

doi: 10.13241/j.cnki.pmb.2014.07.024

不同灌注方法对原位肝移植麻醉的临床效果分析*

董刚 任波[△] 郭晓东 徐晨 刘芳婷 李晶 刘霞 毕振华 刘振文

(解放军第302医院 北京 100039)

摘要 目的:观察下腔静脉逆灌注法与常规门静脉正向灌注法应用于经典非转流原位肝移植手术的临床效果,并比较两种灌注法对新肝期再灌注后综合征的影响。**方法:**回顾性分析我院行经典非转流肝移植手术的患者60例,按照灌注方法的不同分为两组:A组(30例)采用下腔静脉逆灌注法;B组(30例)采用门静脉正向灌注法。比较两组患者围手术期的血流动力学指标、体温、内环境的改变等情况。**结果:**①分别在新肝开放即刻、新肝期5分钟及15分钟观察两组患者的平均动脉压、肺动脉压楔压、心率变化程度及心脏指数,A组均小于B组,差异有统计学意义($P<0.05$);②分别于新肝期5分钟及15分钟观察两组患者的中心静脉压,A组低于B组($P<0.01$);③观察开放时两组患者的最低温度,A组高于B组($P<0.01$);④观察血管活性药物用量,A组少于B组,差异有统计学意义($P<0.05$)。**结论:**经典非转流肝移植术中,采取逆灌注方法可减少术后再灌注综合征的发生。两种灌注方式均需要加强对血流动力学、体温、酸碱平衡的监测与调整,做到针对性的麻醉管理。

关键词:经典非转流肝移植;麻醉;灌注方法;再灌注综合征

中图分类号:R575 文献标识码:A 文章编号:1673-6273(2014)07-1297-03

Clinical Analysis about Different Methods of Retrograde Perfusion for Anesthesia on the Orthotopic Liver Transplantation*

DONG Gang, REN Bo[△], GUO Xiao-dong, XU Chen, LIU Fang-ting, LI Jing, LIU Xia, BI Zhen-hua, LIU Zhen-wen

(302 Hospital of PLA, Beijing, 100039, China)

ABSTRACT Objective: To observe the applications of different retrograde perfusion methods on the orthotopic liver transplantation without venous bypass, and to compare the clinical effects on the post reperfusion syndrome. **Methods:** Sixty patients with orthotopic liver transplantation who were treated in our hospital were selected and randomly divided into two groups according to different perfusion methods. Group A with 30 cases, were unclamped before portal anastomosis, while group B with another 30 cases were performed the normal perfusions via portal veins. The hemodynamic parameters, body temperature, changes of internal environment and fluid therapy of patients were compared between the two groups. **Results:** ① The changes in systolic blood pressure, diastolic blood pressure and heart rate in group A were less than those of group B at the beginning of neohepatic phase, the fifth minutes and the fifteenth minutes respectively, and there were statistically significant differences between two groups($P<0.05$); ② The central venous pressure was significantly lower than that of group B at the fifth and tenth minutes of neohepatic phase, and there was statistically significant difference between two groups ($P<0.05$); ③ At the early neohepatic stage, the body temperature in group A were significantly lower than that of the group B. ④ The requirement of vasoactive drugs in the group A was significantly smaller than that of the group B, and there was statistically significant difference between two groups ($P<0.05$). **Conclusion:** Compared with traditional perfusion, the retrograde perfusion in the orthotopic liver transplantation is more useful to relieve the post reperfusion syndrome. It is suggested that the hemodynamics, body temperature, and internal environment should be emphasized to monitor and regulate the OLT.

Key words: Orthotopic liver transplantation; Anesthesia; Reperfusion; Post-reperfusion syndrome

Chinese Library Classification(CLC): R575 **Document code:** A

Article ID: 1673-6273(2014)07-1297-03

前言

肝移植手术(Liver transplantation)作为治疗终末期肝脏疾病的有效手段,其手术方式和麻醉管理技术已逐渐形成标准化,手术成功率也不断提高^[1]。但再灌注损伤仍然是肝脏移植围手术期最为常见的并发症之一,临床上再灌注综合征的发生率

高达30%^[2]。目前,临床上正在努力尝试减少再灌注后综合征发生率的有效麻醉方法方式,但大多数患者在术后还是会出现不同程度的血流动力学改变,其中以血压下降为主^[3,4]。有研究报告^[5],在供体腔静脉吻合完成后,立即开放腔静脉吻合,腔静脉血逆行灌注肝脏的方法可减轻再灌注损伤的程度。本研究通过比较两种不同灌注方法对患者围手术期血流动力学指标的变

* 基金项目:院长创新基金项目(YNKT2010011)

作者简介:董刚(1976-),男,硕士,主治医师,主要研究方向:肝硬化,肝移植麻醉的基础与临床研究

[△] 通讯作者:任波, E-mail: laohushanshang@163.com

(收稿日期:2013-05-12 接受日期:2013-06-11)

化、内环境的改变及药物治疗等方面的差异,探索减少再灌注综合征发生率的有效方法。现将具体结果汇报如下:

1 资料与方法

1.1 一般资料

选取 2009 年至 2011 年间我院收治的择期首次实施肝移植手术的患者 60 例,随机分为两组,A 组(30 例)采用下腔静脉

逆灌注法;B 组(30 例)采用门静脉正向灌注法。A 组中,男 24 例,女 6 例,平均年龄为 47 ± 13 岁;B 组中,男 23 例,女 7 例,平均年龄为 49 ± 9 岁。两组患者的年龄、性别等一般资料无统计学差异,有可比性。详见表 1。

再灌注综合征判定标准:新肝期最初 5 分钟内,血流动力下降 $>30\%$,并持续至少 1 分钟。

表 1 肝移植患者的一般资料

Table 1 General information of patients with liver transplantation

Group	Sex		Age		Primary diseases		Child-Pugh		
	Male	Female		BMI(Kg/m ²)	Hepatocellular carcinoma	Cirrhosis	A	B	C
Group A	24	6	47 ± 13	25 ± 4	11	19	5	12	13
Group B	23	7	49 ± 9	24 ± 4	14	16	5	13	12

1.2 手术方式

1.2.1 A 组手术方法 经典原位肝移植:完成供、受体肝上下腔静脉吻合后,在吻合门静脉前先开放肝上下腔静脉,使腔静脉的血逆行灌注入肝脏,自供肝门静脉放血后阻断供肝门静脉,然后依次吻合门静脉、肝动脉。

1.2.2 B 组手术方法 按常规经典原位肝移植方法依次吻合供受体肝上下腔静脉、肝下下腔静脉、门静脉,然后依次开放门静脉、肝上下腔静脉、肝下下腔静脉,最后吻合肝动脉。

1.3 麻醉与监测

患者进入手术室后,连接心电图,监测无创血压和脉搏血氧饱和度,面罩吸氧,桡动脉穿刺置管连续监测动脉压。麻醉诱导采用静脉注射咪唑安定 $20-60 \mu\text{g/kg}$,瑞芬太尼 $2 \mu\text{g/kg}$,异丙酚 $1-2 \text{ mg/kg}$,罗库溴铵 50 mg ,气管插管后接麻醉机行机械通气。麻醉维持以罗库溴铵,异氟醚持续吸入,瑞芬太尼持续泵入;经右颈内静脉置入六腔 Swan-Ganz 漂浮导管;连续监测平均动脉压、心率、中心静脉压、肺动脉压楔压和心脏指数,记录不同时间点的血流动力学参数及再灌注综合征的发生情况。以液体容量调节为主,血管活性药物为辅;必要时应使用适量的去氧肾上腺素或去甲肾上腺素维护患者血管的循环功能;监测并及时调整血气、电解质、血糖、血常规、凝血等情况。保温措施:患者身下垫保温毯,下肢覆盖热风毯,上肢用棉垫包裹,头部加保温罩,输入保温液体,输血管路连接加温仪等。监测鼻咽温和血温,保持体温在 36°C 以上。

1.4 统计学方法

应用 SPSS 13.0 统计软件进行分析。计量资料以均数 $\pm$ 标准差($\bar{x} \pm s$)表示,组间比较采用两独立样本 t 检验,计数资料比较采用 χ^2 检验,以 $P < 0.05$ 为差异有统计学意义。

2 结果

两组患者的血流动力学指标的变化情况:①新肝开放即刻,新肝期 5、15、30 min,A 组患者的收缩压、舒张压、心率变化程度均小于 B 组($P < 0.05$);②新肝期 5、15 min,A 组患者中心静脉压低于 B 组($P < 0.05$);③开放时最低温度,A 组高于 B 组,

($P < 0.01$),见表 2;④血管活性药物用量,A 组少于 B 组($P < 0.05$),见表 3。

3 讨论

肝移植术再灌注期,患者容易出现一系列的血流动力学改变和心脏功能的剧烈变化等紧急情况,严重的可导致患者术中死亡^[58]。目前研究尚未明确再灌注综合征发生的具体原因,但有研究认为其与患者术前的心脏功能状况有关,还有研究认为其与高钾血液的突然回流、肺栓塞、术中 Ca^{2+} 缺失、细胞因子及供肝内血管活性物质的释放而引起的交感神经抑制等因素有关^[7,9,10]。

为了维持新肝期血流动力学的稳定,我们首先尝试改进手术方式^[11,13]。但有研究已证实,静脉-静脉转流并不能减少再灌注综合征的发生,而背驮式肝移植术中,虽然患者的血流动力学相对稳定,但再灌注损伤的发生率仍然可达 25% 左右^[12]。此外,包括缺血预处理、血液灌注、保存液灌注以及逆灌注等针对供肝保护、冲洗及灌注方法也不断被尝试^[15-17]。

与传统灌注方法^[18]相比,下腔静脉逆行灌注法的优势在于不仅可以缩短下腔静脉系统瘀血的时间,减轻患者的下肢、肾及盆腔脏器因缺血缺氧而产生的异常代谢产物对循环系统的影响,而且通过腔静脉向门静脉产生一定量血液的逆灌注可将肝内的低温高钾灌注液及供肝保存期间产生的血管活性物质有效的进行中和或冲洗排出体外。本文通过对经典非转流肝移植术中采用下腔静脉逆灌注法的效果进行分析,结果表明逆灌注法明显缩短下腔静脉的阻断时间,更加易于维持新肝期血流动力学的稳定,再灌注综合征的发生率也明显降低。相关动物实验表明,逆灌注可以有效的冲洗供肝无氧代谢产生的有毒物质,减轻缺血再灌注损伤的程度^[14]。逆灌注的血液成分有利于新肝细胞功能的恢复^[19],即使是肝的代谢、解毒功能的部分恢复也有助于肝内毒性物质的清除。通过血液逆灌注法^[20],可提前填充肝脏内容量,等门脉开放后,既不会引发血容量的突然减少,还有利于维持血流动力学的稳定,减少药物干预。

综上所述,经典非转流肝移植术中巧妙的采用下腔静脉逆灌注法减少有害物质的产生,促进其清除,有助于减轻新肝期

表 2 两组患者血流动力学变化情况($\bar{x} \pm s$)

Table 2 Situations of Hemodynamic parameters of patients in two groups

	Group	CVP(mmHg)	MAP(mmHg)	HR(times/min)	PAWP(mmHg)	CO(L/min)
无肝前期	A	8.89± 2.24	80.01± 10.27	84.89± 13.55	14.42± 3.07	8.75± 2.52
Pre anhepatic	B	8.91± 2.23	78.81± 10.78	85.28± 13.46	14.38± 3.12	8.71± 2.52
无肝期 5min	A	5.23± 1.18	68.39± 11.12	91.78± 12.60	8.26± 2.46	6.27± 1.49
Anhepatic(5min)	B	5.21± 1.21	68.41± 11.10	91.74± 12.62	8.25± 2.47	6.21± 1.57
无肝期 30 min	A	4.76± 1.35	74.21± 10.26	104.07± 13.04	8.16± 2.98	6.58± 1.68
Anhepatic(30min)	B	4.73± 1.37	73.26± 10.25	103.88± 13.10	8.15± 2.99	6.57± 1.68
新肝期即刻	A	9.16± 3.05 [□]	61.46± 7.64 [■]	84.16± 10.06 [□]	12.48± 3.14 [□]	6.72± 1.72
Neohepatic	B	10.41± 3.61	51.46± 7.64 [■]	98.88± 12.04	15.484± 3.1	6.71± 1.72
新肝期 5 min	A	10.95± 2.46 [□]	65.45± 9.31 [□]	86.26± 10.48 [□]	20.15± 3.78 [□]	7.97± 2.45*
Neohepatic(5min)	B	12.64± 2.54 [■]	54.45± 9.31 [■]	92.46± 11.48	24.05± 3.95	7.57± 2.33
新肝期 15 min	A	10.92± 2.48 [□]	75.35± 9.36 [□]	83.22± 9.78 [□]	20.01± 3.45*	9.12± 3.12*
Neohepatic(15 min)	B	12.44± 2.61	63.49± 12.51	90.50± 11.90	22.05± 3.46	8.48± 3.12
新肝期 30 min	A	10.01± 2.42*	76.85± 12.01 ^{□#}	82.16± 9.72*	18.17± 2.89 [□]	9.98± 3.61
Neohepatic(30 min)	B	11.43± 2.71	64.49± 12.71	87.15± 12.32	21.79± 2.84	9.78± 3.64

Note: *P<0.05, [□] P<0.01 vs control group; # P<0.05, [■] P<0.01 vs Pre anhepatic phase.

表 3 两组患者药物干预血管活性的变化情况($\bar{x} \pm s$)

Table 3 Changes of vascular activity of patients in two groups after intervention with drugs

	Group	Anhepatic	Neohepatic	Neohepatic(15min)	Neohepatic(30min)
Ca ²⁺	A	1.06± 0.21	0.99± 0.17	1.02± 0.14	1.26± 0.11
(mmol/L)	B	1.07± 0.19	1.00± 0.16	1.03± 0.15	1.24± 0.12
BE	A	0.1± 2.2	-2.7± 2.1 [□]	-4.8± 2.3 [□]	1.1± 2.2
(mmol/L)	B	0.5± 2.1	-3.6± 2.2	-6.4± 2.3	1.5± 2.4
去氧肾上腺素	A	280± 70	240± 60*	40± 10	10± 5
Phenylephrine(μg)	B	280± 80	280± 90	40± 10	10± 5
去甲肾上腺素	A	0.14± 0.06	0.23± 0.07 [□]	0.24± 0.08 [□]	0.18± 0.07
Norepinephrine(μg·kg ⁻¹ ·min ⁻¹)	B	0.15± 0.07	0.30± 0.06	0.33± 0.07	0.21± 0.07

Note: *P<0.05, [□] P<0.01.

再灌注综合征的发生。

参考文献(References)

- [1] Bruhl SR, Vetteth S, Rees M, et al. Post-reperfusion syndrome during renal transplantation: a retrospective study [J]. Int J Med Sci, 2012, 9 (5): 391-396
- [2] Knicpcissd, Iberer F, Grasser B, et al. A single- center experience with retrograde reperfusion in liver transplantation[J]. Transpl int. 2003, 16 (10): 730-735
- [3] 任波,郭晓东,刘树红,等. 异丙酚麻醉对肝叶切除患者肝功能与炎症细胞因子的影响[J]. 现代生物医学进展, 2013, 13(07): 1304-1306
Ren Bo, Guo Xiao-dong, Liu Shu-hong, et al. Effect of Propofol on the Liver Function and Inflammatory Factors in Patients Undergoing Hepatectomy[J]. Progress in modern biomedicine, 2013, 13(07): 1304-1306
- [4] Lentschener C, Roche K, Ozier Y. A review of aprotinin in orthotopic liver transplantation: can its harmful effects offset its beneficial effects [J]. Anesthesia and Analgesia, 2005, 100(5): 1248-1255
- [5] 任波, 郭晓东, 刘树红, 等. 右美托咪啶对全麻行肝叶切除患者麻醉恢复期躁动的影响[J]. 现代生物医学进展, 2013, 13(11): 2093-2095
Ren Bo, Guo Xiao-dong, Liu Shu-hong, et al. Right Dexmedetomidine Anesthesia Line Lobe Resection Recovery from Anesthesia in Patients with Restless [J]. Progress in Modern Biomedicine, 2013, 13 (11): 2093-2095
- [6] Chung IS, Kim HY, Shin YH, et al. Incidence and predictors of post-reperfusion syndrome in living donor liver transplantation [J]. Clin Transplant, 2012, 26(4): 539-543
- [7] Fukazawa K, Pretto EA. The effect of methylene blue during orthotopic liver transplantation on post reperfusion syndrome and postoperative graft function[J]. J Hepatobiliary Pancreat Sci, 2011, 18(3): 406-413
- [8] Bezinover D, Kadry Z, McCullough P, et al. Release of cytokines and hemodynamic instability during the reperfusion of a liver graft[J]. Liver Transpl, 2011, 17(3): 324-330

(下转第 1364 页)

- uc Pract, 2012, 12(3): 133-1338
- [11] 刘利敏, 郭晓东, 江岚, 等. 人性化管理在特需护理工作中的应用[J]. 现代生物医学进展, 2013, 13(23): 4565-4567
Liu Li-min, Guo Xiao-dong, Jiang Lan, et al. The application of harmonized management on the special wards[J]. Progress in Modern Biomedicine, 2013, 13(23): 4565-4567
- [12] 刘利敏, 郭晓东, 江岚, 等. 特需病房护理工作面临的问题及对策[J]. 现代生物医学进展, 2013, 13(24): 4770-4772
Liu Li-min, Guo Xiao-dong, Jiang Lan, et al. Problems and solutions of special wards in hospitals [J]. Progress in Modern Biomedicine, 2013, 13(24): 4770-4772
- [13] 武洋, 王梁敏, 何蓓, 等. 影响住院患者护理需求的因素分析[J]. 现代生物医学进展, 2012, 12(25): 4927-4930
Wu Yang, Wang Liang-min, He Bei, et al. Analysis of the influencing factors on inpatients nursing care needs[J]. Progress in Modern Biomedicine, 2012, 12(25): 4927-4930
- [14] 冯宇, 郭晓东, 张瑞, 等. 快速流程管理对老年直肠癌术后康复的影响[J]. 现代生物医学进展, 2013, 13(10): 1930-1932
Feng Yu, Guo Xiao-dong, Zhang Rui, et al. The effect of rapid process management on the postoperative rehabilitation of elderly rectal cancer[J]. Progress in Modern Biomedicine, 2013, 13(10): 1930-1932
- [15] Akazawa C, Nishizono T, Yamamoto M, et al. Investigation of actual daily lifestyle leading to continuous self-management after living-donor liver transplantation: More than 5 years living with living-donor liver transplantation and emotions of recipients [J]. Jpn J Nurs Sci, 2013, 10(1): 79-88
- [16] Schlegel C, Woermann U, Shaha M, et al. Effects of communication training on real practice performance: a role-play module versus a standardized patient module[J]. J Nurs Educ, 2012, 51(1): 16-22
- [17] Bertolotti P, Bilotti E, Colson K, et al. Management of side effects of novel therapies for multiple myeloma: consensus statements developed by the International Myeloma Foundation's Nurse Leadership Board[J]. Clin J Oncol Nurs, 2008, 12(3 Suppl): 9-12
- [18] Salamonson Y, Halcomb EJ, Andrew S, et al. A comparative study of assessment grading and nursing students' perceptions of quality in sessional and tenured teachers [J]. J Nurs Scholarsh, 2010, 42(4): 423-429
- [19] 章凤. 双因素理论在缓解护士职业倦怠中的应用 [J]. 辽宁医学院学报, 2013, 11(2): 1241-1243
Zhang Feng. Application of double factor theory in reliving nursing job burnout[J]. Journal of Liaoning Medical University, 2013, 11(2): 1241-1243
- [20] 金桂花. 提高护士素质, 化解医患矛盾[J]. 内蒙古中医药, 2013, 32(7): 106-107
Jin Gui-hua. Improving nurses' quality and resolving patient-doctor conflicts [J]. Traditional Chinese Medicine in Inner Mongolia, 2013, 32(7): 106-107

(上接第 1299 页)

- [9] Bezinover D, Kadry Z, Uemura T, et al. Association between plasma cyclic guanosine monophosphate levels and hemodynamic instability during liver transplantation[J]. Liver Transpl, 2013, 19(2): 191-198
- [10] Kim YK, Lee K, Hwang GS, et al. Sympathetic withdrawal is associated with hypotension after hepatic reperfusion [J]. Clin Auton Res, 2013, 23(2): 1-5
- [11] Peng Zhang-long, Lu Zhi-jun, Wang Hai-bin, et al. Effects of different ways of liver transplantation on hemodynamics[J]. Journal of Shanghai Jiaotong University (Medical Science), 2006, 26(6): 652-656(in Chinese)
- [12] 毕振华, 毕晓琳, 李忠斌, 等. 肝段切除术围术期动脉血乳酸浓度和桡动脉压的变化[J]. 现代生物医学进展, 2012, 12(26): 5109-5112
Bi Zhen-hua, Bi Xiao-lin, Li Zhong-bin, et al. The Changes of Arterial lactate Concentrations and Radial Artery Pressure in Segment Hepatectomy Perioperative [J]. Progress in Modern Biomedicine, 2012, 12(26): 5109-5112
- [13] Gurusamy KS, Naik P, Abu-Amara M, et al. Techniques of flushing and reperfusion for liver Transplantation [J]. Cochrane Database Syst Rev, 2012, 14(3): 1-31
- [14] Xue Q, Yuan Z, Chen Z, et al. Protective role of nitric oxide induced by ischemic preconditioning on cold ischemic-reperfusion injury of rat liver graft[J]. Transplant Proc, 2012, 44(4): 948-951
- [15] Andreani P, Hoti E, de la Serna S, et al. Ischaemic preconditioning of the graft in adult living related right lobe liver transplantation: impact on ischaemia-reperfusion injury and clinical relevance [J]. HPB (Oxford), 2010, 12(7): 439-446
- [16] Cordoví de Armas L, Jiménez Paneque RE, Gala López B, et al. Rapid and homogeneous reperfusion as a risk factor for post reperfusion syndrome during orthotopic liver transplantation[J]. Rev Bras Anestesiol, 2010, 60(2): 154-1, 88-92
- [17] 李庆虹, 郭晓东, 张敏, 等. 肝移植术后急性肾功能衰竭的相关因素的临床分析[J]. 现代生物医学进展, 2011, 11(20): 3906-3908
Li Qing-hong, Guo Xiao-dong, Zhang Min, et al. Clinical Analysis of Related Factors in Patient with Acute Renal Failure after Liver Transplantation[J]. Progress in Modern Biomedicine, 2011, 11(20): 3906-3908
- [18] Kern H, Bald C, Brill T, et al. The influence of retrograde reperfusion on the ischaemia-/ reperfusion injury after liver transplantation in the rat[J]. Int J Exp Pathol, 2008, 89(6): 433-437
- [19] Liu Qi-yu, Li Li, Li Xiao-yan, et al. Liver graft injury induced by ischemia and reperfusion secondary to retrograde reperfusion [J]. World Chinese Journal of Digestology, 2011, 19(15): 1550-1554 (In Chinese)
- [20] Chung IS, Kim HY, Shin YH, et al. Incidence and predictors of post-reperfusion syndrome in living donor liver transplantation [J]. Clin Transplant, 2012, 26(4): 539-543