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·临床研究·

浅低温脑灌注在体外循环下小儿室间隔缺损修补术中的应用

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[摘 要] **目的** 探讨浅低温脑灌注在体外循环下小儿室间隔缺损修补术中的应用效果。**方法** 回顾性分析2017年2月至2018年7月我院收治的81例行体外循环下小儿室间隔缺损修补术患儿的临床资料,将术中采用浅低温脑灌注治疗的43例患儿设为浅低温组,术中采用中低温下脑灌注治疗的38例患儿设为中低温组。对比2组患儿术中最低鼻咽温度,术中最低直肠温度,术中体外循环时间,术中主动脉阻断时间,术后呼吸支持时间,术后心包和纵隔引流量,麻醉前(T0)、麻醉后10 min(T1)、手术开始后20 min(T2)、手术结束时(T3)血压(BP)及心率(HR)水平变化,术中室颤,术后低血压,术后心律失常及术后短暂性神经功能障碍发生率。**结果** 浅低温组术中最低鼻咽温度、术中最低直肠温度均高于中低温组,差异有统计学意义($P<0.05$),2组术中体外循环时间、术中主动脉阻断时间、术后呼吸支持时间、术后心包和纵隔引流量比较差异无统计学意义($P>0.05$);各时刻2组间收缩压(SBP)、舒张压(DBP)、HR组间比较差异无统计学意义($P>0.05$),且2组SBP、DBP和HR水平均先下降后升高,其中T1、T2、T3时刻BP和HR水平均明显低于T0时刻($P<0.05$),T2时刻BP和HR水平均明显低于T1时刻($P<0.05$),T3时刻BP和HR水平均明显高于T2时刻,差异均有统计学意义($P<0.05$);浅低温组术后心律失常发生率与中低温组均相近,差异无统计学意义($P>0.05$),浅低温组术中室颤、术后低血压、术后短暂性神经功能障碍发生率均显著低于中低温组,差异有统计学意义($P<0.05$)。**结论** 在体外循环下小儿室间隔缺损修补术中,应用浅低温脑灌注治疗可减少术中室颤、术后低血压及术后短暂性神经功能障碍。

[关键词] 脑灌注;浅低温;中低温;小儿室间隔缺损;体外循环;室间隔缺损修补术

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Application of mild hypothermia cerebral perfusion in treatment of pediatric ventricular septal defect repair under cardiopulmonary bypass

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Abstract: Objective To explore the effect and value of mild hypothermia cerebral perfusion in treatment of pediatric ventricular septal defect repair under cardiopulmonary bypass. **Methods** Clinical data of 81 pediatric patients who were admitted into our hospital from February 2017 to July 2018 and underwent ventricular septal defect repair under cardiopulmonary bypass were retrospectively analyzed. Among them, the 43 cases treated by mild hypothermia cerebral perfusion during operation were set as the mild hypothermia group, and the other 38 cases treated by moderate hypothermia cerebral perfusion during operation were set as the moderate hypothermia group. The lowest nasopharyngeal temperature during operation, minimum rectal temperature during operation, duration of cardiopulmonary bypass, duration of intraoperative aortic occlusion, time of postoperative respiratory support, volume of postoperative pericardial and mediastinal drainage, changes of blood pressure (BP) and heart rate (HR) [before anesthesia (T0), at 10 minutes after anesthesia (T1), at 20 minutes after operation (T2), and at the end of operation (T3)], incidence of intraoperative ventricular fibrillation, postoperative hypotension, postoperative arrhythmia and postoperative transient neurological dysfunction of the two groups were compared. **Results** The lowest nasopharyngeal temperature and minimum rectal temperature during operation in the mild hypothermia group were higher than those in the moderate hypothermia group, and the differences were statistically significant ($P<0.05$). There was no statistically significant difference in duration of cardiopulmonary bypass, duration of intraoperative aortic occlusion, time of postoperative respiratory support, volume of postoperative pericardial and mediastinal drainage between the two groups ($P>0.05$). There was no significant difference in systolic blood pressure (SBP), diastolic blood pressure (DBP), and HR between the two groups at any point-in-time ($P>0.05$). The levels of SBP, DBP and HR in the two groups decreased first and then increased. BP and HR levels at T1, T2, T3 were significantly lower than those at T0 ($P<0.05$); BP and HR levels at T2 were significantly lower than those at T1 ($P<0.05$), while BP and HR levels at T3 were significantly higher than those at T2 ($P<0.05$). The incidence of postoperative arrhythmia in the mild hypothermia group was similar to that in the moderate hypothermia group without statistically significant differences ($P>0.05$). The incidences of intraoperative ventricular fibrillation, postoperative hypotension and transient neurological dysfunction in the mild hypothermia group were significantly lower than those in the moderate hypothermia group with statistically significant differences ($P<0.05$). **Conclusion** During the pediatric ventricular septal defect repair under cardiopulmonary by-

pass, the application of mild hypothermia cerebral perfusion can reduce the intraoperative ventricular fibrillation, postoperative hypotension and postoperative transient neurological dysfunction.

Keywords: cerebral perfusion; mild hypothermia; moderate hypothermia; pediatric ventricular septal defect; cardiopulmonary bypass; ventricular septal defect repair

室间隔缺损是临床常见的先天性心脏病,可严重影响心脏功能。室间隔缺损占小儿先天性心脏病的25% ~40%,是常见的死因[1]。室间隔缺损修补术是此类患儿临床常用的治疗手段,在体外循环下实施室间隔缺损修补术可保护其脏器功能[2]。手术过程中局部停止循环可造成重要器官发生缺血缺氧性损伤,易增加术后心输出量低及脑功能损伤的风险,低温脑灌注可有效保护大脑及心功能,但临床上针对具体灌注条件仍有争议[3-4],浅低温与中低温脑灌注哪一种方法更优尚无定论。因此,本研究通过回顾性分析于我院接受浅低温与中低温脑灌注体外循环下行修补术的室间隔缺损患儿的临床资料,对比2组患儿术中术后循环及神经功能,探究更优的灌注条件,以期为室间隔缺损患儿治疗方案的选择提供参考。

1 资料与方法

1.1 临床资料

回顾性分析2017年2月至2018年7月我院收治的81例小儿室间隔缺损实施体外循环下修补术患儿的临床资料,将其中43例术中采用浅低温脑灌注治疗的患儿设为浅低温组,将38例术中采用中低温下脑灌注治疗的患儿设为中低温组。比较2组患儿的临床资料,差异无统计学意义($P > 0.05$),具有可比性(表1)。本研究经我院伦理委员会审批通过。

表1 患儿临床资料比较

组别	n	性别		年龄	体质量	心胸比率	心功能[例(%)]		室间隔缺损	室间隔缺损类型[例(%)]		
		男	女	(岁)	(kg)	(%)	Ⅰ级	Ⅱ级	直径(cm)	膜周型	干下型	混合型
浅低温组	43	23(53.49)	20(46.51)	3.12±0.56	14.51±3.62	0.55±0.03	25(58.14)	18(41.86)	1.12±0.30	26(60.47)	15(34.88)	2(4.65)
中低温组	38	20(52.63)	18(47.37)	3.10±0.55	14.53±3.65	0.56±0.04	22(57.89)	16(42.11)	1.14±0.31	24(63.16)	12(31.58)	2(5.26)
χ^2/t		0.006		0.162	0.025	1.282	0.000		0.295	0.062	0.099	0.150
P		0.939		0.872	0.980	0.204	0.982		0.769	0.803	0.753	0.699

纳入标准:确诊为室间隔缺损且符合体外循环下室间隔缺损修补术治疗指征;术中实施连续脑灌注治疗;有完整的临床资料[5]。排除标准:合并其他类型发育畸形或功能障碍;高度可疑神经系统功能障碍;伴有颅脑损伤或其他类型脑部疾病;合并其他系统慢性疾病;家属拒绝对其临床资料进行调阅。

1.2 方法

所有患儿术前均给予常规检查,控制肺动脉高压,围术期预防性应用抗生素。取平卧位,实施全身麻醉,于胸骨正中做切口,将心包打开提吊扩大暴露,肝素化处理,近心包返折位置处插入主动脉管,排气后接主动脉灌注管,经过右心耳将引流管插入上腔静脉,经右心房外侧壁下方将下腔静脉引流管插入,于主动脉根部插入心脏停搏液灌注针,排气后与冷停搏液灌注装置相连接。开始转流后降温,根据体表温度和体表面积控制灌注流量,将平均灌注压维持在30 ~50 mmHg。浅低温组于浅低温下阻断升主动脉以及上下腔静脉,具体操作:将鼻咽温度控制在32 ~34 ℃,腋下温度控制在30 ~32 ℃;中低温组于中低温下阻断升主动脉以及上下腔动脉,具体操作:将鼻咽温度控制在28 ~32 ℃,腋下温度控制在26 ~30 ℃。患儿术中均实施顺行性脑灌注治疗,术中平均动脉压均维持在50.25 ~60 mmHg,术中灌注压为30 ~40 cm H_2O。经主动脉根部灌入冷晶体心脏停搏液,待心脏停跳后在其表面覆盖冰屑。若属于膜周型缺损则经右房入路进行修补治疗(缺损直径 <1 cm,则采用带垫片缝线进行间断褥式缝合操作将缺损关闭,外加荷包缝合加强,缺损直径≥1 cm,则采用补片进行间断缝合修补,所选补片为自体心包片);若属于干下型缺损或混合型缺损,则采用经右室流出道纵切口入路进行修补治疗(采用补片进行间断缝合修补,所选补片为自体心包片)。缺损修补完成后复温,排气,心脏复跳,若出现室颤,则需除颤。放置心包、纵隔引流管,关胸。

1.3 观察指标

对比2组术中最低鼻咽温度、术中最低直肠温度、术中体外循环时间、术中主动脉阻断时间、术后呼吸支持时间、术后心包和纵隔引流量。对比2组围术期血压(blood pressure, BP)、心率(heart rate, HR)水平变化,分别于麻醉前(T0)、麻醉后10 min(T1)、手术开始后20 min(T2)、手术结束时(T3)采用生命体征监护仪测得上述生命体征指标变化,并做好记录;对比2组术中室颤、术后低血压、术后心律失常、术后短暂性神经功能障碍发生率。

1.4 统计学分析

采用 SPSS 23.0 软件分析数据,计量资料($\bar{x} \pm s$)以重复测量方差分析,每两个样本间对比以 LSD-t 检验,每两个时刻间对比以配对 t 检验;两样本间计量资料采用独立样本 t 检验;计数资料以率(%)表示,采用 χ^2 检验,若理论频数为 1 ~5 则需校正,若为 0 则需采用 Fisher 精确检验。$P<0.05$ 为差异有统计学意义。

2 结果

2.1 围术期指标对比

浅低温组术中最低鼻咽温度、术中最低直肠温度均高于中低温组,差异具有统计学意义($P<0.05$);术中体外循环时间、术中主动脉阻断时间、术后呼吸支持时间、术后心包和纵隔引流量比较,2 组差异无统计学意义($P>0.05$),见表 2。

表 2 患儿围术期指标比较($\bar{x} \pm s$)

组别	n	术中最低鼻咽温度(℃)	术中最低直肠温度(℃)	术中体外循环时间(min)	术中主动脉阻断时间(min)	术后呼吸支持时间(d)	术后心包和纵隔引流量(mL)
浅低温组	43	31.03 ±1.15	34.20 ±0.86	52.83 ±9.56	49.86 ±5.63	1.68 ±0.31	85.06 ±3.17
中低温组	38	29.16 ±1.02	32.10 ±0.72	51.33 ±9.87	49.23 ±5.48	1.72 ±0.35	86.23 ±3.22
t		7.698	11.827	0.694	0.509	0.546	1.646
P		0.000	0.000	0.490	0.612	0.587	0.104

2.2 围术期 BP、HR 水平对比

各时刻 2 组间收缩压(SBP)、舒张压(DBP)、HR 组间比较差异无统计学意义($P>0.05$),时间和交互比较差异均有统计学意义($P<0.05$),且 2 组 SBP、DBP 和 HR 水平均先下降后升高,其中 T1、T2、T3 时刻 BP 和 HR 水平均明显低于 T0 时刻($P<0.05$),T2 时刻 BP 和 HR 水平均明显低于 T1 时刻($P<0.05$),T3 时刻 BP 和 HR 水平均明显高于 T2 时刻,差异均有统计学意义($P<0.05$),见表 3。

表 3 围术期 BP、HR 水平对比($\bar{x} \pm s$)

组别	n	SBP(mmHg)				DBP(mmHg)				HR(次/分钟)			
		T0	T1	T2	T3	T0	T1	T2	T3	T0	T1	T2	T3
浅低温组	43	130.62 ±7.53	121.28 ±7.66 *	110.88 ±7.09 *#	121.86 ±7.85 *△	84.51 ±5.60	75.74 ±5.02 *	69.82 ±6.06 *#	75.61 ±5.41 *△	130.62 ±7.53	121.28 ±7.66 *	110.88 ±7.09 *#	121.86 ±7.85 *△
中低温组	38	130.86 ±7.66	121.32 ±7.57 *	110.83 ±7.10 *#	121.93 ±7.50 *△	84.42 ±5.58	75.53 ±5.10 *	69.74 ±6.11 *#	75.46 ±5.50 *△	130.86 ±7.66	121.32 ±7.57 *	110.83 ±7.10 *#	121.93 ±7.50 *△
F		1.032				1.125				1.967			
P		0.375				0.368				0.183			

*:与组内 T0 时刻比较,$P<0.05$;#:与组内 T1 时刻对比,$P<0.05$;△:与组内 T2 时刻对比,$P<0.05$

2.3 术中和术后并发症发生率对比

浅低温组术中室颤、术后低血压、术后短暂性神经功能障碍发生率均显著低于中低温组($P<0.05$);2 组术后心律失常发生率比较,差异无统计学意义($P>0.05$),见表 4。

表 4 术中和术后并发症发生率对比[例(%)]

组别	n	术中室颤	术后低血压	术后心律失常	术后短暂性神经功能障碍
浅低温组	43	1(2.33)	1(2.33)	1(2.33)	0(0)
中低温组	38	7(18.42)	7(18.42)	3(7.89)	6(15.79)
χ^2		4.202	4.202	0.410	5.211
P		0.040	0.040	0.522	0.022

3 讨论

室间隔缺损患儿在体外循环下修补术治疗期间会出现许多非生理性变化,如低循环量、血液稀释、低体温、脑损伤等,造成这些情况的原因与小儿脏腑娇嫩、多个系统器官发育尚不成熟、功能尚不完善、体液调节能力相对较差、手术可造成严重的创伤性应激反应等有关,对患儿的手术效果和生命安全均会造成极大的影响[6-8]。充分的脑保护是主动脉手术成功的关键因素之一,单独低温体外循环技术可导致中枢神经系统及内脏器官的损伤,因而临床提倡将低温与脑灌注治疗结合应用于体外循环手术中[9-10]。

低温状态下机体代谢水平降低,此状态不仅可有效抑制手术应激反应,降低心肌细胞及脑组织需氧量,还可明显减轻缺氧缺血造成的重要器官损伤,同时体外循环过程中灌注血与机体血有一定温差,低温灌注可平衡这种温差,使机体内环境温度相对稳定,避免环境改变引起的术后周围血管痉挛及微循环障碍等并发症[11]。低温下连续脑灌注治疗既能够控制脑代谢,延长脑缺血时间,还可延长主动脉远端吻合时间,为手术提供无血视野,是当前临床上常用的脑保护技术[12]。但体温过低易影响机体正常生理功能,造成凝血功能不足,毛细血管渗漏,循环血量降低等,进一步影响心肌细胞收缩功能,导致细胞组织供氧能力下降,尤其针对低龄患儿,灌注温度过低可能使外周循环系统发生

无复流现象,加重心肌缺血/再灌注损伤,引起心脏室颤,造成心脏负担更大,严重影响手术效果[13]。近年来,浅低温脑灌注与中低温脑灌注手术方式的提出有效缓解了深低温造成的心功能及凝血功能损伤。浅低温通常是指将停循环温度控制在30 ℃左右,中低温脑灌注则将停循环温度维持在24 ~28 ℃之间,与传统深低温低于24 ℃的环境比较,浅低温脑灌注和中低温脑灌注均能明显缩短升降温流转时间,避免流转时间过长造成的重要脏器功能损伤等不良反应,对实施体外循环下室间隔缺损修补术发挥一定的保护性治疗作用,但哪一种灌注条件更适用于小儿室间隔缺损仍需深入探讨,本研究通过分析二者的优劣,以期为此类患儿提供更理想的治疗方案。

浅低温和中低温脑灌注在治疗期间对鼻咽温度和腋下温度的控制范围要求不同,因而术中最低鼻咽温度也有明显差异。本研究显示,浅低温组术中最低鼻咽温度、术中最低直肠温度均明显高于中低温组,表明体外循环下室间隔缺损修补术中浅低温脑灌注治疗可提高术中最低鼻咽和直肠温度,避免术中鼻咽和直肠温度过低。此外,本研究中2组患儿BP和HR均呈现出先降低后升高的趋势,证实麻醉和手术创伤均可导致BP和HR的波动。主动脉手术患儿围术期BP、HR和血流动力学等指标均可出现不同程度的波动,血流动力学等指标的改变可能影响灌注过程脑局部组织氧浓度及代谢过程,同时对于复杂的心脏手术,以上指标若出现异常均会延缓术后心功能的恢复,对手术效果及患者预后影响较大,因此脑灌注过程中应密切关注BP、HR和血流动力学等指标,将上述指标水平控制在理想的范围内才能尽可能减轻其对机体中枢神经和重要脏器造成的不良影响[14]。

本研究中,浅低温组术中室颤、术后低血压和术后短暂性神经功能障碍发生率均显著低于中低温组,提示浅低温脑灌注应用于室间隔缺损患儿体外循环下修补术,可显著降低上述不良事件的发生风险。研究显示,主动脉手术中低温下脑灌注治疗期间若设置温度过低,会增加术中室颤的发生风险[15-17]。主动脉手术中浅低温脑灌注治疗者术中室颤的发生率明显低于中低温下脑灌注治疗者,且中低温下脑灌注治疗者术中室颤的发生率明显低于深低温下连续脑灌注治疗者[18],本研究结果与上述报道相符。关于浅低温脑灌注对术后短暂性神经功能障碍发生率的影响,裴华伟等[19]认为浅低温和中低温下脑灌注治疗者术后短暂性神经功能障碍的发生率相近,结论与本研究不符。分析原因可能与选择的病例不同有关,该研究所选病例为主动脉弓部手术患者,而本研究所选病例均为室间隔缺损患儿。

综上所述,在体外循环下室间隔缺损修补术中建议采用浅低温脑灌注治疗,其可显著控制术中室颤、术后低血压和术后短暂性神经功能障碍发生率,维持术中鼻咽和直肠温度。

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·临床研究·

前方肌肉间隙入路髋关节置换术的疗效观察

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[摘 要] **目的** 探讨前方肌肉间隙(OCM)入路髋关节置换术临床应用价值。**方法** 选取2017年1月至2018年1月于本院行髋关节置换术的68例患者作为研究对象,根据手术方式不同将其分为观察组和对照组,每组34例。对照组行传统髋关节置换术治疗,观察组行OCM入路髋关节置换术治疗,比较2组患者围术期指标,包括手术时间、术中出血量、手术切口长度、术后下床时间、住院时间等;采用Harris评分和WOMAC评分量表评估患者关节功能改善情况。**结果** 患者手术时间组间比较差异无统计学意义($P>0.05$),观察组患者在术中出血量、手术切口长度、术后下床时间、住院时间方面明显优于对照组,差异有统计学意义($P<0.05$)。术前2组患者Harris评分及WOMAC评分比较,差异无统计学意义($P>0.05$);术后1周、12个月观察组Harris评分及WOMAC评分均明显高于对照组,差异有统计学意义($P<0.05$)。**结论** OCM入路微创髋关节置换术具有创伤小、术后恢复快、预后质量高等优点,适用于多数髋关节疾病患者。

[关键词] 肌肉间隙;髋关节置换术;切口长度;手术入路;预后质量

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Therapeutic effect of anterior muscle space approach for hip arthroplasty

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Abstract: Objective To explore the clinical value of hip arthroplasty with anterior muscle space approach, namely the Orthopäedische Chirurgie Müenchen (OCM) approach. **Methods** Totally 68 patients who underwent hip arthroplasty in our hospital from January 2017 to January 2018 were selected as the research objects. They were divided into the observation group and the control group according to different surgical methods, with 34 cases in each group. The control group received conventional hip replacement surgery, and the observation group received OCM approach hip replacement surgery. The perioperative indicators of the two groups were compared, including the operation time, intraoperative blood loss, surgical incision length, postoperative time of getting out of bed, length of hospital stay. The Harris score and WOMAC scale were used to evaluate the improvement of joint function. **Results** There was no significant difference in operative time between the two groups ($P>0.05$); the intraoperative blood loss, surgical incision length, postoperative time of getting out of bed, length of hospital stay of the observation group were significantly better than those in the control group, and the differences were statistically significant ($P<0.05$).

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