

肝段切除术围术期动脉血乳酸浓度和桡动脉压的变化

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摘要 目的 观察肝细胞癌合并肝炎肝硬化患者行肝段切除术围术期动脉血乳酸浓度,及肝门阻断、开放后有创血压的变化。**方法** 选择择期行肝段切除术的肝硬化患者 30 名,给予全凭静脉麻醉,于手术开始前、第一肝门阻断开放即时、阻断开放后 15min,分别采取动脉血化验血乳酸浓度,记录采取动脉血时血压值及开放后血压最低值,设计为自身前后对照,应用 CHISS 软件进行统计学分析。**结果** 开放即时与开放后 15min 动脉血乳酸浓度与术前比较均有明显统计学差异($P<0.05$),乳酸浓度与肝门阻断时间呈正相关,开放即时与开放后动脉血乳酸浓度相比无明显统计学差异($P>0.05$)。开放后血压下降程度与乳酸浓度无明显相关,与阻断时间无明显相关。肝门阻断前后及开放后 15min 患者血红蛋白无明显变化($P>0.05$)。**结论** 肝段切除术围术期行第一肝门阻断后血乳酸浓度明显升高,肝脏再灌注期间乳酸未进一步升高,甚至有所降低。开放后血压下降程度与乳酸浓度无明显相关。

关键词 肝硬化;肝段切除术;血乳酸;桡动脉压

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The Changs of Arterial lactate Concentrations and Radial Artery Pressure in Segment Hepatectomy Perioperative

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ABSTRACT Objective: To evaluate perioperative lactic acid concentration of arterial blood in hepatectomy for hepatocellular carcinoma patients with cirrhosis, and the radial artery invasive blood pressure when the porta hepatis was blocked and reopened. **Methods:** Thirty hepatocellular carcinoma patients with cirrhosis undergoing elective hepatectomy were choosed and given total intravenous anesthesia. Arterial blood samples were collected to test the lactic acid concentration before surgery, porta hepatis blocked, 15minutes after porta hepatis reopened and record arterial blood pressure when taking the blood samples and the lowest blood pressure after porta hepatis reopened. Before and after control for their own design, apply CHISS software for statistical analysis. **Results:** Arterial blood lactic acid concentration when 15min after porta hepatis reopened and open real-time was significantly high compared with their levels before surgery, and was positively correlated with porta hepatis blocked time. There were no difference in the amount of intraoperative bleeding between before and after the reopened, so in the concentration of lactic acid. **Conclusion:** Perioperative lactic acid concentration of arterial blood in hepatectomy increased significantly after porta hepatis blocked, but the latic acid didn't further increase or even declined during liver reperfusion. The extent of decline in blood pressure has no significant correlation with the lactic acid concentration and blocked time.

Key words: Liver cirrhosis; Hepatectomy; Lactic acid of arterial blood; Radial artery pressure

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乳酸是细胞内无氧酵解的产物,乳酸酸中毒系临床危重疾病的一种常见病理生理状态,在普通患者围手术期较少发生,但在肝段切除术围术期常因肝门阻断导致乳酸的堆积。肝门阻断导致肝脏严重缺血缺氧,发生无氧酵解,导致乳酸的堆积以及线粒体氧化磷酸化功能降低。阻断开放后,缺氧代谢产物进入体循环,从而引发代谢性酸中毒。

此外,肝门阻断后对门脉系统血流动力学的改变可能造成内脏器官的低灌注,也可导致乳酸的堆积^[1-2]。乳酸升高说明组织无氧代谢增加,直接反映无氧代谢的程度,在临床上的即时监测有极为重要的意义,尤其是在肝硬化肝癌患者围手术期中更直接反映肝脏的损伤程度。现有研究业已证实,乳酸升高后可抑制心肌收缩力,导致血压的下降^[3-4]。

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1 资料与方法

1.1 一般资料

本研究病例来自 2011 年 9 月至 2012 年 1 月在我院择期行肝癌切除术的患者, ASA I 或 II 级。其中男性 25 例, 女性 5 例, 年龄 29-71 岁。体重 51-92kg。其诊断均为原发性肝癌合并肝炎肝硬化。患者肝脏功能评分均为 ChildA 级。术前合并有轻度贫血(Hb<90g/L)、糖尿病、心肺功能异常、肾功能不全、转移性肝癌和其他部位肿瘤均不纳入本研究。术中均行第一肝门完全阻断。肝门阻断时间为 7-60min。

1.2 原发性肝癌及肝炎肝硬化的诊断

行腹部 B 超、CT、MRI 均提示肝脏恶性肿瘤, 结合生化指标经临床明确诊断为原发性肝癌。化验乙肝五项提示 HBsAg 阳性或丙肝抗体阳性。行 B 超、生化检查结合临床明确诊断为肝炎肝硬化。

1.3 麻醉方法

麻醉前 30min 肌肉注射地西泮 10mg、阿托品 0.5mg。入室后开放上肢静脉, 所有病例均选择全凭静脉靶控输注麻醉。以异丙酚、瑞芬太尼靶控注射诱导, 病人入睡后注射罗库溴铵 0.6-0.9mg/kg。气管插管后行机械控制通气, 调节呼吸参数, 使 PetCO₂ 维持在 30-35mmHg。连续靶控输注丙泊酚、瑞芬太尼维

持麻醉, 设定血浆靶浓度分别为 2.5μg/mL 和 4.0μg/mL。监测 BIS, 维持 BIS 值在 40-60。间断静注罗库溴铵 10mg 维持肌松。所有患者均在诱导后行左侧桡动脉置管, 监测有创血压。当出血量超过全身血容量的 20%或 Hb<80g/L 时输注滤白红细胞。平均动脉压(MAP) 改变超过基础值 20%则适当给予血管活性药物。

1.4 动脉血乳酸浓度测定和血压的记录

监测指标: 采用 GEM PREMIER3000 血气分析仪检测动脉血气及乳酸浓度值, DATEX OHMEDA7900 监护仪监测桡动脉血压。记录患者第一肝门阻断时间、手术开始前、第一肝门阻断开放即刻、阻断开放后 15min 时动脉血乳酸浓度, 记录采取动脉血时血压值及开放后血压最低值。

1.5 统计学处理

应用 CHISS 软件进行数据统计分析, 计量资料用均数标准差($\bar{x} \pm s$) 表示, 组间比较采用自身前后对照, 采用均数 t 检验, 组内比较采用重复测量资料的方差分析, 率的比较采用 χ^2 检验。以 $P < 0.05$ 作为差异有统计学意义。

表 1 患者一般情况和肝门阻断时间

Table1 General condition and time of clamping porta hepatis of patients

Group	Range	Average
Age	29-71	49.20± 9.75
Weight (kg)	51-92	67.40± 9.63
Time of clamping porta hepatis (min)	7-60	21.27± 10.82
Male/female	25/5	

2 结果

2.1 患者年龄、体重、肝门阻断时间等一般情况 见表 1

2.2 术前与术后动脉血乳酸与血红蛋白浓度测定比较

肝门开放即刻与开放后 15min 动脉血乳酸浓度均较术前

表 2 患者手术前、肝门开放即刻、肝门开放后 15min 乳酸、血红蛋白浓度

Table 2 The lactic acid and hemoglobin concentration of before operation, Immediate porta hepatic open and after porta hepatic open 15min of patients

Group	Before operation	Immediate porta hepatic open	After porta hepatic open 15min
Lactic acid concentration	0.88± 0.29* [△]	2.19± 0.96 [△]	1.99± 0.17*
Hemoglobin	11.33± 0.98	11.13± 0.95	10.92± 0.93

Note: [△] The lactic acid concentration has difference between before operation and immediate porta hepatic open($P=0.000$);

The lactic acid concentration has difference between before operation and after porta hepatic open 15min($P=0.000$).

表 3 患者手术前、肝门开放即刻及开放后 15min 桡动脉血压值

Table 3 The radial artery pressures of before operation, Immediate porta hepatic open and after porta hepatic open 15min of patients

Group	Before operation	After porta hepatic open 1 min	After porta hepatic open 15min
SBP	134.45± 16.55	108.71± 14.83	128.16± 16.84
DBP	78.84± 7.59	63.42± 7.53	71.06± 7.01

显著升高($P<0.01$),与肝门阻断时间成正相关(见图1),开放前后相比动脉血乳酸浓度无明显差异($P=0.07>0.05$)。肝门开放即刻、开放后15min的血红蛋白较术前无统计学差异($P>0.05$)。

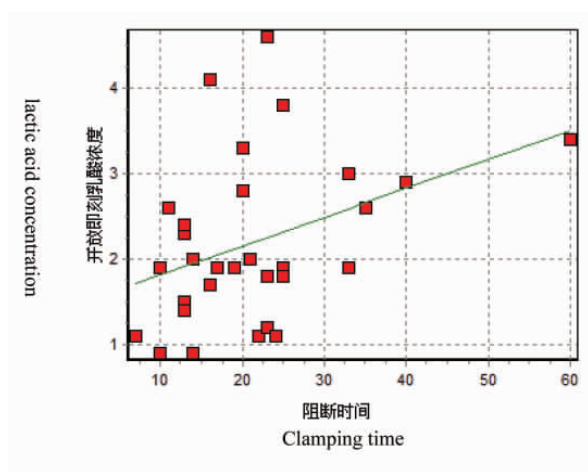


图1 阻断时间与乳酸浓度

Fig.1 Clamping time and lactic acid concentration

2.3 术前与术后 SBP、DBP 变化比较

患者肝门开放即刻桡动脉血压值(SBP、DBP)较术前显著降低($P<0.01$),血压下降程度与肝门阻断时间无明显相关,开放后15min桡动脉血压值与术前血压无明显差异($P=0.13>0.05$)。

3 讨论

我国是肝炎高发国家,约85%的肝细胞肝癌病人同时合并肝硬化。肝硬化不但对肝功能产生影响,限制了肝切除量,同时可增加术后并发症和死亡率。对于行第一肝门阻断的肝硬化患者,肝脏的损伤进一步加重,肝细胞萎缩导致无氧耐受能力也下降,乳酸代谢能力下降造成乳酸堆积更明显^[5-7]。有报道显示,动脉血乳酸浓度为5mmol/L时死亡率即达80%^[8]。

从本实验检测数据结果看,所有病人肝门阻断后血乳酸值均明显高于术前值。但在肝门开放后乳酸浓度未进一步明显升高,表现为与开放前持平甚至有所降低,说明肝脏缺血再灌注损伤,可能与氧自由基增多、线粒体酶系损伤有关,并未直接影响到乳酸的代谢。其原因可能为再灌注期间肝脏因细胞氧供得以恢复,乳酸代谢逐渐恢复正常或基本正常。

此外,肝门阻断期间患者血压与术前相比无明显改变,但开放后血压均有一过性降低,与术前比较有统计学意义($P<0.05$),但均可在肝门开放后15min之内恢复到术前水平。考虑为乳酸酸中毒时心室收缩功能受到抑制,导致血压下降。但本实验并没有提示血压下降程度与乳酸浓度及阻断时间有完全负相关。患者肝门开放即刻、开放后15min的Hb和Hct较术前无统计学差异($P>0.05$),Hb和Hct都分别维持在90g/L和28%以上。说明实验中患者血容量无明显改变,不是导致血压下降的原因。

实验较为遗憾的是未能连续检测乳酸浓度随时间变化规律:何时到达峰值,峰值达到的高度、下降变化规律以及何时下

降正常等。肝段切除术中进行常规监测的同时,积极纠正乳酸酸中毒,改善组织氧供有助于心排量和氧输送的同时,对改善重要脏器的灌注和氧合状况已得到肯定^[9-10]。乳酸升高随之而来的是器官功能衰竭的发生率和病死率的增高,这是由于组织灌注不佳和氧合不充分,细胞无氧增加所造成的。血乳酸水平增高和酸血症与组织循环障碍互为因果^[11-14]。

术中为了减少乳酸的堆积,首先在肝段切除术围术期尽量减少乳酸林格液的使用,以醋酸林格液或勃脉力A注射液代替。其次加快手术速度,减少肝门阻断时间。有报道显示半肝阻断术后转氨酶、并发症均较第一肝门完全阻断有显著下降。半肝阻断保留了部分肝脏的正常灌注,尤其是肠系膜血流仍可通过未阻断侧肝脏回流入体循环,肝脏的无氧酵解也会有下降,对手术中血流动力学的影响较小^[15-17],特别适合合并有肝硬化的病人。但对乳酸的堆积也是是否会显著下降还需进一步实验证实。此外,半肝血流阻断法需要手术医生有熟练的肝门解剖知识,否则极易损伤Glisson鞘内管道,造成出血和胆漏^[18]。

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