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静注硫酸镁对腰硬联合麻醉患者术后疼痛和寒战反应的影响

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摘要 目的:探讨腰硬联合麻醉中静脉输注 50 mg/kg 和 25 mg/kg 两种剂量的硫酸镁对术后镇痛和寒战的的影响。**方法:** 90 名腰硬联合麻醉(CSEA)下行全子宫切除术的患者随机分成 3 组。在腰麻注药后即刻, MGI 组 30 分钟内静脉输注硫酸镁 25 mg/kg 继以 10 mg/kg/h 的速度输注至手术结束;MGⅡ组输注硫酸镁 50 mg/kg,然后以 10 mg/kg/h 的速度输注;C 组注入等量生理盐水。观察术后 24 小时的疼痛评分(视觉模拟评分法:VAS),术后镇痛药物的用量,寒战的发生率。 **结果:**三组术后镇痛用药量由低到高依次为 MGII 组,MGI 组,C 组($P < 0.001$)。术后 VAS 评分,MGII 组较 C 组减少,($P < 0.05$);在 12 h,24 h,MGII 组较 MGI 组减少,MGI 组在 2 h,4 h 较 C 组减少($P < 0.05$)。术后寒战在 C 组发生率最高,在 MGI 组与 MGII 组发生率少,组间有统计学差异($P = 0.007$)。 **结论:**腰硬联合麻醉中静脉输注两种剂量的硫酸镁均可以改善术后镇痛,减少术后寒战的发生率,大剂量硫酸镁更有效,但也可能伴随更大的血流动力学波动。

关键词:硫酸镁;术后镇痛;术后寒战;视觉模拟评分法;镇痛药用量

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Effects of Intravenous Magnesium Sulphate during CSEA on Postoperative Analgesia and Postoperative Shivering

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ABSTRACT Objective: To evaluated the effects of i.v.infusion of magnesium sulphate with two different doses of 50 mg/kg and 25 mg/kg during combined-spinal-epidural-anaesthesia (CSEA) on postoperative analgesia and shivering. **Methods:** 90 patients undergoing abdominal panhysterectomy surgery under CSEA were randomly divided into 3 groups. Just after the intrathecal injection, Group MGI received an iv. $MgSO_4$ of 25 mg/kg within 30 minute, followed by 10 mg/kg/h infusion until the end of operation. Group MGII received 50 mg/kg of $MgSO_4$ followed by 10 mg/kg/h infusion. Group C received an equal volume of physiological saline. Postoperative pain scores (VAS), analgesic consumption, and the incidences of shivering were evaluated. **Results:** Cumulative postoperative analgesic consumptions was lowest in Group MGII($P<0.001$), and highest in group C ($P<0.05$). VAS was significantly lower in Group MGII than in group C. VAS at 12 h, 24 h after surgery was significantly lower in Group MGII than in group MGI ($P<0.05$). VAS of Group MGI at 2 h, 4 h after surgery was lower than in group C, ($P<0.05$). The incidences of shivering were lower in group MGI and MGI than in group C ($P=0.007$). **Conclusions:** I.V. infusion of magnesium sulphate with two different doses during CSEA improve postoperative analgesia and reduce the incidences of shivering. High dose of magnesium sulphate was more effective, however, the influences on hemodynamics may also increase.

Key words: Magnesium sulfate; Postoperative analgesia; Shivering; VAS; Postoperative analgesic requirements

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前言

硫酸镁是天然的生理性钙通道阻滞剂 [1,2], 也是 N- 甲基 -D- 天门冬氨酸谷氨酸受体(NMDA)拮抗剂[3],过去常用于产科子痫前期的患者,还用于治疗心律失常和哮喘[4]。近年来越来越多的研究发现麻醉中应用镁,可以减少术中麻醉药物用量,改善术后镇痛[5],协同肌松药的作用[6,7],降低术后寒战的发生率[8]。

麻醉中硫酸镁的用药方式多样, 全身麻醉时可经静脉输注,也可腰麻时鞘内给药[9,10],区域麻醉中静脉输注硫酸镁也能改善术后镇痛[11],但区域麻醉中静脉输注镁的最佳剂量尚未充分研究。因此,本实验的研究目的是比较腰硬联合麻醉中静脉输注两种剂量的硫酸镁对术后疼痛和寒战反应的影响。

1 材料与方法

1.1 实验对象

在患者知情同意下选择我院 2010 年 1 月～2011 年 3 月拟在 CSEA 下行择期全子宫切除术, 年龄在 18-60 岁,ASA 分级Ⅰ～II 级患者 90 名。排除标准:肥胖(BMI>28 kg/m²),心血

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管,肝肾功能障碍,房室阻滞,神经肌肉疾病,阿片类药或镇痛药滥用,曾用过钙通道阻滞剂,对硫酸镁过敏的患者。

1.2 方法

患者入手术室后开放外周静脉通道，并进行连续心电图、脉搏血氧饱和度(SpO_2)、无创血压监测。选择 L2-3 水平行腰硬联合麻醉,平面控制在 T6 以下。腰麻用药为 3.33 %葡萄糖 +0.5 %布比卡因 3 mL,腰麻针为 25-G。术中平均动脉压(MAP)低于基础值的 20%时,给予麻黄碱 5 mg 静注。术后视觉模拟评分法(VAS)评分 >5 分时,患者口服氯芬可待因片,每次 1 片。所泵药物均稀释至 20 mL。在腰麻给药即刻,静脉泵入以下研究药物。小剂量硫酸镁组(MGI)组:在 30 分钟内泵入硫酸镁 25 mg /kg,然后以 10 mg /kg/h 的速度维持输注,直至手术结束;大剂量硫酸镁组(MGII)组在 30 分钟内泵入硫酸镁 50 mg/ kg,然后以 10 mg /kg /h 的速度维持输注,直至手术结束;C 组在相同时间段泵入等量生理盐水。

1.3 记录指标

患者的一般资料,包括年龄、身高、体重、ASA 分级;感觉阻滞平面、麻醉时间、手术时间;入室 10 分钟后的 MAP 和心率(HR)(基础值)、腰麻给药前(前)、给药即刻(t0)、给药后 5、10 分钟的 MAP 和 HR,随后每隔 10 分钟记录 MAP,HR,直至手术结束,分别记为(t5,t10,t20,t40……依此类推);术中麻黄碱的用量;术后 VAS 评分:记录术后 30 分钟,1 h,2 h,4 h,8 h,12 h,24 h 各时间点的 VAS 值，分别记为 T1,T2,T3,T4,T5,T6,T7;术后镇痛药的总需求量;术后寒战的发生率,恶心呕吐发生率,以及术后下肢活动恢复时间。

1.4 统计学方法

采用 SPSS11.5 软件系统分析所有数据，计量资料采用($\bar{x}\pm s$)表示,组间比较,根据资料是否满足方差齐性检验,分别采用单因素方差分析以及 Brown-Forsythe 方差分析;任意两组间的比较采用 LSD 检验。分类变量以及计数资料采用卡方检验。三组资料不同时间 MAP、HR 以及 VAS 的值,采用重复测量方差分析。根据资料是否满足球对称,采用一元分析结果或多元分析结果。双侧检验，$P < 0.05$ 表示差异有统计学意义。

2 结果

2.1 术后镇痛总用药量

三组术后镇痛用药量差异显著（$P < 0.001$),C 组最高,MGII 组最低;MGI 组与 C 组用药量差异显著($P < 0.05$);MGII 组与 MGI 组差异有统计学意义($P < 0.05$)(表 1)。

2.2 术后疼痛评分比较

MGII 组在 2 h,4 h,8 h,12 h,24 h 较 C 组均减少，有统计学差异($P < 0.05$);在 12 h,24 h,MGII 组较 MGI 组减少,有统计学差异($P < 0.05$)。MGI 组在 2 h,4 h 较 C 组减少,有统计学差异($P < 0.05$)(表 2)。

2.3 血流动力学变化

三组麻黄碱用量差异显著($P < 0.001$),MGII 以及 MGI 组与 C 组比较,麻黄用量显著高于 C 组麻黄用量($P < 0.05$);MGI 组与 MGII 组比较,麻黄用量小于 MGII 组麻黄用量($P < 0.05$)(表 3)。

2.4 术后寒战的发生率

术后 C 组出现寒战数为 9 例,寒战率为 30 %;MGI 组出现寒战数为 1 例，寒战率为 3.33 %;MGII 组出现寒战数为 2 例,寒战率为 6.67 %；三组出现寒战率差异有统计差异（$P = 0.007$)。寒战在 C 发生率最高，在 MGI 与 MGII 组发生率少。MGII 与 MGI 组术后寒战发生率没有统计学差异（$P = 0.554$)(表 4)。

3 讨论

表 1 术后镇痛药用量的比较($\bar{x}\pm s$, n=30)

Table 1 Comparison of cumulative postoperative analgesic consumptions($\bar{x}\pm s$, n=30)

	Group C	MGI	MGII
Analgesic consumptions (mg)	59.75± 40.85	36.00± 36.23▲	12.00± 20.24▲●

注:▲与 C 组比较,$P < 0.05$;● 与 MGI 组比较,$P < 0.05$。

Note: ▲ Compared with Group C, $P < 0.05$; ● Compared with Group MGI, $P < 0.05$.

表 2 各时间点的 VAS 比较($\bar{x}\pm s$, n=30)

Table 2 Comparison of VAS at each time point($\bar{x}\pm s$, n=30)

Group	C	MGI	MGII	F	P
T1(30)	0.12± 0.49	0.10± 0.31	0	0.669	0.573
T2(1h)	0.53± 0.90	0.30± 0.80	0.23± 0.57	1.698	0.171
T3(2h)	1.42± 0.90	1.05± 1.25	1.37± 0.97	4.179	0.008
T4(4h)	4.52± 1.22	2.87± 1.50*	2.45± 0.90▲	16.68	<0.001
T5(8h)	2.80± 1.37	2.33± 1.48	1.75± 0.85▲	3.727	0.013
T6(12h)	3.12± 1.47	2.65± 1.68	1.7± 0.98▲●	5.598	0.001
T7(24h)	3.23± 1.05	2.60± 1.00*	1.72± 0.94▲●	11.35	<0.001

注:▲与 C 组比较,$P < 0.05$;● 与 MGI 组比较,$P < 0.05$。

Note: ▲ Compared with Group C, $P < 0.05$;● Compared with Group MGI,$P < 0.05$.

表 3 麻黄碱用量的比较($\bar{x}\pm$ s, n=30)

Table 3 Comparison of ephedrine consumption($\bar{x}\pm$ s, n=30)

Group	C	MGI	MGII	P
Ephedrine consumption(mg)	9.80± 7.30	16.73± 9.23▲	24.53± 6.89▲●	<0.001

注:▲与 C 组比较,P < 0.05;● 与 MGI 组比较,P < 0.05。

Note: ▲ Compared with Group C, P < 0.05;● Compared with Group MGI,P < 0.05.

表 4 术后寒战的发生率的比较

Table 4 Comparison of the incidence of postoperative shivering

Group	C	MGI	MGII	X^2	P
Shivering(n/%)	8(30)	1(3.33)▲	2(6.67)▲	12	0.007

注:▲与 C 组比较,P < 0.05。

Note: ▲ Compared with Group C, P < 0.05.

术后疼痛是临床最常见和最需要处理的急性疼痛,在生理与心理上都会对术后康复产生不良影响。硫酸镁虽然不是麻醉药,但它是天然的生理性钙通道阻滞剂[1,2],也是 NMDA 受体拮抗剂[3],在疼痛和寒战反应的调节中可能发挥重要作用。

在本次实验中,采用了 50 mg/kg 的负荷量及 10 mg/kg/h 的维持量,未观察到过度镇静,意识模糊,呼吸抑制的发生。以往的研究表明,应用更大剂量的镁会引起更多副作用[11-14]。

镁离子改善术中及术后镇痛的机制复杂,目前仍不完全清楚,可能的机制有以下几种:一,镁剂竞争性阻滞了钙离子通道,而干扰钙离子的内流可以增加伤害性刺激的阈值,从而产生非特异性抗伤害作用[15]。二,拮抗 NMDA 受体,从而阻止了 NMDA 受体介导的钙离子内流[16]。另外,镁剂可以促进血管内皮释放一氧化氮,扩张血管。一氧化氮能保护缺血再灌注引起的血管内皮功能不全,从而减轻疼痛[17,18]。

MGI 组在 2 h,4 h 时较 C 组减少;在 12 h,24 h 时,MGII 较 MGI 组的 VAS 评分减少,可能与 MGI 组硫酸镁的负荷量小,没有达到有效的血药浓度有关,镇痛作用小而持续时间短,因此足够剂量的硫酸镁负荷量和输注剂量对有效的镇痛是重要的。

各组患者的血流动力学在手术过程中较平稳,但是三组资料麻黄碱用量差异显著,由高到低依次为 MGII 组,MGI 组,C 组(P < 0.001)。镁有剂量依赖性负变力作用,其对人类血流动力学影响的研究表明,镁有外周(主要为动脉)血管舒张作用[14,19,20]。静脉给硫酸镁可以抑制术后寒战[8],表明其可以降低寒战反应的阈值。硫酸镁不止作用于中枢,也是一种轻度的肌肉松弛药,因此也许同时可以减少寒战的发生。硫酸镁还使外周血管舒张,从而改善皮肤循环,因此减少了寒战的发生[8]。寒战可引起患者不适并加剧术后疼痛[21],抑制寒战反应,或许进一步减少了术后疼痛,增加患者的舒适度。

总之,腰硬联合麻醉后静脉输注硫酸镁可以改善术后疼痛,减少术后镇痛药的需求量,减少寒战反应的。给予负荷量 50 mg/kg 的硫酸镁,然后以 10 mg/kg/h 的速度维持输注,术后镇痛效果更佳,但大剂量的硫酸镁是否会带来血流动力学变化,以及最佳的用药方案仍有待研究。

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要的作用,这为临床诊断和治疗提供了的依据。

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