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## 远端血管通路导管治疗急性脑梗死对血清 Adropin 蛋白、载脂蛋白 A1 的影响\*

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**摘要 目的:**探讨远端血管通路导管治疗急性脑梗死对血清 Adropin 蛋白、载脂蛋白 A1(ApoA1)的影响。**方法:**将 2018 年 6 月到 2021 年 4 月选择在本院急诊的急性脑梗死患者 84 例作为研究对象,根据随机信封 1:1 抽签原则把患者分为导管组与支架组,各 42 例。支架组给予支架溶栓治疗,导管组给予远端血管通路导管治疗,比较两组手术相关指标、mTICI 分级情况、脑血流流变学变化以及血清 Adropin、ApoA1 含量等指标。**结果:**导管组的导引导管到位时间、血管获得再通时间均较支架组少( $P<0.05$ );导管组治疗后 1 个月的血管灌注改良脑梗死溶栓试验(mTICI)分级优于支架组( $P<0.05$ );两组颅脑椎动脉与基底动脉血流速度治疗前均无差异( $P>0.05$ ),治疗后两组的颅脑椎动脉与基底动脉血流速度高于治疗前( $P<0.05$ ),导管组较支架组高( $P<0.05$ );两组血清 Adropin、ApoA1 含量治疗前对比无差异( $P>0.05$ ),治疗后两组的血清 Adropin、ApoA1 含量较治疗前高( $P<0.05$ ),导管组较支架组高( $P<0.05$ )。**结论:**远端血管通路导管治疗急性脑梗死可加快手术操作改善患者的血管灌注分级情况,促进血清 Adropin、ApoA1 的释放,有利于患者脑动脉血流速度的恢复。

**关键词:**远端血管通路导管;急性脑梗死;血管灌注分级;Adropin 蛋白;载脂蛋白 A1

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## Effect of Distal Vascular Access Catheter in Treatment of Acute Cerebral Infarction on Serum Adropin Protein and Apolipoprotein A1\*

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**ABSTRACT Objective:** To investigate the effects of distal vascular access catheters for treatment of acute cerebral infarction on serum Adropin protein and apolipoprotein A1 (ApoA1). **Methods:** From June 2018 to April 2021, 84 cases of patients with acute cerebral infarction in the emergency department of our hospital were selected as the research objects. All the cases were divided into catheter group and stent group with 42 cases each groups accorded to the random envelope 1:1 lottery principle. The stent group was given stent thrombolysis, and the catheter group was given distal vascular access catheter therapy. The operation-related indicators, mTICI grade, cerebral hemorheology changes, and serum Adropin and ApoA1 levels were compared between the two groups. **Results:** In the catheter group, the time to place the guiding catheter and the blood vessel recanalization were shorter than that of the stent group ( $P<0.05$ ). The vascular perfusion modified mTICI of the catheter group were better than that of the stent group one month after treatment ( $P<0.05$ ). There was no difference in craniocerebral and basilar flow velocity between the two groups before treatment ( $P<0.05$ ), after treatment, the blood flow velocity of the craniocerebral vertebral artery and basilar artery were higher than before treatment ( $P<0.05$ ), and the catheter group were higher than the stent group ( $P<0.05$ ). There was no difference in serum Adropin and ApoA1 levels between the two groups before treatment ( $P<0.05$ ), after treatment, the serum Adropin and ApoA1 levels in the two groups were higher than before treatment ( $P<0.05$ ), and the catheter group were higher than the stent group ( $P<0.05$ ). **Conclusion:** The treatment of acute cerebral infarction with distal vascular access catheter can speed up the operation and improve the vascular perfusion grading of patients, promote the release of serum Adropin and ApoA1, and help the recovery of cerebral arterial blood flow velocity.

**Key words:** Distal Vascular Access Catheter; Acute Cerebral Infarction; Vascular Perfusion Grading; Adropin Protein; Apolipoprotein A1

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## 前言

急性脑梗死是局部脑组织区域血液供应障碍,进而引起脑部缺氧缺血引发的疾病。该病的特点为:反复发作、短暂性与突发性,在当前临床上较常见<sup>[1]</sup>。急性脑梗死早期症状不显著,导致发病时具有极高的致残率,且近年来有年轻化趋势<sup>[2]</sup>。目前尚不明确急性脑梗死的具体发病机制,研究发现:糖尿病等疾病是该病的主要病因,且血管狭窄等也可诱发该病<sup>[3]</sup>。当前有研究显示:脑梗死主要与脑血液流变学、凝血功能异常等相关<sup>[4]</sup>。支架取栓为急性脑梗死的主要治疗方法,具有操作简单等优势,但很难持续改善患者预后<sup>[5,6]</sup>。随着机械取栓装置的进步,远端血管通路导管已应用于脑梗死的治疗,该方法的内腔更大、流速更高,能够直接抽吸取栓,从而减少手术时间,提高疾病的成功再通率,使到达目标血管更快速且损伤更小<sup>[7,8]</sup>。Adropin 蛋白为一种内源性生物活性蛋白,与机体动脉粥样硬化、代谢性疾病、心脑血管疾病等存在相关性,具有血管内皮保护、维持胰岛素敏感性等多种作用<sup>[9,10]</sup>。载脂蛋白 A1(Apolipoprotein, ApoA1)是高密度脂蛋白的重要组成成分,由小肠和肝脏产生,主要通过接受外周细胞中过剩的胆固醇,识别组织细胞上的受体,活化卵磷脂胆固醇酰基转移酶,将其转运回肝脏高密度脂蛋白

颗粒,驱动胆固醇的逆向转运<sup>[11,12]</sup>。本文具体探讨了远端血管通路导管治疗急性脑梗死对血清 Adropin、ApoA1 的影响,以明确远端血管通路导管的应用价值与机制。

## 1 资料与方法

### 1.1 一般资料

选择于 2018 年 6 月到 2021 年 4 月在本院急诊的急性脑梗死患者 84 例作为研究对象。

纳入标准:符合急性脑梗死的诊断标准<sup>[13]</sup>;发病时间 <8 h;具有远端血管通路导管与支架溶栓治疗的指征;预计生存期  $\geq 1$  个月;无出血倾向,无严重心、肝、肾等实质脏器疾病;患者家属知情同意本研究;本研究经本院伦理委员会批准;年龄 20-75 岁;美国国立卫生研究院卒中量表(National Institute of Health stroke scale, NIHSS)评分  $\geq 6$  分。

排除标准:颅内动脉瘤、动静脉畸形及可疑蛛网膜下腔出血等患者;存在出血风险者及明显凝血功能障碍者;心源性脑梗死患者。

根据随机信封 1:1 抽签原则把患者分为导管组与支架组各 42 例,两组患者一般资料对比无差异( $P>0.05$ )。见表 1。

表 1 两组一般资料对比

Table 1 Comparison of general data between the two groups

Groups	n	Duration (h)	Systolic blood pressure (mmHg)	Diastolic blood pressure (mmHg)	Body mass index (kg/m <sup>2</sup> )	Gender (male/female)	Age (years)	NIHSS Score (points)
Catheter group	42	4.27± 0.34	135.25± 12.33	78.29± 9.14	22.77± 1.48	22/20	57.39± 6.29	10.33± 1.48
Stents group	42	4.31± 0.24	135.09± 13.85	78.33± 7.18	22.91± 2.48	21/21	57.93± 7.12	10.22± 2.18
t or $\chi^2$		0.623	0.056	0.022	0.314	0.048	0.368	0.271
P		0.535	0.955	0.983	0.754	0.827	0.714	0.787

### 1.2 治疗方法

支架组:给予支架溶栓治疗,经股动脉穿刺,置入动脉鞘,8F 导引导管内嵌导丝,置于病变位置较近的血管,引入中间导管、微导管、微导丝,引入取栓支架 Solitaire-AB 于闭塞段,将支架完全打开。

导管组:给予远端血管通路导管治疗,前期处理同支架组,于病变侧颈内动脉起始段或颈总动脉末端放置导引导管,同时将 6FSofia 导管在微导丝引导下送至血栓近端,负压抽吸 Sofia 导管,退出导管后冲洗 Sofia 导管。

所有患者都给予动脉内给予负荷剂量 0.4  $\mu\text{g}/(\text{kg}\cdot\text{min})$  替罗非班,并于术后 3 d 经微量泵以 0.1  $\mu\text{g}/(\text{kg}\cdot\text{min})$  静脉持续泵入,给予口服阿司匹林 100 mg/d 联合氯吡格雷 75 mg/d。

### 1.3 观察指标

1.3.1 手术相关指标 观察与记录所有患者的导引导管到位时间、血管获得再通时间。

1.3.2 mTICI 分级情况 所有患者在治疗后 1 个月采用改良

脑梗死溶栓试验 (Modified thrombolysis in cerebral infarction score, mTICI) 标准评估血管开通程度<sup>[14]</sup>,0 级:无灌注;1 级:极微量的渗透性灌注;2 级:整个血管区域充盈  $\geq 1/2$ ;3 级:完全灌注。

1.3.3 脑血液流变学变化 在治疗前与治疗 1 个月对患者进行颅脑超声,记录与检测基底动脉、椎动脉的血流速度。

1.3.4 血清 Adropin、ApoA1 含量变化 在治疗前后抽取患者的 2-3 mL 空腹静脉血,自然凝固 30 min 后常温以转速 3000 r/min 离心 10 min,分离血清,-70  $^{\circ}\text{C}$  低温冰箱保存,采用双抗体夹心法测量血清 Adropin、ApoA1 含量。

### 1.4 统计方法

应用 SPSS19.0 软件进行分析,所有计量资料以 ( $\bar{x} \pm s$ ) 表示,采用 t 检验;计数数据采用 (n/%) 表示,采用  $\chi^2$  检验,检验的显著性水平为 0.05。

## 2 结果

2.1 手术相关指标对比

组少( $P<0.05$ )。见表 2。

导管组的导引导管到位时间、血管获得再通时间均较支架

表 2 两组手术相关指标对比(min,  $\bar{x}\pm s$ )

Table 2 Comparison of operation-related indicators between the two groups (min,  $\bar{x}\pm s$ )

Groups	n	Guide catheter placement time	Vessels gain recanalization time
Catheter group	42	26.39± 3.28	255.29± 34.29
Stents group	42	34.24± 4.09	267.98± 23.18
t		9.843	11.742
P		<0.001	<0.001

2.2 mTICI 分级情况对比

( $P<0.05$ )。见表 3。

导管组治疗后 1 个月的血管灌注 mTICI 分级优于支架组

表 3 两组治疗后 1 个月 mTICI 分级情况对比(n)

Table 3 Comparison of mTICI grading between the two groups 1 month after treatment (n)

Groups	n	Level 0	Level 1	Level 2	Level 3
Catheter group	42	0(0.0%)	2(4.8%)	17(40.5%)	23(54.8%)
Stents group	42	1(2.4%)	7(16.7%)	20(47.6%)	14(33.3%)
$\chi^2$			6.210		
P			0.041		

2.3 脑血流流变学变化对比

( $P>0.05$ ), 治疗后两组的颅脑椎动脉与基底动脉血流速度都较

两组颅脑椎动脉与基底动脉血流速度治疗前均无差异 治疗前高,导管组较支架组高( $P<0.05$ )。见表 4。

表 4 两组治疗前后脑动脉血流速度对比(cm/s,  $\bar{x}\pm s$ )

Table 4 Comparison of cerebral arterial flow velocity before and after treatment (cm/s,  $\bar{x}\pm s$ )

Groups	n	Vertebral artery		t	P	Basal artery		t	P
		Before the treatment	After the treatment			Before the treatment	After the treatment		
Catheter group	42	27.33± 3.33	33.29± 2.38	15.888	<0.001	26.98± 2.52	33.59± 3.84	17.877	<0.001
Stents group	42	27.09± 2.84	30.22± 4.02	7.825	0.007	26.76± 3.33	30.78± 4.44	9.872	<0.001
t		0.314	8.924			0.224	8.134		
P		0.762	<0.001			0.821	0.004		

2.4 血清 Adropin、ApoA1 含量变化对比

05), 治疗后两组的血清 Adropin、ApoA1 含量较治疗前高,导

两组血清 Adropin、ApoA1 含量治疗前对比无差异( $P>0$ . 管组较支架组高( $P<0.05$ )。见表 5。

表 5 两组治疗前后血清 Adropin、ApoA1 含量变化对比( $\bar{x}\pm s$ )

Table 5 Comparison of changes in serum Adropin and ApoA1 before and after treatment ( $\bar{x}\pm s$ )

Groups	n	Adropin( $\mu\text{g/mL}$ )		t	P	ApoA1(g/L)		t	P
		Before the treatment	After the treatment			Before the treatment	After the treatment		
Catheter group	42	2.03± 0.23	3.45± 0.48	15.025	<0.001	1.01± 0.24	1.32± 0.14	15.782	<0.001
Stents group	42	2.04± 0.18	2.67± 0.34	6.872	0.016	1.00± 0.18	1.21± 0.22	9.174	<0.001
t		0.067	8.713			0.036	6.877		
P		0.945	0.003			0.976	0.016		

### 3 讨论

急性脑梗死的致残率较高,多发于60岁以上人群。该病临床表现多种多样,除躯体障碍外,也常伴有相应的认知功能损害甚至痴呆<sup>[5]</sup>。药物治疗脑梗死一般能取得较好疗效,但对于急性脑梗死患者多需要采用支架溶栓或导管治疗。本文探讨了远端血管通路导管治疗急性脑梗死对血清 Adropin、ApoA1 的影响,以明确远端血管通路导管的应用价值与机制,为临床治疗提供一定的理论依据。

本研究显示:导管组的导引导管到位时间、血管获得再通时间均较支架组少,表明远端血管通路的导管治疗急性脑梗死能缩短手术时间。这一结果与 Kitajima A 等人<sup>[16]</sup>的结果具有一致性,分析其原因可知,远端血管通路导管是当前机械取栓的一种新方法,其操作简便、效果快速再通,且本研究使用的6FSofia的管头内径为0.070英寸,既可作为中间导管,又可作为抽吸导管,与其他抽吸导管相比,该导管的管径更大、管头吸力更强,从而可加快手术操作<sup>[17,18]</sup>。

经文献报道:急性脑梗死因脑动脉管腔狭窄甚或闭塞,进而导致脑组织缺血缺氧<sup>[19]</sup>。本研究显示导管组治疗后1个月的血管灌注分级优于支架组。这一结果与 Ko CC 等人<sup>[20]</sup>结果相似,进一步分析,远端血管通路导管治疗避免了支架到位及释放所需时间,使得导管快速到达闭塞段,实现血管快速再通,也具有操作简便、步骤少等特点,远端血管通路导管的应用能快速实现再通血管的,且较传统的支架取栓更快<sup>[21]</sup>。本研究所使用的6FSofia导管头端具有很强的吸附能力,经颈内动脉虹吸段的扭曲段到达M1远端、M2段,抽吸时导管头端的血流率比较大,且在用较少时间、最小程度影响血管内皮情况下,到达患病部位,从而改善患者的血管灌注分级情况<sup>[22,23]</sup>。

脑梗死已成为众多中老年人的常见病、多发病,该病的发生与颈动脉或椎-基底动脉系统有关,该系统的异常将导致血液无法顺利直达脑部,造成供血供氧不足,从而诱发局灶性脑缺血,最终诱发神经功能障碍<sup>[24]</sup>。动脉管腔变窄会导致血流速度减缓、血黏度增高、血小板聚集,从诱发脑梗死的发生<sup>[25]</sup>。颅脑多普勒超声探测属可动态显示脑动脉血流参数发生的变化<sup>[26]</sup>。本研究显示:治疗后两组的颅脑椎动脉与基底动脉血流速度高于治疗前,导管组较支架组高。表明远端血管通路导管治疗急性脑梗死能促进患者脑动脉血流速度的恢复, Terasawa Y 等人<sup>[27]</sup>有类似的结论。从机制上进一步分析其原因:应用远端血管通路导管可避免反复支架拉栓带来的血管内膜损伤,降低血栓逃逸风险,提高动脉开通速度,可减少动脉内膜损伤,且其也可解决脑血管痉挛,扩张脑血管并增加脑供血,加快脑动脉血流速度<sup>[28]</sup>。

血清 Adropin 水平降低可导致稳定性冠状动脉疾病的发生,且与冠脉病变 SYNTAX 评分具有相关性。更为重要的是,低水平 Adropin 与内皮功能障碍存在相关性,将会加快动脉粥样硬化过程<sup>[29]</sup>。ApoA1 属于高密度脂蛋白,是该蛋白的主要结构蛋白,可作用于脂类运输,参与调控卵磷脂胆固醇脂酰转移酶向肝内转运。ApoA1 可抑制低密度脂蛋白氧化、调节炎症反应,促进胆固醇从动脉血管壁中流出。ApoA1 降低可促进动脉粥样硬化的形成,诱发血管动脉粥样硬化,促进巨噬细胞胆固

醇脂化和形成泡沫细胞<sup>[30]</sup>。本研究显示:治疗后两组血清 Adropin、ApoA1 含量高于治疗前,导管组高于支架组,表明远端血管通路导管治疗急性脑梗死能促进血清 Adropin、ApoA1 的释放。这一结果与 Chen ZX 等人<sup>[31]</sup>具有一致性,从机制上分析可知,远端血管通路导管可于血栓远心端放置微导管跨越闭塞段血管,经导管同轴技术,稳固锚定血栓,从而保护血栓逃逸。同时远端血管通路导管通过将突触传递阻断,神经元兴奋性降低,进而增加缺血区及周边能量供应,从而有利于机体血清 Adropin、ApoA1 含量的提高<sup>[32,33]</sup>。但本研究也有一定不足,样本量较少,且未进行有关患者长期预后的随访调查,将在下一步进行深入分析。

总之,远端血管通路导管治疗急性脑梗死能加快手术操作,改善患者的血管灌注分级情况,促进血清 Adropin、ApoA1 的释放,有利于患者脑动脉血流速度的恢复。

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