doi: 10.13241/j.cnki.pmb.2015.18.036

右美托咪啶复合芬太尼及七氟烷用于脑肿瘤手术的麻醉效果及对血流动力学的影响 *

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摘要 目的:探讨右美托咪啶复合芬太尼及七氟烷用于脑肿瘤手术的麻醉效果及对血流动力学的影响。**方法:**择期全麻下行脑肿瘤切除术患者 40 例,随机分为右美托咪啶组(D 组)和丙泊酚组(P 组)各 20 例。麻醉诱导前 D 组静脉输注右美托咪啶 0.5 μg/kg,P 组给予同等容量的生理盐水,均 15 min 泵注完成。静脉注射咪唑安定、芬太尼、顺式阿曲库铵、依托咪酯行麻醉诱导。术中均用芬太尼、七氟烷、顺式阿曲库铵维持麻醉,D 组持续静脉输注右美托咪啶 0.2~1.0 μg·kg^{-1}·h^{-1},P 组给予丙泊酚 3~10 mg·kg^{-1}·h^{-1},调整右美托咪啶及丙泊酚用量,使 BIS 值维持于 40~50。于麻醉用药前(基础值)(T0)、麻醉诱导气管插管前(T1)、气管插管后(T2)、切开硬脑膜(T3)、取瘤(T4)、术毕(T5)、拔气管导管时(T6)记录心率(HR)、血压(SBP、DBP)。记录手术时间、输液量、出血量、苏醒时间、拔管时间及拔管后 10 min 警觉 / 镇静(OAA/S)评分。**结果:**与 T0 比较,D 组 T1、T3、T4 时 SBP、DBP 明显降低(P＜0.05),HR 明显减慢(P＜0.05),但仍接近正常值,P 组 T1 时 SBP、DBP 明显降低(P＜0.05),HR 明显减慢(P＜0.05),T2、T5、T6 时 SBP、DBP 明显升高(P＜0.05),HR 明显加快(P＜0.05)。与 P 组比较,T2~T6 时 D 组 SBP、DBP 明显低于 P 组(P＜0.05),HR 明显慢于 P 组(P＜0.05)。D 组苏醒时间、拔管时间明显短于 P 组(P＜0.05),拔管后 10min OAA/S 评分显著高于 P 组(P＜0.05)。**结论:**右美托咪啶或丙泊酚复合芬太尼、七氟烷麻醉用于脑肿瘤手术均能够提供满意的麻醉效果,右美托咪啶能抑制气管插管、拔管等引起的血流动力学反应,术后苏醒快且苏醒质量高。

关键词:右美托咪啶;丙泊酚;芬太尼;七氟烷;脑肿瘤

中图分类号:R614;R739.4 **文献标识码:**A **文章编号:**1673-6273(2015)18-3540-04

Anesthesia Effect of Dexmedetomidine Combined with Fentanyl and Sevoflurane in Brain Tumor Operation and Its Influence on Hemodynamics*

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ABSTRACT Objective: To investigate the anesthesia effect of dexmedetomidine combined with fentanyl and s oflurane in brain tumor operation and its influence on hemodynamics. **Methods:** A total of 40 patients, undergoing elective brain tumor resection under general anesthesia, were randomly divided into dexmedetomidine group (D group, n=20) and propofol group (P group, n=20). Before anaesthesia, D group was treated with intravenous dexmedetomidine (0.5 μg/kg) induction, and P group, the equivalent volumes of normal saline for 15 mins. The two grups were treated with intravenous midazolam, fentanyl, CIS atracurium, etomidate for anesthesia induction. Fentanyl, sevoflurane and CIS atracurium were used to maintain the anesthesia of the two groups during the operation; then D group was given with continuous intravenous infusion of dexmedetomidine 0.2~1.0 μg·kg^{-1}·h^{-1}; while P group, propofol 3~10 mg·kg^{-1}·h^{-1}. After that, the dosage of dexmedetomidine and propofol were adjusted to keep the BIS value in 40~50. HR, SBP, DBP were recorded before anaesthesia (T0), before tracheal intubation of anesthesia induction (T1), after tracheal intubation (T2), dura mater incision(T3), taking tumor (T4), operation completing (T5), and tracheal extubation (T6); record the operation time, transfusion volume, amount of bleeding,awakening time, extubation time and the OAA/S score 10 min after extubation. **Results:** Compared with T0, the SBP, DBP were obviously cut down(P＜0.05) and HR was slower of D group at T1, T3, T4(P＜0.05), but they were still close to the normal value;while the SBP, DBP were obviously cut down(P＜0.05) and HR was slower of P group at T1(P＜0.05), and SBP, DBP obviously increased(P＜0.05) and HR was faster at T2, T5, T6(P＜0.05). SBP and DBP of D group were significantly lower than those of P group at T2~T6 (P＜0.05), and the HR was slower than P group (P＜0.05). The awakening and extubation time of D group were significantly shorter than those of P group (P＜0.05), and the OAA/S score 10 mins after extubation of D group was higher than that of P group (P＜0.05). **Conclusion:** Dexmedetomidine or propofol combined with fentanyl and sevoflurane has an excellent anesthesia effect in brain tumor operation, and dexmedetomidine can restrain the hemodynamic response caused by the tracheal intubation and extubation, with a faster

* 基金项目:海南省自然科学基金项目(2012-SZR-04-07 812170)

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(收稿日期:2014-12-02 接受日期:2014-12-30)

and high quality of postoperative awakening.

Key words: Dexmedetomidine; Propofol; Fentanyl; Sevoflurane; Brain tumor

Chinese Library Classification(CLC): R614; R739.4 Document code: A

Article ID: 1673-6273(2015)18-3540-04

前言

理想的脑肿瘤手术麻醉要求维持围术期血流动力学稳定，减少脑血流量，从而降低颅内压，且使脑组织氧供、氧需平衡达到最优化，术后苏醒快且完全，便于术后早期神经功能评估[1-3]。右美托咪啶（Dexmedetomidine）是一种新型高选择性、高特异性 α2 肾上腺受体激动剂，分布半衰期约 5 min，消除半衰期 2 h[4]，具有镇静、催眠、镇痛作用，能抑制交感神经活性，维持稳定的血流动力学，" 易唤醒 "，且无呼吸抑制[5,6]。研究表明右美托咪啶能降低脑血流量和脑代谢率，但保持中枢对 CO2 的反应性和脑血管的自主调节功能[7]，增加脑组织氧合，适于神经外科手术的麻醉[8-10]。本研究将右美托咪啶复合芬太尼、七氟烷用于脑肿瘤手术，通过观察围术期血流动力学变化和术后恢复情况，并与丙泊酚复合芬太尼、七氟烷相比较，为临床应用提供依据。

1 资料与方法

1.1 一般资料

本研究经海口市人民医院医学伦理委员会批准，并与患者、家属签署知情同意书。选择 40 例择期全身麻醉下行脑肿瘤手术患者，20~60 岁，男女不限，ASA Ⅰ~Ⅱ级，术前心功能Ⅰ~Ⅱ级。所有患者无心肺疾病，无肝、肾功能异常，亦无其他系统明显异常，无药物过敏史。采用随机数字表法，将患者随机分为 2 组（n=20）：右美托咪啶组（D 组）和丙泊酚组（P 组）。D 组年龄 21~60，平均年龄 45± 2.3；男 9 例，女 11 例；体重 48~72 kg，平均体重 56± 2.5 kg。P 组年龄 19~58，平均年龄 43± 2.2；男 11 例，女 9 例；体重 49~74 kg，平均体重 58± 2.8 kg。两组患者在年龄、性别、体重上比较无统计学差异（P＞0.05）。

1.2 麻醉方法

所有患者禁食 12 h，禁饮 6 h。术前 30 min 肌肉注射阿托品 0.5 mg、苯巴比妥纳 0.1。入室后用多功能监测仪（Datex-Ohmeda，美国）监测心电图（ECG）、心率（HR）、血压（SBP、DBP）、脉搏血氧饱和度（SPO_2）和吸入、呼出七氟烷浓度，并用脑电双频指数(bispectralindex,BIS)监测仪（Aspect 公司，美国）监测 BIS 值。建立静脉通道，30 min 输注聚明胶肽注射液 5 mL/kg。局部麻醉行左桡动脉置管监测有创收缩压（SBP）、舒张压（DBP）。行右颈内静脉穿刺置管输液。麻醉诱导前，D 组静脉输注右美托咪啶（批号：13071034，江苏恒瑞医药股份有限公司）0.5 μg/kg（用生理盐水稀释成 4 μg/ml），P 组输注同等容量的生理盐水，均在 15 min 泵注完成。静脉注射咪唑安定 0.1 mg/kg、芬太尼(批号：1131108C3，宜昌人福药业有限责任公司) 4 μg/kg，顺式阿曲库铵 0.2 mg/kg，依托咪酯 0.3 mg/kg，BIS 值≤ 50 时，气管插管，行机械通气，呼吸参数为：潮气量 8~10 mL/kg，通气频率 10~12 次 /min，吸呼比 1:2，维持呼气末二氧化碳分压（$PETCO_2$）30~35 mmHg（1 mmHg=0.133KPa）。麻醉维持两组均分别于切皮前、锯颅骨前 5 min 各静脉注射芬太尼 2 μg/kg，持续静脉输注顺式阿曲库铵 0.1 $mg\cdot kg^{-1}\cdot h^{-1}$，吸入呼气末浓度为 1.5%七氟烷（批号：44091，丸石制药株式会社，日本），D 组持续静脉输注右美托咪啶 0.2~1.0 $\mu g\cdot kg^{-1}\cdot h^{-1}$，P 组给予丙泊酚（批号：10GM1210，北京费森尤斯卡比医药有限公司）3~10 $mg\cdot kg^{-1}\cdot h^{-1}$，术中调整右美托咪啶或丙泊酚用量，使 BIS 值维持 40~50 范围内。所有患者在手术开始时，静脉输注高渗氯化钠羟乙基淀粉液 250 mL。术中使血压控制于基础值的± 30%。手术结束前约 20 min，停止使用七氟烷和顺式阿曲库铵。缝皮时，停止输注右美托咪啶和丙泊酚。手术结束时均静脉注射新斯的明 1 mg/kg 拮抗肌松剂的作用，当患者被呼名时能睁眼、能完成简单的指令动作、潮气量＞6 mL/kg、不吸氧气时 SPO_2＞95%给予拔出气管导管。拔管后在麻醉复苏室继续监测 30 min。分别记录麻醉用药前（T0）、麻醉诱导气管插管前（T1）、气管插管后（T2）、切开硬脑膜（T3）、取瘤（T4）、术毕（T5）、拔气管导管时（T6）的 HR、SBP、DBP。记录手术时间、输液量、出血量、苏醒时间（停药至呼之能睁眼时间）、拔管时间（停药至拔除气管导管时间）、拔管后 10 min 警觉 / 镇静（OAA/S）评分。

1.3 统计学处理

采用 SPSS13.0 统计软件进行统计学分析，计量资料用均数± 标准差（$\bar{x}\pm s$）表示，组间比较采用 t 检验，组内比较采用重复方差分析，P＜0.05 为差异有统计学意义。

2 结果

2.1 血流动学变化

与 T_0 比较，D 组 T_1、T_3、T_4 时 SBP、DBP 明显降低（P＜0.05），T_2、T_5、T_6 时无明显变化（P＞0.05），P 组 T1 时，SBP、DBP 明显降低（P＜0.05），而 T_2、T_5、T_6 时明显升高（P＜0.05），T3、T4 时无明显变化（P＞0.05）。与 P 组比较，T2~T6 各时点 D 组 SBP、DBP 明显低于 P 组（P＜0.05）。

与 T_0 比较，D 组 T_1、T_3、T_4 时，HR 明显减慢（P＜0.05），其余时点无明显变化（P＞0.05），P 组 T_1 时明显减慢（P＜0.05），而 T_2、T_5、T_6 时明显加快（P＜0.05），T_3、T_4 时无明显变化（P＞0.05）。与 P 组比较，T_2~T_6 时 D 组明显慢于 P 组（P＜0.05），见表 1。

2.2 两组手术情况比较

两组患者手术时间、出血量及输液量比较均无统计学差异（P＞0.05）。两组比较，D 组苏醒时间、拔管时间均显著短于 P 组（P＞0.05）。D 组拔管后 10 min OAA/S 评分显著高于 P 组（P＜0.05），见表 2。

3 讨论

本研究结果表明右美托咪啶复合芬太尼、七氟烷和丙泊酚复合芬太尼、七氟烷用于脑肿瘤手术均能提供满意的麻醉效果。丙泊酚是一种起效快，作用时间短的静脉麻醉药，可降低脑

表 1 两组患者各时点血流动力学指标比较(n=20,$\bar{x}\pm s$)

Table 1 Comparison of hemodynamics indexes of two groups at different time points (n=20, $\bar{x}\pm s$)

指标 Indexes	组别 Groups	T_0	T_1	T_2	T_3	T_4	T_5	T_6
SBP (mmHg)	D 组 D group	122.15± 11.27	100.53± 8.12*	116.44± 7.30#	105.35± 5.86*#	104.4± 6.23*#	114.60± 4.47#	121.13± 12.21#
	P 组 P group	120.70± 11.13	98.34± 8.31*	139.78± 6.11*	120.54± 8.11	113.20± 10.91	131.05± 15.51*	145.15± 14.05*
DBP (mmHg)	D 组 D group	75.65± 5.51	60.51± 5.32*	69.83± 5.61#	67.65± 6.99*#	67.25± 6.81*#	73.35± 6.41#	70.65± 6.25#
	P 组 P group	76.30± 6.81	61.37± 5.23*	90.45± 7.16*	72.90± 6.23	72.30± 4.66	80.9± 8.71*	90.24± 7.63*
HR (time/min)	D 组 D group	79.50± 4.12	63.34± 3.84*	73.54± 3.35#	66.75± 6.84*#	68.95± 5.79*#	79.55± 2.96#	80.30± 3.85#
	P 组 P group	79.95± 4.50	65.19± 4.81*	89.23± 6.14*	77.15± 4.21	79.15± 8.16	86.20± 6.13*	92.15± 4.20*

注:T_0 相比,*P＜0.05;与 P 组比较,#P＜0.05。

Note:Compared with T_0,*P＜0.05;compared with P group,#P＜0.05.

表 2 两组手术情况比较(n=20,$\bar{x}\pm s$)

Table 2 Comparison of operation status between two groups(n=20, $\bar{x}\pm s$)

组别 Groups	手术时间(min) Operation time(min)	出血量(ml) Amount of bleeding(ml)	输液量(ml) Transfusion volume(ml)	苏醒时间(min) Awakening time(min)	拔管时间(min) Extubation time(min)	OAA/S 评分 OAA/S score
D 组 D group	210.75± 42.71	409.50± 32.78	2230.00± 562.63	12.00± 3.26#	15.40± 4.07#	4.29± 0.52#
P 组 P group	219.60± 49.05	407.00± 31.65	2160.00± 709.58	18.25± 4.22	23.28± 5.45	3.58± 0.70

注:与 P 组比较,#P＜0.05。

Note:Compared with P group,#P＜0.05.

血流量和脑代谢率,同时不影响脑血流的自主调节功能[11-14]。动物实验表明右美托咪啶能抑制异氟醚或七氟醚引起的脑血管扩张作用[15]。另有研究表明右美托咪啶可引起脑血流量下降,但保持中枢对二氧化碳的反应性和脑血管的自主调节功能,增加脑组织氧合。Gune Y 等[10]的研究结果表明开颅手术中,右美托咪啶复合瑞太尼、氧化亚氮和丙泊酚复合瑞芬太尼、氧化亚氮麻醉,其脑松弛评分相似。本研究未进行脑松弛评分,亦未测颅内压,但两组患者术中手术野清晰,均未发生脑组织膨出等颅内压明显升高情况。这可能与丙泊酚、右美托咪啶降低脑血流,从而降低颅内压有关[16,17]。

神经外科手术麻醉的几个重要原则之一是维持围术期稳定的血流动力学。开颅手术血流动力学剧烈波动常发生于麻醉诱导和手术结束时。研究表明颅内肿瘤手术患者在麻醉诱导前,静脉输注右美托咪啶,能抑制气管插管反应,具有血流动力学稳定作用[18]。手术结束、麻醉苏醒期,动脉血压的突然升高,可增加开颅手术术后颅内出血的风险[19]。尤克强等[12]给予全身麻醉下行神经外科手术的高血压患者于手术结束前 30 min,静脉输注右美托咪啶能有效抑制拔管刺激引起的呼吸和血流动力学过度波动的应激反应,有效维持呼吸、循环的稳定。本研究麻醉诱导前静脉输注右美托咪啶 0.5 μg/kg, 术中以 0.2~1.0 $\mu g\cdot kg^{-1}\cdot h^{-1}$ 维持至缝皮, 结果表明右美托咪啶能抑制气管插管、拔管期引起的血流动力学反应,维持围术期血流动力学稳定,与以往的研究结果一致[20]。另外,本研究中 D 组 T_1、T_3、T_4 时 SBP、DBP 明显降低,HR 明显减慢, 但降低的幅度在临床可接受的范围,无需药物治疗。这可能与右美托咪啶抑制交感神经活性,使迷走神经活性相对增强,使血压下降、心率减慢有关。本研究结果显示 D 组苏醒时间、拔管时间较短, 苏醒质量较高。这可能与右美托咪啶激动脑内蓝斑核突触前膜 α2 受体,抑制去甲肾上腺素的释放,降低突触后膜的兴奋性,从而抑制了大脑皮层的觉醒反应,产生类似于自然睡眠的镇静、催眠作用有关。

综上所述,右美托咪啶或丙泊酚复合芬太尼、七氟烷麻醉用于脑肿瘤手术均能够提供满意的麻醉效果,右美托咪啶能抑制气管插管、拔管等引起的血流动力学反应,术后苏醒快且苏醒质量高。

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