

咪达唑仑口服溶液在患儿七氟烷麻醉术后躁动的临床应用

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收稿日期: 2023年11月27日; 录用日期: 2023年12月21日; 发布日期: 2023年12月27日

摘要

目的: 探讨咪达唑仑口服溶液对七氟烷麻醉儿童术后躁动、不良反应的影响。方法: 选择2022年3月至2023年6月日照市中心医院收治的腹部手术患儿120例, 采用随机数字表法将患者分为3组, A组: 术前30 min口服咪达唑仑口服溶液0.5 mg/kg, 麻醉后经鼻给予盐水滴鼻处理; B组: 术前30 min口服普通糖浆, 麻醉后经鼻给予右美托咪定1 µg/kg滴鼻处理; C组: 术前30 min口服普通糖浆, 麻醉后经鼻给予盐水滴鼻处理。收集患儿一般资料, 包括性别、年龄、ASA分级。记录麻醉诱导即刻(T1)、拔管前(T2)、拔管即刻(T3)患儿平均血压(MAP)、心率(HR)变化。记录患儿的手术时间、复苏时间。记录患儿的躁动发生率、以及术后不良反应(恶心、呕吐)的发生情况。结果: 三组患儿一般情况, 包括性别、年龄、ASA分级、手术时间差异无统计学意义($P > 0.05$)。与C组患儿复苏时间比较, A组、B组患儿复苏时间均降低($P < 0.05$); 与B组患儿复苏时间比较, A组患儿复苏时间均降低($P < 0.05$)。三组患儿在T1、T2时MAP、HR差异无统计学意义($P > 0.05$)。在T3时间点, 与C组患儿MAP、HR比较, A组、B组患者MAP、HR均降低($P < 0.05$); A组与B组患儿MAP、HR差异无统计学意义($P > 0.05$)。与C组患儿比较, A组和B组患儿术后不良反应(恶心、呕吐)降低($P < 0.05$)。与C组患儿比较, A组和B组患儿术后躁动发生率降低($P < 0.05$); 与B组患儿术后躁动发生率比较, A组患儿术后躁动发生率降低($P < 0.05$)。结论: 咪达唑仑口服溶液可改善七氟烷麻醉儿童术后躁动、不良反应, 安全性高。

关键词

咪达唑仑, 七氟烷, 术后躁动, 儿童

Clinical Application of Midazolam Oral Solution in Young Children with Agitation after Sevoflurane Anesthesia

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文章引用: 王琳, 高兴超, 冯立霞, 郑利艳, 邱同霞, 赵涛. 咪达唑仑口服溶液在患儿七氟烷麻醉术后躁动的临床应用[J]. 临床医学进展, 2023, 13(12): 19917-19922. DOI: 10.12677/acm.2023.13122805

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Received: Nov. 27th, 2023; accepted: Dec. 21st, 2023; published: Dec. 27th, 2023

Abstract

Objective: To investigate the effect of midazolam oral liquid on postoperative agitation and adverse reactions in children undergoing sevoflurane anesthesia. **Methods:** A total of 120 children with abdominal surgery admitted to Rizhao Central Hospital from March 2022 to June 2023 were selected. The patients were divided into three groups by random number table method. Group A: oral midazolam oral solution 0.5 mg/kg 30 minutes before operation, and nasal saline nasal drip after anesthesia. Group B: oral administration of ordinary syrup 30 min before operation, nasal administration of dexmedetomidine 1 µg/kg nasal drip after anesthesia; Group C: oral administration of ordinary syrup 30 min before operation, and nasal administration of saline nasal drip after anesthesia. The general data of the children were collected, including gender, age and ASA classification. The changes of mean blood pressure (MAP) and heart rate (HR) were recorded immediately after anesthesia induction (T1), before extubation (T2) and immediately after extubation (T3). The anesthesia time and recovery time of the children were recorded. The incidence of agitation and postoperative adverse reactions (nausea and vomiting) were recorded. **Results:** There was no significant difference in the general conditions of the three groups of children, including gender, age, ASA grade, and surgery time ($P > 0.05$). Compared with the recovery time of group C, the recovery time of group A and group B decreased ($P < 0.05$). Compared with the recovery time of group B, the recovery time of group A decreased ($P < 0.05$). There was no significant difference in MAP and HR between the three groups at T1 and T2 ($P > 0.05$). At T3 time point, compared with MAP and HR in group C, MAP and HR in group A and group B decreased ($P < 0.05$). Compared with group C, the postoperative adverse reactions (nausea and vomiting) in group A and group B were decreased ($P < 0.05$). Compared with group C, the incidence of postoperative agitation in group A and group B was lower ($P < 0.05$). Compared with the incidence of postoperative agitation in group B, the incidence of postoperative agitation in group A decreased ($P < 0.05$). **Conclusion:** Midazolam oral solution can improve postoperative agitation and adverse reactions in children with sevoflurane anesthesia, with high safety.

Keywords

Midazolam, Sevoflurane, Postoperative Agitation, Children

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1. 引言

在临床麻醉中，七氟烷广泛用于小儿的吸入麻醉[1]。七氟烷在血液中的溶解度很低，血/气分配系数低，因此，在气体和血液中能很轻松达到稳定，急速起效，迅速排出[2]。七氟烷吸入麻醉术后患儿在围

苏醒期经常会出现躁动的情况[3]。咪达唑仑是短效苯二氮卓类的镇静催眠药，可减轻患儿术前焦虑，减轻患儿对心理创伤及恶性刺激的回忆[4]。本研究通过对患儿术前应用咪达唑仑口服溶液，探讨其对七氟烷麻醉后导致的躁动、不良反应的影响。

2. 资料与方法

2.1. 一般资料

选择 2022 年 3 月至 2023 年 9 月日照市中心医院收治的腹部手术患儿 120 例。采用随机数字表法将患者分为 3 组：A 组：术前 30 min 口服咪达唑仑口服溶液 0.5 mg/kg，麻醉后经鼻给予盐水滴鼻处理；B 组：术前 30 min 口服普通糖浆，麻醉后经鼻给予右美托咪定 1 μ g/kg 滴鼻处理；C 组：术前 30 min 口服普通糖浆，麻醉后经鼻给予盐水滴鼻处理。入组标准：ASA 分级 I~II 级，年龄 3~6 岁；无精神、神经疾患，心、肺、肝、肾功良好、活动当量 > 4 METs。排除标准：术前口服其它镇静药物；对咪达唑仑过敏或本品其它成分过敏的患儿；术前困难气道评估，Mallampati 分级 $\geq$ III 级患者；急性闭角型青光眼患儿或未经有效治疗的开角型青光眼患儿。

2.2. 麻醉方案

所有患儿常规禁饮食，未使用其它术前用药。患儿在父母协助给予咪达唑仑口服溶液或糖浆，面罩吸氧。持续监测平均血压(MAP)、心率(HR)、心电图(ECG)、脉搏血氧饱和度(SpO_2)、脑电双频谱指数(BIS)。口服咪达唑仑口服溶液 30 min 后开始麻醉诱导，三组患儿采用相同的麻醉诱导方法：面罩吸氧(3~6 L/min)和七氟烷(6%~8%)，静脉注射丙泊酚(2 mg/kg)和顺式苯磺酸阿曲库铵(1.5 mg/kg)，置入喉罩后给予经鼻滴定处理。术中采用七氟烷维持麻醉，BIS：40~60。缝合皮肤时给予切口局部浸润麻醉，关闭七氟烷，复苏患儿。

2.3. 观察指标

收集患儿一般资料，包括性别、年龄、ASA 分级。记录麻醉诱导即刻(T1)、拔管前(T2)、拔管即刻(T3)患儿平均血压(MAP)、心率(HR)变化。记录患儿的手术时间、复苏时间。记录患儿的躁动发生率、以及术后不良反应(恶心、呕吐)的发生情况。

2.4. 统计学分析

采用 SPSS 26.0 统计学软件进行数据处理及统计学分析，计量资料以均数 $\pm$ 标准差表示，组间比较采用单因素方差分析；计数资料以率或百分比表示，组间比较采用 χ^2 检验。 $P < 0.05$ 为差异有统计学意义。

3. 结果

3.1. 三组患儿一般情况比较

三组患儿一般情况比较，性别、年龄、ASA 分级、手术时间差异无统计学意义($P > 0.05$)。见表 1。

3.2. 三组患儿血压、心率比较

三组患儿在 T1、T2 时 MAP、HR 差异无统计学意义($P > 0.05$)。在 T3 时间点，与 C 组患儿 MAP、HR 比较，A 组、B 组患者 MAP、HR 均降低($P < 0.05$)；A 组与 B 组患儿 MAP、HR 差异无统计学意义($P > 0.05$)。见表 2。

Table 1. Comparisons of the general conditions of the children in three groups
表 1. 三组患者一般情况比较

指标	A 组	B 组	C 组	F/χ^2	P 值
年龄(岁)	4.75 ± 1.03	4.85 ± 0.98	5.05 ± 0.93	0.971	0.382
性别 (男/女)	23/17	22/18	19/21	0.871	0.647
ASA 分级 (I/II)	10/30	12/28	14/26	0.952	0.621
手术时间 (min)	30.63 ± 4.50	29.40 ± 4.24	30.15 ± 4.85	0.741	0.479

Table 2. Comparisons of blood pressure and heart rate of the children in three groups
表 2. 三组患者血压、心率比较

分组	MAP (mmHg)			HR (bpm)		
	T1	T2	T3	T1	T2	T3
A	81.78 ± 3.28	84.73 ± 3.02	90.25 ± 4.45	96.23 ± 5.31	93.68 ± 5.17	95.68 ± 6.65
B	82.83 ± 3.98	85.95 ± 3.47	90.78 ± 4.32	97.93 ± 5.91	93.30 ± 5.21	97.53 ± 6.14
C	83.53 ± 3.47	85.65 ± 3.91	95.18 ± 4.50	98.50 ± 5.58	92.83 ± 4.93	103.03 ± 5.82
F 值	2.416	1.341	14.935	0.808	0.279	15.148
P 值	0.094	0.266	<0.001	0.448	0.757	<0.001

3.3. 三组患儿复苏时间、术后不良反应、躁动比较

与 C 组患儿复苏时间比较, A 组、B 组患儿复苏时间均降低($P < 0.05$); 与 B 组患儿复苏时间比较, A 组患儿复苏时间降低($P < 0.05$)。与 C 组患儿比较, A 组和 B 组患儿术后不良反应(恶心、呕吐)降低($P < 0.05$)。与 C 组患儿比较, A 组和 B 组患儿术后躁动发生率降低($P < 0.05$); 与 B 组患儿术后躁动发生率比较, A 组患儿术后躁动发生率降低($P < 0.05$)。见表 3。

Table 3. Comparisons of resuscitation time, postoperative adverse reactions and agitation of the children in three groups
表 3. 三组患者复苏时间、术后不良反应、躁动比较

分组	复苏时间 (min)	术后不良反应		术后躁动
		恶心	呕吐	
A	13.75 ± 2.81	3 (7.5%)	2 (5%)	2 (5%)
B	18.23 ± 3.18	4 (10%)	2 (5%)	6 (15%)
C	22.03 ± 3.85	11 (27.5%)	8 (20%)	12 (30%)
F/χ^2	62.757	7.451	6.667	9.120
P 值	<0.001	0.024	0.036	0.010

4. 讨论

咪达唑仑口服溶液是最常用的儿童口服镇静药物。咪达唑仑口服溶液可完美地替代咪达唑仑注射剂混合糖浆, 有效性可靠、接受度高, 并且服用方法简单方便, 节省了将药物与矫味剂混合的繁琐步骤[5]。因此, 本研究采用咪达唑仑口服溶液对七氟烷术后躁动、血流动力学变化及不良反应进行研究。

吸入七氟烷麻醉术后病人在围苏醒期经常会出现躁动的情况,可能是由于病人苏醒太快,体内残留还没有被排出的七氟烷造成中枢系统恢复不统一,当大脑皮层仍处于抑制状态,皮层下中心已经恢复,中枢发生局灶敏化[6]。研究发现[7] [8],七氟烷麻醉中插管前输注右美托咪定可显著减少术中七氟烷的用量并能够有效降低苏醒期呼末七氟烷浓度,减少患者苏醒期躁动的发生。咪达唑仑是短效苯二氮卓类的镇静催眠药,它通过与 GABA 直接激活的抑制性神经递质受体相互作用发挥镇静催眠作用,可用作儿科术前用药有助于麻醉诱导的顺利进行[9] [10]。咪达唑仑和右美托咪定两种药物均可用于患者的麻醉诱导,减少患者术后躁动。

咪达唑仑起效快,10~20 min 起效,口服后 30 min 达到最大镇静和抗焦虑效果。绝对生物利用度为 36% [11]。成人和 1 岁以上的患儿,咪达唑仑血浆蛋白结合率约 97%,通过肝脏和肠道的细胞色素 P4503A4 (CYP3A4)代谢成活性代谢产物 α -羟基咪达唑仑,在血浆中以葡萄糖醛酸结合物或非结合形式存在,最后主要以 α -羟基咪达唑仑葡萄糖苷酸形式经尿液排泄[12]。咪达唑仑单次口服 0.25、0.5 和 1 mg/kg 的咪达唑仑后,其平均消除半衰期为 2.2~6.8 h。本研究对此进行比较,发现咪达唑仑和右美托咪定对血流动力学的影响没有差异,对术后恶心呕吐的发生也没有差异。在患儿术后躁动方面,咪达唑仑和右美托咪定均可减少七氟烷麻醉引起的术后躁动,同时咪达唑仑的效果要优于右美托咪定的效果。

综上所述,咪达唑仑口服溶液可以有效可靠地用于患儿术前的镇静,为患儿麻醉前建立静脉通道和面罩吸氧提供理想的镇静环境,降低患儿七氟烷麻醉后导致的躁动。

基金项目

山东省医学会镇痛镇静-麻醉优化专项资金(YXH2021ZX045),山东省自然科学基金(ZR2020QH004),国家自然科学基金(82002083)。

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