、T4时点疼痛VAS评分显著高于HUSA组,差异均有统计学意义(均$P<0.05$;表4)。

表2 两组患者手术一般情况比较

Table 2 Comparison of general conditions of operation between two groups ($n=52$)

Group	Surgery duration (min, $\bar{x}\pm s$)	Intraoperative blood loss (ml, $\bar{x}\pm s$)	Use of dopamine [n(%)]	Average dose of dopamine (mg, $\bar{x}\pm s$)
Combined block	89.47±17.35	297.28±92.76	2(3.85)	2.57±0.74
HUSA	95.62±20.63	307.42±104.25	13(25.0)	3.24±0.96
t/χ^2	1.645	0.524	9.426	3.986
P value	0.103	0.610	0.002	<0.001

HUSA: hypobaric unilateral spinal anesthesia.

表3 两组患者麻醉效果比较

Table 3 Comparison of anesthesia effects between two group ($n=52$, min, $\bar{x}\pm s$)

Group	Sensory block onset time	Sensory block completion time	Motor block onset time	Motor block completion time
Combined block	4.23±0.79	14.37±2.46	7.48±1.28	20.43±3.01
HUSA	2.94±0.71	11.49±2.24	4.82±1.14	18.46±2.87
t	8.758	6.242	11.191	3.416
P value	<0.001	<0.001	<0.001	<0.001

HUSA: hypobaric unilateral spinal anesthesia.

联合阻滞组术后0~24 h、术后24~48 h吗啡用量显著小于HUSA组,差异均有统计学意义(均$P<0.05$;表5)。

2.5 两组患者血流动力学参数比较

联合阻滞组T1时点MAP小于HUSA组($P<0.05$),T3、T4时点大于HUSA组($P<0.05$)。联合阻滞组T2、T3、T4时点MAP均较T0时点下降($P<0.05$),HUSA组T1时点MAP较T0时点显著升高($P<0.05$),T2、T3、T4时点均较T0时点显著下降($P<0.05$;表6)。

联合阻滞组T1时点HR小于HUSA组($P<0.05$)。HUSA组T1时点HR较T0显著升高($P<0.05$;表6)。

表4 两组患者不同时点疼痛VAS评分比较

Table 4 Comparison of pain VAS scores between two groups at different time points ($n=52$, points, $\bar{x}\pm s$)

Group	T0	T1	T2	T3	T4	12 hafter surgery	24h after surgery	F	P value
Combined block	3.72±1.24	2.17±0.62	1.53±0.76	0.42±0.27	1.27±0.72	1.03±0.45	0.65±0.40	22.519	<0.001
HUSA	3.49±1.40	4.79±1.44	0.34±0.15	0.34±0.20	0.78±0.33	1.97±0.73	2.85±0.96	30.452	<0.001
t	0.887	12.051	11.077	1.717	4.461	7.904	15.254		
P value	0.377	<0.001	<0.001	0.089	<0.001	<0.001	<0.001		

VAS: visual analogue scale; HUSA: hypobaric unilateral spinal anesthesia.

表 5 两组患者术后 PCA 镇痛吗啡用量比较

Table 5 Comparison of morphine dosage for postoperative PCA analgesia between two groups ($n=52$, mg, $\bar{x}\pm s$)

Group	0-24h after surgery	24-48h after surgery
Combined block	16.47±3.82	8.25±2.43
HUSA	20.13±4.15	10.58±2.88
t	4.679	4.459
P value	<0.001	<0.001

PCA: patient-controlled analgesia; HUSA: hypobaric unilateral spinal anesthesia.

2.6 两组患者应激指标比较

两组患者术后 24 h Glu、Cor 均较术前升高，且联合阻滞组均低于 HUSA 组，差异均有统计学意义（$P<0.05$；表 7）。

2.7 两组患者并发症比较

联合阻滞组术后尿潴留、恶心呕吐及头晕头痛发生率均低于 HUSA 组，差异均有统计学意义（均 $P<0.05$；表 8）。

3 讨 论

老年髋关节置换术麻醉的目标除了确保患者安全、舒适之外，还要维持血流动力学稳定，减少对心脑血管系统的影响，以降低心肺并发症风险、缩短康复进程[6]。

髂筋膜间隙阻滞是指在超声引导下，将麻醉药物精准注入髂筋膜间隙，通过阻断股神经、迷走神经和旋后神经实现麻醉。骶丛神经阻滞则是将局麻药物注入骶孔内，以麻醉骶丛神经。二者联合使用，可实现髋关节和下肢的广泛麻醉[7-9]。本研究显示与 HUSA 组相比，超声引导下联合阻滞可减少多巴胺用量。联合阻滞技术可精准麻醉术区，提供足够的麻醉深度，而充分的麻醉深度可减少交感神经的激活，从而降低围术期对多巴胺的需求[10]。

此外，关于两种麻醉方法对患者术中血流动力学的影响，本研究发现，HUSA 组 T1 时 MAP、HR 均较其基线 T0 时水平显著升高，而联合阻滞组 T1 时 MAP、HR 均较 T0 无显著变化，且组间比较显示联合阻滞组 T1 时 MAP、HR 均低于 HUSA 组，可能原因是摆放体位易引起应激反应，联合阻滞组可维持稳定的血流动力学状态，从而减少体位变化带来的应激反应，而 HUSA 组可能由于交感神经抑制不足，从而在体位变化时出现短暂的血流动力学波动。在手术过程中，随着麻醉药物的作用，两组 MAP 水平均下降且低于同组 T0 水平，但联合阻滞组 T3、T4 时点的 MAP 水平高于 HUSA 组，提示联合阻滞下患者 MAP 变化幅度更小，血流动力学在整个手术过程更为平稳[11,12]。

本研究发现，联合阻滞组阻滞起效、完善时间更长，可能原因是联合阻滞涉及多个神经束，局部麻醉药物需要大面积扩散，耗时更久。摆侧卧位时联合阻滞组疼痛 VAS 评分更低，与既往研究[13]一致，可能与先行髂筋膜间隙阻滞可减轻摆放体位的不适有关；联合阻滞组术后 12 h、术后 24h 疼痛 VAS 评分低于 HUSA 组，与联合阻滞组吗啡用量更小的结果一致，证实联合阻滞可提供更持久的麻醉镇痛效果。而联合阻滞组 T2、T4 时点疼痛 VAS 评分稍高，可能与联合阻滞起效时间长、局部麻醉药物分布范围和浓度变化有关。术后 Glu、Cor 升高是应激的典型标志[14]，本研究显示联合阻滞组术后 24 h Glu、Cor 均更低，表明联合阻滞可提供广泛持续镇痛，从而减少疼痛应激。并发症方面，本研究发现联合阻滞组术后尿潴留、恶心呕吐及头晕头痛的发生率均低于 HUSA 组，分析原因可能与其对中枢神经系统的干扰较小且对阿片类药物的需求更少有关。此外，HUSA 麻醉药物作用于脊髓腔，可能影响到自主神经系统，从而干扰膀胱功能，且其对阿片类药物的需求高于联合阻滞，故药物引起的恶心呕吐发生率也更高[15]。

表 6 两组患者不同时点血流动力学参数比较

Table 6 Comparison of hemodynamic parameters between two groups at different time points ($n=52$, $\bar{x}\pm s$)

Group	MAP (mmHg)					F	P value
	T0	T1	T2	T3	T4		
Combined block	104.43±19.62	104.92±14.87	89.92±11.36*	90.67±10.74*	90.22±10.52*	11.204	<0.001
HUSA	102.34±17.87	115.62±16.35*	87.63±13.04*	84.33±11.46*	85.43±11.96*	19.895	<0.001
t	0.568	3.491	0.955	2.911	2.169		
P value	0.571	<0.001	0.342	0.004	0.032		
Group	HR (beats/min)					F	P value
	T0	T1	T2	T3	T4		
Combined block	75.24±11.07	76.43±10.32	72.95±12.06	76.02±9.68	76.34±10.81	2.535	0.042
HUSA	74.06±10.82	80.82±11.49*	72.11±11.77	72.56±12.07	72.98±11.60	3.764	0.005
t	0.550	2.050	0.359	1.613	1.528		
P value	0.584	0.043	0.720	0.110	0.130		

MAP: mean arterial pressure; HR: heart rate; HUSA: hypobaric unilateral spinal anesthesia. Compared with T0, * $P<0.05$. 1 mmHg = 0.133 kPa.

表7 两组患者手术前后应激指标比较

Table 7 Comparison of stress markers before and after surgery between two groups ($n=52$, $\bar{x}\pm s$)

Group	Glu(mmol/L)		GCor(μg/dl)	
	Before surgery	24h after surgery	Before surgery	24h after surgery
Combined block	5.12±0.45	6.38±0.76*	11.52±2.83	18.42±3.57*
HUSA	5.15±0.48	6.82±0.83*	11.48±2.79	20.37±3.91*
t	0.329	2.819	0.073	2.656
P value	0.743	0.006	0.942	0.009

Glu: glucose; Cor: cortisol; HUSA: hypobaric unilateral spinal anesthesia. Compared with before surgery, * $P<0.05$.

表8 两组患者并发症比较

Table 8 Comparison of complications between two groups [$n=52$, $n(\%)$]

Group	Urinary retention	Nausea and vomiting	Dizziness and headache
Combined block	0(0.00)	2(3.85)	0(0.00)
HUSA	5(9.62)	9(17.31)	6(11.54)
χ^2	5.253	4.981	6.373
P value	0.022	0.026	0.012

HUSA: hypobaric unilateral spinal anesthesia.

综上所述,超声引导下髂筋膜间隙联合骶丛阻滞可持续有效镇痛,减少术后应激及阿片类药物的应用,维持术中血流动力学稳定。本研究局限性是样本量小且为回顾性研究,未来可开展大规模前瞻性研究对结果进行验证。

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