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不同的麻醉方案对脑幕上肿瘤手术患者麻醉苏醒期血流动力学的影响*

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摘要 目的:对比不同麻醉方案对脑幕上肿瘤手术患者麻醉苏醒期血流动力学的影响。**方法:**选取2017年10月至2019年10月于我院择期行脑幕上肿瘤手术患者为本次研究对象,将其随机分为研究组($n=40$)和对照组($n=40$)。对照组术中接受右美托咪定麻醉,研究组术中接受异氟醚麻醉,观察并对比研究组和对照组在麻醉诱导前(T_0)、麻醉后30 min(T_1)、麻醉后1 h(T_2)以及手术结束时(T_3)血流动力学指标[心率(Heart rate, HR),平均动脉压(Mean arterial pressure, MAP)]、脑氧代谢情况[颈内静脉球部血氧饱和度(Oxygen saturation of the bulb of internal jugular vein, $SjvO_2$),动脉血氧含量(Arterial oxygen content, CaO_2),脑静脉氧含量(Cerebral jugular venous oxygen content, $CjvO_2$),脑氧摄取率(Cerebralextraction of oxygen, $CERO_2$)],并分析研究组和对照组麻醉效果(优、良、差)和手术相关指标(手术时间、麻醉时间、苏醒时间、输血量)情况。**结果:**与 T_0 时相比,研究组和对照组在 $T_1\sim T_2$ 时MAP和HR均降低,且对照组明显低于研究组($P<0.05$);与 T_0 时相比, T_3 时研究组MAP和HR均增加($P<0.05$);与 T_0 、 T_1 、 T_3 时相比,研究组和对照组 T_2 时MAP和HR均较低,对照组低于研究组($P<0.05$);与 T_0 时相比,研究组和对照组在 $T_1\sim T_3$ 时 $CjvO_2$ 明显增高, $CERO_2$ 明显降低,研究组在 $T_1\sim T_3$ 时 $CjvO_2$ 高于对照组,研究组在 $T_1\sim T_3$ 时 $CERO_2$ 低于对照组($P<0.05$),在 $T_0\sim T_3$ 时研究组和对照组 $SjvO_2$ 、 CaO_2 差异不明显($P>0.05$);与对照组相比,研究组患者麻醉效果优良率较高($P<0.05$),苏醒时间明显缩短($P<0.05$),研究组和对照组手术时间、麻醉时间、输血量差异不明显($P>0.05$)。**结论:**右美托咪定用于脑幕上肿瘤手术患者麻醉效果较好,可以有效稳定血流动力学,降低脑氧代谢,缩短苏醒时间。

关键词:脑幕上肿瘤手术;右美托咪定;异氟醚;苏醒;血流动力学;麻醉效果;脑氧代谢

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Effects of Different Anesthesia Schemes on the Hemodynamics of Patients Undergoing Supratentorial Tumor Surgery*

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ABSTRACT Objective: To compare the effects of different anesthesia schemes on hemodynamics of patients undergoing supratentorial tumor surgery. **Methods:** Patients who underwent supratentorial tumor surgery in our hospital from October 2017 to October 2019 were randomly divided into study group ($n=40$) and control group ($n=40$). The patients in the control group were anesthetized with dexmedetomidine and the patients in the study group were anesthetized with isoflurane. Before anesthesia induction (T_0), 30 minutes after anesthesia (T_1), 1 hour after anesthesia (T_2) and at the end of operation (T_3), hemodynamic indexes (heart rate (HR), mean arterial pressure (MAP) and cerebral oxygen metabolism ($SjvO_2$)) were observed and compared between two groups, the arterial oxygen content (CaO_2), cerebral venous oxygen content ($CjvO_2$), cerebral oxygen uptake rate ($CERO_2$), and the anesthesia effect (excellent, good, bad) and operation related indexes (operation time, anesthesia time, recovery time, infusion volume) of both groups were analyzed. **Results:** Compared with T_0 , the MAP and HR of both groups decreased from T_1 to T_2 , which were significantly lower in the control group than those in the study group ($P<0.05$); compared with T_0 , the MAP and HR of both groups increased from T_3 ($P<0.05$); compared with T_0 , T_1 , T_3 , the MAP and HR of both groups were lower at T_2 , and the MAP and HR of control group were lower than those in study group ($P<0.05$); compared with T_0 , the $CjvO_2$ of the study group and the control group increased significantly at T_1 to T_3 . The $CjvO_2$ at T_1 , T_2 and T_3 in the study group were higher than those in the control group ($P<0.05$), while the $CERO_2$ were lower than those in the control group ($P<0.05$), and there was no significant difference in the between the $SjvO_2$ and CaO_2 between from T_0 to T_3 two groups ($P>0.05$); compared with the control group, the excellent rate of anesthesia effect in the study group was higher ($P<0.05$), the recovery time was significantly shorter ($P<0.05$). There was no significant difference in operation time, anesthesia time and infusion volume between two groups ($P>0.05$). **Conclusion:** Dexmedetomidine has a good anesthetic effect on patients undergoing supratentorial tumor surgery. It can effectively stabi-

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lize the hemodynamics, reduce the cerebral oxygen metabolism, and shorten the recovery time.

Key words: Supratentorial tumor surgery; Dexmedetomidine; Isoflurane; Recovery; Hemodynamics; Anesthesia effect; Cerebral oxygen metabolism

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前言

脑幕上肿瘤由于脑部肿瘤压迫、手术操作方式、器械牵拉刺激等引起患者出现运动、感觉功能异常、癫痫、瘫痪,影响患者的生活质量,甚至威胁生命^[1-3]。目前,临床对于脑部肿瘤的基本和有效的治疗方式是手术治疗,但由于手术中肿瘤附近的脑组织血液循环自我调节功能下降,当患者血压升高时可能出现脑水肿或者脑出血,而血压降低时可能出现肿瘤腔内出血^[4,5]。因此,保持稳定的血流动力学反应对于围手术期脑内环境十分重要^[6],选择合适的麻醉方式对患者预后至关作用。

目前,临床上对于脑幕上肿瘤麻醉方案较多,不同的麻醉药物的作用机制以及麻醉效果也存在较大的差异,右美托咪定和异氟醚麻醉在颅脑手术中应用较为广泛^[7,8]。Dong等^[9]通过观察择期行幕上脑肿瘤手术患者器官插管时血流动力学指标,发现右美托咪定组在插管即刻、插管后5 min和10 min时,HR和MAP明显优于对照组,有助于维持血流动力学稳定。Martin等^[10]研究异氟醚吸入麻醉期间对患者血流动力学的影响,发现异氟醚手术中的应用不仅能够发挥中枢抑制作用,且安全性高。本研究从麻醉苏醒期血流动力学、麻醉效果、脑氧代谢以及

手术指标等方面对比了右美托咪定和异氟醚麻醉方案对脑幕上肿瘤手术患者的影响。

1 资料与方法

1.1 研究资料

选取80例2017年10月至2019年10月于我院择期行脑幕上肿瘤手术患者本次研究对象。纳入标准:(1)符合脑幕上肿瘤诊断标准,且经过磁共振成像(Magnetic Resonance Imaging, MRI),计算机断层摄影(Computed Tomography, CT)检查确诊者;(2)符合美国麻醉医师学会手术(American Society of anesthesiologists surgery, ASA)分级:I~II级;(3)首次发病;(4)首次接受颅脑手术;(5)精神意识正常,可与医护人员正常交流;(6)患者及其家属对本研究利弊知情,均签署知情同意书。排除标准:(1)颈静脉球置管禁忌者;(2)近半年内参与其他临床研究;(3)对本研究中药物有过敏史者;(4)有其他系统严重疾患者。随机分为研究组(n=40)和对照组(n=40),研究组和对照组患者在性别、年龄、ASA分级、体重等一般资料差异不明显($P>0.05$)。如表1所示。

表1 两组患者一般资料对比

Table 1 Comparison of the general data between the two groups

Groups	Cases	Gender(case)		Average age (age)	ASA classification(case)		Average weight (kg)
		Male	Female		I	II	
Study group	40	27	13	39.14± 5.90	21	19	61.76± 7.34
Control group	40	25	15	41.02± 6.10	22	18	62.57± 7.11

1.2 麻醉方法

术前均嘱咐研究组和对照组患者进行常规禁食禁水,入室后常规监测患者心电图、血压、血氧饱和度、体温以及脑电双频谱指数。研究组和对照组患者均分别给予静脉推注0.03 mg/kg咪唑安定,0.5 mg/kg维库溴铵,0.2 μg/kg舒芬太尼,2.0 mg/kg丙泊酚进行麻醉诱导后行气管插管,连接呼吸机监测控制通气,使潮气量为6~10 mL/kg,呼吸频率12~15次/min,呼吸比为1:2,呼气末二氧化碳分压在35~40 mmHg。给予对照组患者吸入1.5 MAC异氟醚麻醉^[11];给予研究组患者持续静注0.4 μg/kg右美托咪定^[12]。根据手术过程中患者脑电双频谱指数给予患者静脉推注0.25 mg/kg维库溴铵和0.1 μg/kg舒芬太尼维持麻醉,直至手术结束前30 min,停止吸入异氟醚和静注右美托咪定。

1.3 观察指标

(1)血流动力学指标:麻醉诱导前(T_0)、麻醉后30 min(T_1)、麻醉后1 h(T_2)以及手术结束时(T_3)血流动力学指标,HR以及MAP水平;(2)麻醉效果:分为优,良,差,其中优表示为手术过程中无疼痛感;良为术中存在轻度疼痛,需加少量镇静药;差为

术中疼痛剧烈,需加大量镇静药^[13];(3)脑氧代谢情况:分别于 T_0 、 T_1 、 T_2 和 T_3 时采集研究组和对照组患者颈内静脉球部以及足背动脉血液进行血气分析,记录 SaO_2 、 PaO_2 、 PjvO_2 、 SjvO_2 ,分别计算 CaO_2 、 CjvO_2 、 CERO_2 ,计算公式分别为: $\text{CaO}_2 = (1.34 \times \text{Hb} \times \text{SaO}_2) + (0.0031 \times \text{PaO}_2)$, $\text{CjvO}_2 = (1.34 \times \text{Hb} \times \text{SjvO}_2) + (0.0031 \times \text{PjvO}_2)$, $\text{CERO}_2 = [(\text{CaO}_2 - \text{CjvO}_2) / \text{CaO}_2] \times 100\%$ ^[14,15];(4)手术指标:手术时间、麻醉时间、苏醒时间、输血量情况。

1.4 统计学方法

数据采用SPSS 20.0进行统计分析,符合正态分布的计量资料($\bar{x} \pm s$),两组对比采用t检验,多组对比采用重复测量方差分析;计数资料(n或%),对比采用 χ^2 检验,以 $P<0.05$ 为差异有统计学意义。

2 结果

2.1 两组不同时刻血流动力学指标的对比

与 T_0 时相比,研究组和对照组在 T_1 ~ T_2 时MAP和HR均降低,对照组明显低于研究组($P<0.05$);与 T_0 时相比, T_3 时研究组MAP和HR均增加($P<0.05$);与 T_0 、 T_1 、 T_3 时相比,研究组和

对照组 T₂ 时 MAP 和 HR 均较低,对照组低于研究组($P<0.05$)。如表 2 所示。

2.2 两组麻醉效果对比

如表 3 所示,与对照组相比,研究组患者麻醉效果优良率较高($P<0.05$)。

2.3 两组不同时刻脑氧代谢情况对比

研究组和对照组在 T₀~T₃ 时 S_{jv}O₂、CaO₂ 差异不明显 ($P>$

0.05),在 T₀~T₂ 时,研究组和对照组 C_{jv}O₂、CERO₂ 差异不明显 ($P>0.05$)。与对照组相比,研究组 T₃ 时 C_{jv}O₂ 明显增高,CERO₂ 明显降低($P<0.05$)。如表 4 所示。

2.4 两组手术指标对比

与对照组相比,研究组苏醒时间明显缩短($P<0.05$),研究组 and 对照组手术时间、麻醉时间、输血量差异不明显($P>0.05$)。如表 5 所示。

表 2 两组不同时刻血流动力学指标的对比($\bar{x}\pm s$)

Table 2 Comparison of the hemodynamic indexes between two groups at different time points($\bar{x}\pm s$)

Indexes	Group	Cases	T ₀	T ₁	T ₂	T ₃
MAP(mmHg)	Study group	40	101.98± 11.54	92.75± 25.55* [#]	91.02± 8.43* [#]	103.11± 19.16* [#]
	Control group	40	103.27± 14.49	83.21± 15.80*	80.61± 4.49*	90.46± 15.99
HR(beat/min)	Study group	40	82.80± 18.61	76.54± 19.42* [#]	74.76± 7.24* [#]	84.29± 15.56* [#]
	Control group	40	80.63± 13.66	67.78± 9.15*	64.12± 9.11*	75.87± 2.52

Note: compared with the control group, * $P<0.05$; compared with T₀, [#] $P<0.05$.

表 3 两组麻醉效果对比[n(%)]

Table 3 Comparison of anesthesia effect between the two groups [n (%)]

Groups	Cases	Excellent	Good	Bad	Excellent and good rate
Study group	40	28(70.00)	9(22.50)	3(7.50)	37(92.50)*
Control group	40	19(47.50)	10(25.00)	11(27.50)	29(72.50)

Note: compared with the control group, * $P<0.05$.

表 4 两组不同时刻脑氧代谢情况对比($\bar{x}\pm s$)

Table 4 Comparison of cerebral oxygen metabolism between the two groups at different times($\bar{x}\pm s$)

Indexes	Group	Cases	T ₀	T ₁	T ₂	T ₃
S _{jv} O ₂ (%)	Study group	40	93.89± 25.31	91.67± 22.76	90.34± 23.60	94.54± 25.33
	Control group	40	91.91± 20.33	89.56± 21.75	88.66± 25.62	89.30± 26.42
CaO ₂ (ml/L)	Study group	40	131.79± 35.41	129.87± 30.60	131.65± 33.40	127.66± 29.76
	Control group	40	132.54± 29.52	126.46± 28.59	132.11± 30.39	127.54± 31.81
C _{jv} O ₂ (ml/L)	Study group	40	124.14± 16.34	119.67± 17.79	119.90± 15.47	128.21± 19.56*
	Control group	40	121.91± 18.42	116.45± 15.88	114.68± 14.50	98.70± 9.12
CERO ₂ (%)	Study group	40	35.54± 5.10	35.91± 6.19	34.04± 5.77	28.97± 3.01*
	Control group	40	32.77± 6.15	35.21± 7.99	30.66± 5.12	43.78± 12.45

Note: compared with the control group, * $P<0.05$.

表 5 两组手术指标对比($\bar{x}\pm s$)

Table 5 Comparison of operation indexes between the two groups($\bar{x}\pm s$)

Groups	Cases	Operative time(min)	Anesthesia time(min)	Transfusion volume(mL)	Recovery time(min)
Study group	40	261.09± 34.56	301.33± 42.29	3762.70± 493.21	14.55± 3.08*
Control group	40	259.49± 32.17	304.28± 11.50	3710.35± 502.65	22.36± 5.04

Note: compared with the control group, * $P<0.05$.

3 讨论

目前,临床上对于脑幕上肿瘤的主要治疗方式是手术治疗,手术能够移除肿瘤,缓解患者由于长期肿瘤对于患者脑组织的压迫造成的血液循环不畅,在最大程度上减小患者脑损伤以及脑细胞的代谢功能^[16,17]。但开颅手术治疗属于有创性的方

式,不仅会使机体处于应激状态,加速糖异生和糖元分解,造成机体血糖升高,从而血流动力学情况变差,造成脑组织血供不足,引起脑氧代谢功能下降^[18,19],增加手术风险。临床研究显示颅脑手术患者术中稳定的血流动力学,对脑组织具有一定的保护作用^[20-22],因此,通过有效的麻醉方式维持稳定的血流动力学以及脑氧代谢功能,对于产生更好的麻醉效果以及手术顺利有

重要意义。

右美托咪定是一种高选择性的 α_2 -肾上腺素受体, α_2 -肾上腺素受体被激活时, 交感神经活性降低, 中枢神经蓝斑神经元放电能力下降, 去甲肾上腺素以及肾上腺素浓度减小, 发挥的镇痛、镇静作用, 改善脑氧代谢功能^[23]。异氟醚属于强效吸入性麻醉药, 具有一定的镇痛作用, 尤其是用于颅脑手术时, 可以抑制脑组织内环磷酸腺苷 (Cyclic Adenosine monophosphate, cAMP) 增加, 减少脑脊液重吸收的阻力, 不会引起颅内压发生较大变化, 因此, 本研究对比右美托咪定和异氟醚麻醉方案对脑幕上肿瘤手术患者麻醉苏醒期血流动力学、麻醉效果、脑氧代谢以及手术指标的影响。

稳定的血流动力学对于手术麻醉效果至关重要, 尤其是对于神经外科手术, 这是因为当患者发生较大幅度的 MAP 和 HR 变化时, 尤其是在麻醉诱导时和手术结束时, 可能导致患者出现严重的脑水肿和脑出血。本研究结果显示右美托咪定能够较好的维持患者的 MAP 和 HR, T2 时 MAP 和 HR 均最低, 这可能与交感神经受到抑制, 迷走神经活性相对增强有关。右美托咪定具有较好的镇定、降低血流动力学变化幅度和血压, 同时也可以减慢心率的作用^[27,28]。脑组织血液回流直接经过颈内静脉球部, CjvO₂、CERO₂、SjvO₂、CaO₂ 等四个主要指标是临床上用于研究脑代谢情况, 反映脑氧供需平衡, 脑血流量与脑氧消耗和脑循环的情况, 是脑缺血缺氧的重要依据。脑氧代谢情况结果显示: 研究组和对照组在 T₁~T₃ 时 CjvO₂ 明显增高, CERO₂ 明显降低, 可能与术中失血、脑水肿等原因有关, 而研究组和对照组 T₀~T₃ 时 SjvO₂、CaO₂ 差异不明显, 可能是因为脑组织内增加血流循环和摄取养分等方式原因有关。Ebru 等^[23]研究发现右美托咪定改善脑氧代谢情况与其促进脑血管扩张, 从而有效增加脑血流量有关。与对照组相比, 研究组患者麻醉效果优良率较高, 苏醒时间明显缩短, 说明右美托咪定的麻醉效果优于异氟醚, 效果满意, 同时可以有效的缩短患者苏醒时间, 有助于患者恢复意识。这主要是因为右美托咪定结合 α_2 受体能力较强, 产生高选择性激动作用, 从而达到镇痛镇静的作用, 而且能够充分抑制交感神经活性, 不影响患者呼吸功能, 并对患者脑、心、肾、肺等重要器官发挥保护作用。

综上, 右美托咪定用于脑幕上肿瘤手术患者麻醉效果较好, 可以有效稳定血流动力学, 降低脑氧代谢, 缩短苏醒时间。

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(上接第 4395 页)

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