

急性颅内大动脉粥样硬化与栓塞性缺血性脑卒中机械取栓治疗的对比研究

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【摘要】 目的 对比分析血管内机械取栓治疗颅内大动脉粥样硬化性(ICAS)和栓塞性(embolic)急性缺血性脑卒中的临床效果和安全性。方法 回顾性分析2019-01—2021-12采用血管内机械取栓治疗的118例急性大血管闭塞的缺血性脑卒中患者的临床资料,其中ICAS组27例(22.9%),Embolic组91例(77.1%)。结果 与Embolic组比较,ICAS组更高的后循环闭塞比例(37.0% vs 14.3%, $P=0.009$)、更高的球囊扩张(66.7% vs 7.7%, $P<0.001$)及支架置入比例(59.3% vs 6.6%, $P<0.001$),手术时间明显延长[110.00(80.00~130.00) min vs 85.00(55.00~120.00) min, $P=0.021$],年龄更小[(63.67±11.48)岁 vs (68.25±10.13)岁, $P=0.047$],合并冠心病比例(14.8% vs 41.8%, $P=0.010$)、心房颤动比例(7.4% vs 52.7%, $P<0.001$)及术后出血发生率(3.7% vs 23.1%, $P=0.023$)明显降低,2组血管成功再通率(92.6% vs 91.2%)及术后3个月预后良好率(40.7% vs 49.5%)均无统计学差异($P>0.05$)。结论 对比颅内动脉粥样硬化与栓塞性急性缺血性脑卒中,危险因素存在差异,ICAS组术后出血发生率明显降低,且术中往往需要联合血管成形术,但两者预后无明显差异。

【关键词】 脑卒中; 颅内动脉硬化; 栓塞; 机械取栓

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Comparative study of mechanical thrombectomy in the treatment of intracranial large atherosclerotic and embolic acute ischemic stroke

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【Abstract】 Objective To compare and analyze the clinical effect and safety of intravascular mechanical thrombectomy in the treatment of intracranial large atherosclerotic (ICAS) and embolic acute ischemic stroke. **Methods** The clinical data of 118 ischemic stroke patients with acute large vessel occlusion treated by intravascular mechanical thrombectomy from January 2019 to December 2021 were analyzed retrospectively, including 27 cases (22.9%) in ICAS group and 91 cases (77.1%) in embolic group. **Results** Compared with embolic group, ICAS group had higher posterior circulation occlusion ratio (37.0% vs 14.3%, $P=0.009$), higher balloon dilatation ratio (66.7% vs 7.7%, $P<0.001$) and stent implantation ratio (59.3% vs 6.6%, $P<0.001$), significantly longer operation time (110.00(80.00-130.00) min vs 85.00(55.00-120.00) min, $P=0.021$), and younger age ((63.67±11.48) years old vs (68.25±10.13) years old, $P=0.047$), The ratio of coronary heart disease (14.8% vs 41.8%, $P=0.010$), the ratio of atrial fibrillation (7.4% vs 52.7%, $P<0.001$) and the incidence of postoperative bleeding (3.7% vs 23.1%, $P=0.023$) were significantly reduced. There was no significant difference

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between the two groups in the successful recanalization rate (92.6% vs 91.2%) and the good prognosis rate at 3 months after operation (40.7% vs 49.5%) ($P>0.05$). **Conclusion** There are differences in risk factors between intracranial atherosclerosis and embolic acute ischemic stroke. The incidence of postoperative hemorrhage in ICAS group is significantly reduced, and angioplasty is often required during operation, but there is no significant difference in prognosis between the two groups.

【Key words】 Storke; Intracranial arteriosclerosis; Embolism; Mechanical thrombectomy

多项研究表明卒中已成为我国居民致残及死亡的主要病因,其中急性缺血性卒中(acute ischemic stroke, AIS)约占 85%^[1],急性大血管闭塞(LVO)是导致 AIS 的常见病因之一,^[2]且致死率和致残率更高^[3],包括栓塞、颅内动脉粥样硬化狭窄(ICAS)、少部分为血管夹层、炎症及其他原因^[4],多个随机对照研究均已证实了支架取栓对急性大血管闭塞脑卒中的有效性和安全性^[5-8],但研究群体主要为西方人群,而亚洲人群在病因学上存在明显差异,ICAS 在亚洲人群更常见^[9]。对于此类病人,往往单纯取栓及抽吸难以达到满意效果,本文主要探讨机械取栓治疗颅内大动脉粥样硬化及栓塞性急性脑卒中的诊治特点及安全转归。

1 资料与方法

1.1 研究对象 回顾性分析 2019-01—2021-12 阜阳市人民医院神经内二科机械取栓治疗急性大血管闭塞脑卒中患者的临床资料。纳入标准:(1)CT 排除出血性卒中;(2)年龄 > 18 周岁;(3)发病前改良 Rankin 量表(modified Rankin Score, mRS)评分 < 2 分;(4)发病到穿刺时间 ≤ 6 h,少数患者经严格临床及影像学评估后,可放宽至 24 h;(5)CT 血管造影、磁共振血管造影或术中 DSA 确认闭塞血管为颈内动脉颅内段、大脑中动脉主干、椎动脉颅内段及基底动脉。排除标准:(1)排除夹层、烟雾病及血管炎;(2)严重的心、肝、肾功能不全;(3)未进行血管内治疗。所有患者或其家属均签署知情同意书。

1.2 治疗方法 溶栓时间窗内的患者与家属沟通给予阿替普酶常规剂量(0.9 mg/kg)静脉溶栓,同时准备血管内治疗。麻醉方式可选择局部麻醉或者全麻,根据患者配合程度而定。麻醉下行全脑血管造影明确梗死血管及侧支代偿情况,将导引导管或长鞘超选至颈内动脉 C1 段或椎动脉 V2 段,在微导管和微导丝引导下,尽可能将 Navien 中间导管靠近至血管闭塞部位,微导管在引导下越过闭塞段,退出微导丝,微导管造影证实真腔,送入 Solitaire AB 4/20 mm 或 6/30 mm 取栓支架,待完全覆盖闭塞段释放支

架,等待 5 min 后,边抽吸中间导管边回收支架,取栓后若造影提示血管仍闭塞,可重复取栓,一般不超过 3 次,若造影提示血管局部重度狭窄或给予替罗非班观察 30 min 后,血管再次闭塞或血流难以维持,则根据血管直径行球囊扩张或支架置入治疗。见图 1。术后给予盐酸替罗非班静脉泵入,次日过渡为阿司匹林肠溶片及硫酸氢氯吡格雷片口服。

1.3 研究方法及观察指标 分组标准^[10]: ICAS 组定义为闭塞部位显著的固定局灶性狭窄,在最终脑血管造影或血管内治疗中可见,包括:(1)固定狭窄程度 > 70%;(2)固定狭窄程度 50%~70%,前向血流迟缓或有再闭塞趋向。Embolic 组定义为机械取栓术后,无明显的局限性狭窄(包含机械取栓术后局部轻度狭窄,但不影响前向血流)。

观察 2 组患者的一般资料、危险因素、闭塞部位、治疗方式、血管再通率、术后颅内出血转化率及 90 d mRS 评分。采用改良脑梗死溶栓血管再通等级(modified thrombolysis in cerebral infarction, mTICI)标准评价血管再通情况,血管良好再通定义为 2b~3 级。发病 90 d 时以电话联系随访,采用改良 Rankin 量表(modified Rankin Scale, mRS)评价临床转归,0~2 分表示临床转归良好。

1.4 统计学分析 应用 SPSS 25.0 软件统计分析。计量资料如符合正态分布以均数±标准差表示,比较采用独立样本 *t* 检验;符合偏态分布的计量资料以中位数和四分位间距 [*M*(IQR)] 表示,采用 Mann-Whitney *U* 检验;计数资料以频数和百分率表示,采用 χ^2 检验或 Fisher 确切概率法检验, $P < 0.05$ 为差异有统计学意义。

2 结果

2.1 基线资料比较 本研究共纳入 118 例患者,91 例为 Embolic, 27 例为 ICAS,基本临床资料见表 1。与 Embic 组患者相比, ICAS 组患者的年龄较小 (63.67 ± 11.48 vs 68.25 ± 10.13 , $P=0.047$),冠心病、心房颤动患病率较低 ($P < 0.05$),责任血管为后循环比例更大 (37.0% vs 14.3% , $P=0.009$),发病至穿刺中位时间较长于栓塞组,但差异无统计学意义 (355.0 vs

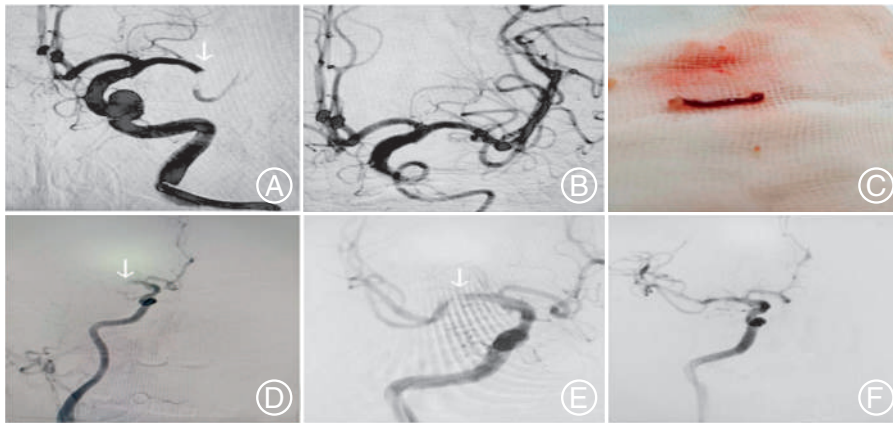


图1 Embolic组(A、B、C)和ICAS组(D、E、F)患者手术操作流程 患者男, 72岁,因“言语不清伴右侧肢体无力 2.5 h”入院,既往房颤病史,不规律服药。A:DSA示左侧大脑中动脉M1段闭塞(箭头);B:采用中间导管联合取栓支架技术,血流完全再通;C:取出的栓子;患者男,57岁,因“突发左侧肢体无力 4 h”入院;D:DSA示右侧大脑中动脉M1段闭塞(箭头);E:经中间导管联合支架取栓技术,取出少量栓子,存在重度固定原位狭窄(箭头),血流难以维持,且有再闭塞倾向;F:置入支架后血流恢复通畅

Figure 1 Operation procedure of patients in embolic group (A, B, C) and ICAS group (D, E, F). The patient, a 72 year old male, was admitted to the hospital because of “unclear speech and right limb weakness for 2.5 hours”, with a previous history of atrial fibrillation and irregular medication. A: DSA showed M1 segment occlusion of left middle cerebral artery (arrow); B: The blood flow was completely recanalized by using the technology of intermediate catheter combined with stent removal; C: Removed embolus; The patient, a 57 year old male, was hospitalized for “sudden left limb weakness for 4 hours”; D: DSA showed M1 segment occlusion of the right middle cerebral artery (arrow); E: Through the intermediate catheter combined with stent thrombectomy technology, a small number of emboli were removed, resulting in severe fixed in situ stenosis (arrow), difficult to maintain blood flow, and a tendency of re occlusion; F: After stent implantation, the blood flow recovered unobstructed

295.0, $P=0.269$), 其余性别、高血压史、糖尿病史、术前NIHSS评分,入院收缩压及舒张压差异均无统计学意义(表1)。

2.2 手术过程和临床结局 ICAS组手术中位时间显著长于Embolic组(110.0 vs 85.0, $P=0.021$),而且接

受球囊扩张或者支架置入的比例明显更高($P<0.001$),术后颅内出血转化率较低(3.7% vs 23.1%, $P=0.023$),但2组血管再通率(92.6% vs 91.2%, $P=1.000$)及术后3个月良好预后率(40.7% vs 49.5%, $P=0.426$)无统计学差异。见表2。

表1 2组患者基线特征比较

Table 1 Comparison of baseline characteristics of patients in the two groups

变量	Embolic组(n=91)	ICAS组(n=27)	统计值	P值
年龄/(岁, $\bar{x}\pm s$)	68.25±10.13	63.67±11.48	2.003	0.047
男性[n(%)]	43(47.3)	16(59.3)	1.201	0.273
血管危险因素[n(%)]				
高血压	51(56.0)	18(66.7)	0.968	0.325
糖尿病	13(14.3)	6(22.2)	0.472	0.492
冠心病	38(41.8)	4(14.8)	6.594	0.010
房颤	48(52.7)	2(7.4)	17.529	<0.001
血压/(mmHg, $\bar{x}\pm s$)				
收缩压	149.03±23.83	153.70±24.12	0.892	0.374
舒张压	86.31±14.02	91.11±15.17	1.534	0.128
NIHSS评分/[分, M(IQR)]	19.0(16.0~21.0)	20.0(19.0~23.0)	1.113	0.266
闭塞部位[n(%)]			6.868	0.009
前循环	78(85.7)	17(63.0)		
后循环	13(14.3)	10(37.0)		
发病至入院时间/[min, M(IQR)]	188.0(107.0~260.0)	210.0(100.0~350.0)	0.948	0.343
发病至穿刺时间/[min, M(IQR)]	295.0(240.0~365.0)	355.0(210.0~470.0)	1.106	0.269

注:ICAS:颅内动脉粥样硬化;Embolic:栓塞;NIHSS:美国国立卫生研究院脑卒中评分;M:中位数;IQR:四分位数间距

表 2 2 组患者手术操作结果及临床转归比较

变量	Embolism 组(n=91)	ICAS 组(n=27)	统计值	P 值
手术时间[分, M(IQR)]	85.0(55.0~120.0)	110.0(80.0~130.0)	2.299	0.021
mTICI 分级 2b 或 3 级[n(%)]	83(91.2)	25(92.6)	0.000	1.000
补救治疗[n(%)]				
球囊扩张	7(7.7)	18(66.7)	43.370	<0.001
支架置入	6(6.6)	16(59.3)	38.076	<0.001
颅内出血转化[n(%)]	21(23.1)	1(3.7)	5.152	0.023
术后 3 个月 mRS 评分[n(%)]			0.633	0.426
0~2 分	45(49.5)	11(40.7)		
3~6 分	46(50.5)	16(59.3)		

3 讨论

大血管狭窄常常由于颅内动脉粥样硬化斑块所致^[11], ICAS 是卒中再发的重要危险因素^[12]。由于两者不同的病理生理机制^[13], 其手术方式同样存在差异^[14]。对于栓塞的患者, 其栓子常常来自心源性、近端血管斑块脱落或不明来源, 尽早血管再通治疗是降低病死率和致残率的核心环节, 然而在动脉粥样硬化的基础上合并原位血管闭塞是导致 ICAS-LVO 的重要原因^[15], 重点在于如何快速的处理原位狭窄和降低血小板聚集, 而非栓子。对于这类患者, 补救性的治疗, 如球囊扩张或永久性的支架植入能够明显的提高血管再通成功率^[16], 且降低术后脑出血的发生率及病死率, 但同样也延长了手术时间、增加再闭塞的风险, 最终影响手术疗效^[17]。

狭窄伴原位闭塞机械取栓治疗的一个重要关注点是发病后 90 d 时临床转归, 目前, 多项研究均已证实大血管栓塞血管内治疗的有效性和安全性, 但 ICAS 合并原位闭塞取栓治疗疗效仍在探索, 有文献显示狭窄伴原位闭塞血管再通 3 个月后好于栓塞^[18], 但也有文献显示预后差于栓塞或者两者相似^[9, 19]。在本研究中, ICAS 组患者平均年龄(年龄是影响卒中预后的重要因素)较小, 男性比例较高, 与既往研究一致^[20], 2 组患者具有相似的血管再通率及良好预后率。分析其原因, 可能与较长的手术时间有关, 既往有研究表明, 手术时间延长是影响狭窄伴原位闭塞病变预后的重要因素^[21-22], 理论而言, ICAS-LVO 患者血栓负荷量小, 反复取栓损伤血管、缺血再灌注致出血等并发症的风险明显降低, 机械取栓容易实现血管再通, 大大减少了脑细胞缺血的时间, 但这需要术者更丰富的手术经验及技术。

术后伴颅内出血是狭窄伴原位闭塞机械取栓治疗的另一个重要关注点。研究显示, 血管内介入术

后颅内出血率高达 46.1%, 且为转归不良的重要危险因素^[23]。本研究显示, ICAS 组颅内出血发生率明显低于栓塞组, 可能是由于一方面栓塞性闭塞血栓负荷量大, 且多为陈旧性栓子, 质地较硬, 难以取出, 反复多次取栓易导致血管内膜撕裂, 另一方面, 栓塞组患者常常发病急骤, 梗死核心区大^[24], 缺少有效的侧支循环, 增加了无效再通及再灌注出血损伤的风险^[25]。

值得一提的是, 本研究对闭塞血管的性质的判断依据术中造影的结果, 具有一定的局限性, 有时很难区分病变为潜在的狭窄或者为取栓后残留的栓子。另一方面, 本研究发现部分超时间窗 ICAS 患者采用合适的手术治疗方式仍然取得良好预后, ICAS-LVO 往往病情反复且易波动, 发病前常有反复的短暂性脑缺血发作, 甚至表现为进展性卒中^[26], 是因为颅内大血管在闭塞以前就往往合并原位的重度狭窄, 有较好的侧支循环, 单纯依据时间窗筛选并不可靠, 所以, 对于 ICAS-LVO 超时间窗的患者, 如何快速有效评估组织窗更为关键^[27-31]。

本研究为回顾性研究, 数据来自单中心, 纳入的病例数有限, 难免造成选择性偏倚。总之, 本研究表明, 由于发病机制不同, ICAS-LVO 手术方式通常更复杂, 更多的患者需要球囊血管成形及补救性支架置入, 术后颅内出血发生率低, 今后还需更多的研究如何快速的识别 ICAS 以及寻找最合适的血管内治疗策略。

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