

· 临床研究 ·

急诊和择期经皮冠状动脉介入术后心肌修复情况的比较

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【摘要】 **目的** 探讨急诊和择期经皮冠状动脉介入(PCI)术后心肌的修复情况。**方法** 回顾性分析2018年1月至2019年2月广安市人民医院心血管内科住院的心肌梗死患者97例,根据行PCI术时机分为急诊PCI术组50例和择期PCI术组47例,术后3个月通过心脏磁共振成像(CMRI)评估和比较2组患者心功能和心肌修复情况,并比较术前和术后3个月肌钙蛋白I(TnI)、脑钠肽(BNP)和肌酸激酶同工酶MB(CK-MB)水平。应用SPSS 19.0统计软件对数据进行分析,根据数据类型采用 t 检验或 χ^2 检验进行组间比较。相关性采用Pearson相关分析。**结果** 2组患者PCI术后3个月较术前左心室舒张末期容积(LVEDV)、左心室收缩末期容积(LVESV)、梗死心肌质量、梗死心肌容积视觉评分、室壁运动异常评分、TnI、BNP和CK-MB均改善,且急诊PCI术组相比择期PCI术组患者水平低[(108.41±21.15)和(126.61±22.05)ml;(59.55±14.41)和(65.54±11.64)ml;(6.84±2.15)和(9.16±3.00)g;(6.03±2.11)和(8.15±2.32)分;(3.01±1.16)和(4.41±1.25)分;(106.84±29.98)和(122.16±32.11)g/L;(1.00±0.34)和(1.24±0.54)ng/L;(32.21±5.44)和(35.49±4.48)U/L],差异均有统计学意义($P<0.05$)。Pearson相关分析结果表明,梗死心肌质量与梗死心肌容积视觉评分、室壁运动异常评分、LVEDV、LVESV正相关($r=0.411, 0.354, 0.306$ 和 $0.341, P<0.05$)。**结论** 急诊PCI术可显著改善心肌梗死患者心肌的功能和修复。

【关键词】 磁共振成像;经皮冠状动脉介入;急诊;择期**【中图分类号】** R541**【文献标志码】** A**【DOI】** 10.11915/j.issn.1671-5403.2019.11.178

Comparison for myocardial repair after emergency and selective percutaneous coronary intervention

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【Abstract】 **Objective** To investigate the myocardial repair after emergency and elective percutaneous coronary intervention (PCI). **Methods** A retrospective study was conducted on 97 patients with myocardial infarction admitted in our department from January 2018 to February 2019. According to the timing of PCI, they were divided into emergency PCI group ($n=50$) and selective PCI group ($n=47$). Cardiac function and myocardial repair were evaluated and compared by cardiac magnetic resonance imaging (CMRI) in 3 months after operation. The levels of troponin I (TnI), brain natriuretic peptide (BNP) and creatine kinase isoenzyme-MB (CK-MB) were compared before and 3 months after operation. SPSS statistics 22.0 was used for data analysis. Student's t test or Chi-square test was applied to make comparison between 2 groups according to the different data types. Pearson correlation analysis was also employed. **Results** Compared with before operation, left ventricular end-diastolic volume (LVEDV), left ventricular end-systolic volume (LVESV), preoperative myocardial mass, visual score of myocardial volume, abnormal wall motion score, and levels of TnI, BNP and CK-MB were all improved in both groups, and the indicators were lower in the emergency PCI group than the selective PCI group [(108.41±21.15) vs (126.61±22.05) ml, (59.55±14.41 vs (65.54±11.64) ml, (6.84±2.15) vs (9.16±3.00) g, (6.03±2.11) vs (8.15±2.32) score, (3.01±1.16) vs (4.41±1.25) score, (106.84±29.98) vs (122.16±32.11) g/L, (1.00±0.34) vs (1.24±0.54)ng/L, (32.21±5.44) vs (35.49±4.48) U/L]. Pearson correlation analysis showed that myocardial quality was positively correlated with myocardial volume visual score, wall motion abnormality score, LVEDV and LVESV ($r=0.411, 0.354, 0.306$ and $0.341, P<0.05$). **Conclusion** Emergency PCI can significantly improve myocardial function and repair in patients with myocardial infarction.

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【Key words】 magnetic resonance imaging; percutaneous coronary intervention; emergency; selection

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冠状动脉粥样硬化性心脏病(简称冠心病)是临床常见疾病,病情不断进展会造成冠状动脉闭塞,导致心肌梗死发生^[1]。经皮冠状动脉介入(percutaneous coronary intervention, PCI)术是心肌梗死患者首选治疗方法,通过PCI术可使得血管再通,有效改善患者预后。但PCI术后患者心肌组织局部的微循环灌注并没有得到明显改善,心肌灌注比例仍存在失衡,因此患者后续会出现不良心血管事件,了解患者PCI术后心肌恢复情况对改善预后的意义重大^[2]。心脏磁共振成像(cardiac magnetic resonance imaging, CMRI)技术具有无创、可重复性优势,可准确判断患者心脏功能,为此本研究通过CMRI评估急诊和择期PCI术后患者心肌的修复情况并进行了比较,以期CMRI的临床应用提供依据。

1 对象与方法

1.1 研究对象

回顾性分析2018年1月至2019年2月广安市人民医院心血管内科住院的心肌梗死患者97例,根据行PCI术时机分为急诊PCI术组50例和择期PCI术组47例。纳入标准:(1)诊断符合《内科学》第9版诊断标准^[3];(2)在我院行PCI术和CMRI;(3)患者及家属知情同意。排除标准:(1)有严重心律失常、扩张型心肌病、心包积液、心脏瓣膜病;(2)合并有恶性肿瘤、肝肾功能障碍、活动性内脏出血、电解质紊乱、甲状腺功能亢进等疾病。

1.2 治疗

急诊PCI术组患者入院后立刻嚼服阿司匹林300 mg和氯吡格雷300 mg,送入导管室行冠状动脉造影,给予替格瑞洛180 mg负荷量,采用美国GE公司生产的造影机, Judkins方法行血管造影检查。冠状动脉狭窄超过管腔3/4患者行PCI术,将导丝送至病变血管狭窄远端,反复扩张后,选取合适支架在狭窄部位释放,术后给予常规造影检查。PCI术成功判定标准为残余狭窄 $\leq 20\%$ 及梗死相关动脉(infarction related artery, IRA)远端血流达到心肌梗死溶栓血流(thrombolysis in myocardial infarction, TIMI)分级3级。择期PCI术患者为急性期末直接行PCI术,急性期后1周内完成PCI术。

1.3 心肌功能检查

患者PCI术后3个月行CMRI检查,仪器为西

门子Avanto 1.5T超导磁共振扫描仪,患者仰卧,采用4通道心脏相控线圈置于患者的左前胸和左侧背部,对患者开展两腔心长轴、四腔心长轴及5层左室短轴检查。扫描次数调整为50,患者屏气,给药同时启动灌注扫描,首过灌注成像后以2.5 ml/s的速度静脉注射同样剂量的对比剂,5 min后行延迟强化成像,扫描时间约40 s。手工描记左心室舒张末期及收缩末期的室壁轮廓,计算机辅助计算射血分数(ejection fraction, EF)、左心室舒张末期容积(left ventricular end-diastolic volume, LVEDV)和左心室收缩末期容积(left ventricular end-systolic volume, LVESV)。室壁运动异常评估分值0~4分,其中0分为正常,1分为运动减低,2分为无运动,3分为矛盾运动,4分为室壁瘤形成。梗死心肌容积用计算机辅助测体积法(computer-assisted volume method, CAVM)评估时逐层手工描记延迟强化轮廓,计算机辅助计算梗死心肌容积,乘以心肌比重1.05 g/cm³即可得梗死心肌质量。梗死心肌容积用视觉评分(vision scoring method, VSM)评估时选择3个标准短轴层面(基底、中间和心尖),每个节段按照透壁程度评分,0分为无强化,1分为0%~25%强化,2分为26%~50%强化,3分为5%~75%强化,4分为76%~100%强化,所有节段评分相加为VSM总分^[4]。

1.4 肌钙蛋白I、脑钠肽和肌酸激酶同工酶MB检测

术前和术后3个月抽取空腹静脉血2 ml, 3000转/min离心10 min后分离血清,采用电化学法测定肌钙蛋白I(troponin I, TnI)和脑钠肽(brain natriuretic peptide, BNP)水平,采用酶联免疫吸附法测定肌酸激酶同工酶MB(creatine kinase isoenzyme-MB, CK-MB)水平,试剂盒由南京建成生物制品有限公司提供,按照试剂盒说明操作。

1.5 统计学处理

应用SPSS 19.0统计软件对数据进行分析。计量资料用均数 \pm 标准差($\bar{x}\pm s$)表示,组间比较采用 t 检验。计数资料用例数(百分率)表示,组间比较用 χ^2 检验。指标间相关性采用Pearson相关分析。 $P<0.05$ 为差异有统计学意义。

2 结果

2.1 2组患者基线资料比较

2组患者年龄、性别、高血压、糖尿病、心脏功能

分级等一般资料比较差异无统计学意义,具有可比性($P>0.05$;表1)。

2.2 2组患者心功能参数比较

2组患者术后3个月较术前LVEDV和LVESV均改善,且急诊PCI术组明显低于择期PCI术组,差异均有统计学意义($P<0.05$;表2)。

2.3 2组患者心肌修复情况比较

2组患者术后3个月相比术前梗死心肌质量、VSM评分和室壁运动异常评分均改善,且急诊PCI术组各项明显低于择期PCI术组患者,差异均有统计学意义($P<0.05$;表3)。

2.4 2组患者手术前后TnI、BNP和CK-MB比较

2组患者术后3个月较术前TnI、BNP和CK-MB均改善,且急诊PCI术组明显低于择期PCI术组,差

异均有统计学意义($P<0.05$;表4)。

2.5 相关性分析

患者术后3个月梗死心肌质量与VSM评分、室壁运动异常评分、LVEDV、LVESV和EF进行Pearson相关性分析,结果显示梗死心肌质量与VSM评分、室壁运动异常评分、LVEDV和LVESV呈正相关($r=0.411, 0.354, 0.306, 0.341, P<0.05$)。

3 讨论

急性心肌梗死是冠心病常见类型,主要是由于冠状动脉粥样硬化斑块发生破裂后导致血小板凝集,形成血栓而阻塞管腔,使得心肌缺血坏死^[4,5]。PCI术可恢复梗死动脉血流,同时保证再灌注心肌细胞功能,维持左心室正常地收缩和舒张^[6,7]。

表1 2组患者基线资料比较

Table 1 Comparison of baseline data between two groups

Group	n	Gender	Age	Hypertension	Diabetes mellitus	STEMI
		(male/female, n)	(years, $\bar{x}\pm s$)	[n(%)]	[n(%)]	[n(%)]
Emergency PCI	50	30/20	65.42±8.15	28(56.00)	13(26.00)	23(46.00)
Selective PCI	47	25/22	65.74±7.22	26(55.32)	14(29.79)	22(46.81)
t/χ^2		0.457	0.204	0.005	0.173	0.006
P value		0.499	0.836	0.946	0.677	0.936

Group	n	Hyperlipidemia	Genisimi score	Thrombus aspiration	Killip III-IV	Anterior myocardial infarction
		[n(%)]	($\bar{x}\pm s$)	[n(%)]	[n(%)]	[n(%)]
Emergency PCI	50	13(26.00)	69.92±2.10	11(22.00)	14(28.00)	27(54.00)
Selective PCI	47	12(25.53)	70.02±2.00	12(25.53)	11(23.40)	23(48.94)
t/χ^2		0.003	-0.240	0.167	0.267	0.249
P value		0.958	0.811	0.683	0.605	0.618

PCI; percutaneous coronary intervention; STEMI; ST-segment elevation myocardial infarction; CK-MB; creatine kinase isoenzyme-MB.

表2 2组患者心功能参数比较

Table 2 Comparison of cardiac function parameters between two groups

($\bar{x}\pm s$)

Group	n	LVEDV(ml)		LVESV(ml)		EF(%)	
		Before	3 months after	Before	3 months after	Before	3 months after
		operation	operation	operation	operation	operation	operation
Emergency PCI	50	130.41±25.51	108.41±21.15 ^{*#}	67.71±19.10	59.55±14.41 ^{*#}	51.15±12.26	54.41±12.26
Selective PCI	47	135.15±30.20	126.61±22.05 [*]	72.21±20.11	65.54±11.64 [*]	47.71±11.18	53.31±11.41

PCI; percutaneous coronary intervention; LVEDV; left ventricular end diastolic volume; LVESV; left ventricular end systolic volume; EF; ejection fraction. Compared with before operation, ^{*} $P<0.05$; compared with selective PCI group, [#] $P<0.05$.

表3 2组患者心肌修复情况比较

Table 3 Comparison of myocardial repair between two groups

($\bar{x}\pm s$)

Group	n	Quality of infarcted myocardium(g)		VSM(score)		Abnormal wall motion(score)	
		Before	3 months after	Before	3 months after	Before	3 months after
		operation	operation	operation	operation	operation	operation
Emergency PCI	50	11.41±4.68	6.84±2.15 ^{*#}	11.41±5.24	6.03±2.11 ^{*#}	5.22±1.67	3.01±1.16 ^{*#}
Selective PCI	47	12.24±5.80	9.16±3.00 [*]	12.60±6.10	8.15±2.32 [*]	5.57±1.75	4.41±1.25 [*]

PCI; percutaneous coronary intervention; VSM; vision scoring method. Compared with before operation, ^{*} $P<0.05$; compared with selective PCI group, [#] $P<0.05$.

表4 2组患者手术前后 TnI、BNP 和 CK-MB 比较

Table 4 Comparison of TnI, BNP and CK-MB before and after operation between two groups ($\bar{x}\pm s$)

Group	n	TnI(g/L)		BNP(ng/L)		CK-MB(U/L)	
		Before operation	3 months after operation	Before operation	3 months after operation	Before operation	3 months after operation
Emergency PCI	50	330.20±65.02	106.84±29.98 ^{**}	8.92±2.10	1.00±0.34 ^{**}	112.21±23.38	32.21±5.44 ^{**}
Selective PCI	47	321.18±57.70	122.16±32.11 [*]	9.16±1.82	1.24±0.54 [*]	108.28±24.49	35.49±4.48 [*]

PCI: percutaneous coronary intervention; TnI: troponin I; BNP: brain natriuretic peptide; CK-MB: creatine kinase isoenzyme-MB. Compared with before operation, ^{*} $P<0.05$; compared with selective PCI group, ^{**} $P<0.05$.

常规超声指标可被用于评价 PCI 术后患者心脏功能情况,但由于如左心房内径、心房容量、EF 等指标缺乏量的金标准,因此超声指标无法有效反映患者 PCI 术后左心功能变化情况^[8,9]。而 CMRI 可清晰显像心肌、心腔与大血管的结构^[10],同时视野相对较大,分辨率较高,可良好显示心肌组织特征。一次检查就可获取患者治疗后心脏解剖、功能、灌注、代谢及冠状动脉走行变化的全部信息^[11],为此本研究采用 CMRI 评估心肌梗死患者急诊和择期 PCI 术后心肌恢复情况。

研究表明冠状动脉血流恢复后心肌功能会相应恢复,一般在冬眠心肌和顿抑心肌间出现,又称可逆性心肌损伤,PCI 术后部分存活心肌活性恢复,已经梗死部分心肌则无法恢复活性而形成瘢痕组织,从而限制心肌舒张能力^[12]。本研究表明急诊 PCI 术组患者的梗死心肌质量、VSM 评分、室壁运动评分明显低于择期 PCI 术组患者,分析原因为急诊 PCI 术在短时间内可开通罪犯血管,尤其对于不稳定斑块内出血的急性心肌梗死患者,短期开通罪犯血管可重建血液运行通路,显著减少罪犯血管导致的血流动力学及器官功能改变。

研究证实 CK-MB、BNP 和 TnI 联合检测对心肌梗死具有较好的诊断价值^[13]。TnI 主要来自受损的心肌细胞膜,在血液中的稳定性较好。BNP 是心肌受损时释放的细胞膜表面糖蛋白成分,心肌细胞受损时水平明显升高。CK-MB 半衰期短,诊断心肌损伤具有良好的灵敏度和特异度,心肌细胞膜稳定性被破坏时水平明显升高。择期 PCI 术组患者因受损心肌细胞无法在短时间内得到修复,受损心肌细胞会不断增多,因此 TnI、BNP 和 CK-MB 水平明显高于急诊 PCI 术患者。

急诊 PCI 术组患者 LVEDV 和 LVESV 明显低于择期 PCI 术组患者,究其原因因为急诊 PCI 术可有效改善左心室腔内的分流,提高其运动的同步性。而择期 PCI 术患者由于心肌相对缺血时间更长,心肌细胞死亡更多,因此预后不佳。国内李梦竹等^[14]的

研究表明急诊 PCI 术组患者术后 1 个月和 3 个月的 LVEDV、LVESV 均低于择期 PCI 术组患者($P<0.05$),本研究结果与其基本一致。

梗死心肌质量与 VSM 评分、室壁运动异常评分、LVEDV 和 LVESV 直线相关,主要是由于心肌梗死后左心室发生重构,收缩功能减退,传导组织与心肌细胞损伤可加重左心室电活动与机械收缩不同步,同时梗死后心肌各节段收缩不同步也可导致心腔局部压力不均衡,加速心脏功能恶化^[15,16]。

综上,本研究通过 CMRI 评估了心肌梗死患者 PCI 术后的心肌功能和修复情况,结果表明评估手段可行。同时研究表明急诊 PCI 术能显著改善心肌梗死患者的梗死心肌质量,但由于随访时间短,入组病例有限,后期还需扩充样本量并长期随访进行论证。

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