

血管内治疗对不同病变性质急性基底动脉闭塞患者预后的影响

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【摘要】 目的 评估血管内治疗对不同病变性质导致的急性基底动脉闭塞性脑卒中患者预后的影响。**方法** 连续回顾性分析 2017-11—2021-11 在苏州大学附属张家港医院(31 例)和苏州大学附属第二医院(50 例)行血管内治疗的急性基底动脉闭塞患者 81 例,按照有无基底动脉狭窄(BAS)分 BAS 组和无 BAS 组,比较 2 组患者的临床、影像、手术资料,对比分析 2 组的预后结局。对 BAS 组进一步按血管成形术分亚组,比较预后。**结果** 共纳入 BAS 组患者 56 例,无 BAS 组患者 25 例,其女性比例更高(48.0% vs 19.6%, $P=0.009$),BAS 组的高血脂比例(25% vs 0, $P=0.004$)、吸烟比例(53.6% vs 24.0%, $P=0.013$)、入院低密度脂蛋白[2.96(2.60~3.59) vs 2.62(1.91~2.75), $P=0.006$]更高,BAS 组患者 pc-ASPECTS 评分低于无 BAS 组患者[7(6~8) vs 8(7~8), $P=0.01$],采用血管内成形术 BAS 组更高(33.9% vs 8.0%, $P=0.014$)。2 组的成功再灌注 mTICI 2b~3、病变血管部位、穿刺-复流时间、rt-PA 静脉溶栓率差异均无统计学意义($P>0.05$)。经校正性别、年龄、吸烟、pc-ASPECTS、低密度脂蛋白、术后 mTICI 2b~3 比例等因素后,BAS 组相比无 BAS 组,90 d 良好预后 mRS(0~2)更低($OR=0.20$,95% CI :0.40~0.96, $P=0.044$),90 d 有利预后 mRS(0~3)、症状性颅内出血、90 d 内死亡 2 组无统计学差异($P>0.05$)。BAS 组内有无血管成形术亚组比较,90 d 良好预后、症状性颅内出血、死亡无统计学差异。**结论** 急性基底动脉闭塞患者中 BAS 和无 BAS 组的血管内治疗再通率、手术时间无统计学差异,但合并 BAS 患者的 90 d 良好预后低于无 BAS 患者,而症状性颅内出血及死亡两者无显著差异。BAS 患者中是否行血管内成形术对预后无影响。

【关键词】 急性基底动脉闭塞;血管内治疗;基底动脉狭窄;血管成形;预后

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Effect of intravascular therapy on prognosis of patients with acute basilar artery occlusion caused by different pathological properties

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【Abstract】 Objective To evaluate the effect of intravascular therapy on the prognosis of patients with acute basilar artery occlusion stroke caused by different pathological properties. **Methods** Totally 81 patients with acute basilar artery occlusion who underwent endovascular treatment in Zhangjiagang Hospital of Soochow University (31 cases) and the Second Affiliated Hospital of Soochow University (50 cases) from November 2017 to November 2021 were analyzed retrospectively. The patients were divided into BAS group and non BAS group according to whether there was basilar artery stenosis (BAS). The clinical, imaging and surgical data of the two

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groups were compared, and the prognosis and outcome of the two groups were compared and analyzed. Bas group was further divided into subgroups according to angioplasty, and the prognosis was compared. **Results** A total of 56 patients with BAS and 25 patients with non BAS were included. The proportion of women in the non BAS group was higher (48.0% vs 19.6%, $P=0.009$). The proportion of hyperlipidemia (25% vs 0, $P=0.004$) and smoking (53.6% vs 24.0%, $P=0.013$) in BAS group were higher. The admission low-density lipoprotein in BAS group was higher than that in non BAS patients [2.96 (2.60–3.59) vs 2.62 (1.91–2.75), $P=0.006$], and the pc-ASPECTS was lower than that in non BAS patients [7 (6–8) vs 8 (7–8), $P=0.01$]. Patients with BAS who underwent endovascular angioplasty were higher than those with non BAS (33.9% vs 8.0%, $P=0.014$). There was no significant difference in successful reperfusion mTICI 2b–3, lesion vessel location, puncture reflow time and intravenous thrombolysis rate of rt-PA between the two groups ($P>0.05$). After adjusting for gender, age, smoking, pc-ASPECTS, low density lipoprotein and postoperative mTICI 2b–3. Compared with non BAS group, the 90 day good prognosis mRS (0–2) in BAS group was lower, $OR=0.20$, 95% $CI:0.40-0.96$, $P=0.044$. There was no significant difference in 90 day favorable prognosis mRS(0–3), symptomatic intracranial hemorrhage and death within 90 days between the two groups ($P>0.05$). There was no significant difference in 90 day good prognosis, symptomatic intracranial hemorrhage and death between the BAS group with and without angioplasty. **Conclusion** In patients with acute basilar artery occlusion, there was no significant difference in recanalization rate and operation time between bas and non bas groups. However, the 90 day good prognosis of patients with BAS was lower than that of patients without BAS, and there was no significant difference between symptomatic intracranial hemorrhage and death. Endovascular angioplasty has no effect on the prognosis of BAS patients.

【Key words】 Acute basilar artery occlusion; Endovascular therapy; Basilar artery stenosis; Angioplasty; Prognosis

急性基底动脉闭塞(acute basilar artery occlusion, ABAO)是一种严重威胁生命的卒中类型,尽管已有静脉溶栓药物应用和现代的血管内治疗措施,病死率、致残率仍极高^[1-2]。鉴于 ABAO 极差的临床结局,尽管 ABAO 的血管内治疗目前未取得类似前循环大血管闭塞的随机研究结果^[3-5],血管内治疗在临床实践中仍然认为是有效的^[6],也得到了专家共识的推荐^[7]。最新的 ABAO 血管内治疗随机研究^[8-9]未能证实血管内治疗较药物治疗的显著优势,哪一类型的 ABAO 患者能够在血管内治疗中获益有待进一步的研究。国内外对于不同机制导致的 ABAO 血管内治疗的研究,得出了不同的结果^[10-11]。急性基底动脉闭塞的常见类型是慢性狭窄基础的急性闭塞和无狭窄基础的急性闭塞,本研究通过分析术前有无基底动脉狭窄(basilar artery stenosis, BAS),分 BAS 和无 BAS 两种病变性质导致的 ABAO,对比两者的临床资料,分析两种闭塞类型对预后结局的影响,为临床决策提供参考。

1 资料与方法

1.1 研究对象 回顾性分析 2017–11—2021–11 苏州大学附属张家港医院(31 例)和苏州大学附属第二医院(50 例)行血管内治疗的后循环急性基底动脉闭塞性脑卒中 81 例患者的临床资料。其中男 58 例,女 23 例,中位年龄 65 (7–55) 岁。纳入标准:(1)术前经 CTA、DSA 证实的急性基底动脉主干闭塞,术前 CT 排除脑出血。(2)术前 NIHSS >6 分,发病–穿刺时间 <24 h 或最后正常时间–穿刺时间 <24 h。(3)患者家属同意行血管内介入治疗。排除标准:(1)术前 pc-ASPECTS <6

分。(2)术前 CT 显示小脑大面积梗死伴脑水肿者及脑积水者。(3)发病前改良 Rankin 量表(modified Rankin's scale, mRS) ≥ 2 分者。(4)随访资料不全者。

1.2 资料收集方法 收集入组患者的人口学资料(性别、年龄)及既往病史,入院 NHISS 评分,术前 pc-ASPECTS 评分,静脉溶栓,手术方式,病变部位,侧支循环情况、再灌注 mTICI 分级,发病、穿刺、再通时间节点及基线血压、血凝、生化等资料,随访 90 d mRS,术后症状性颅内出血,90 d 内死亡。主要结局:90 d mRS(0–2)为预后良好,90 d mRS(0–3)为预后有利。次要结局:90 d 内全因死亡,症状性颅内出血:术后 CT 见出血转化且临床症状加重(NIHSS 增加 ≥ 4 分)^[12]。

1.3 手术方法 术前根据《中国急性缺血性脑卒中诊治指南 2018》^[13]要求,如符合静脉溶栓指征,给予标准剂量 rt-PA 静脉溶栓后桥接血管内治疗,如溶栓禁忌或家属拒绝溶栓,直接血管内治疗。术前常规脑血管造影,明确病变血管部位、路径、侧支循环、后交通代偿情况等,应用可回收支架拉栓或中间导管抽吸或抽拉结合等技术开通闭塞血管,如残余狭窄无法维持血流,允许补救性血管成形术(球囊扩张或支架植入)或动脉内给药(rt-PA、尿激酶、替罗非班)。记录穿刺、再通时间节点,再灌注 mTICI 分级。根据术中拉栓或抽吸后血管有无狭窄情况明确 ABAO 的病变性质,无 BAS 患者、合并 BAS 患者(图 1)。

1.4 统计学方法 应用 SPSS 19.0 统计软件,符合正态分布的计量资料以均值 \pm 标准差表示,非正态分布的计量资料以中位值(四分位间距)表示,组间比较采用 Mann-Whitney U 或 Kruskal-Wallis 秩和检验。计数

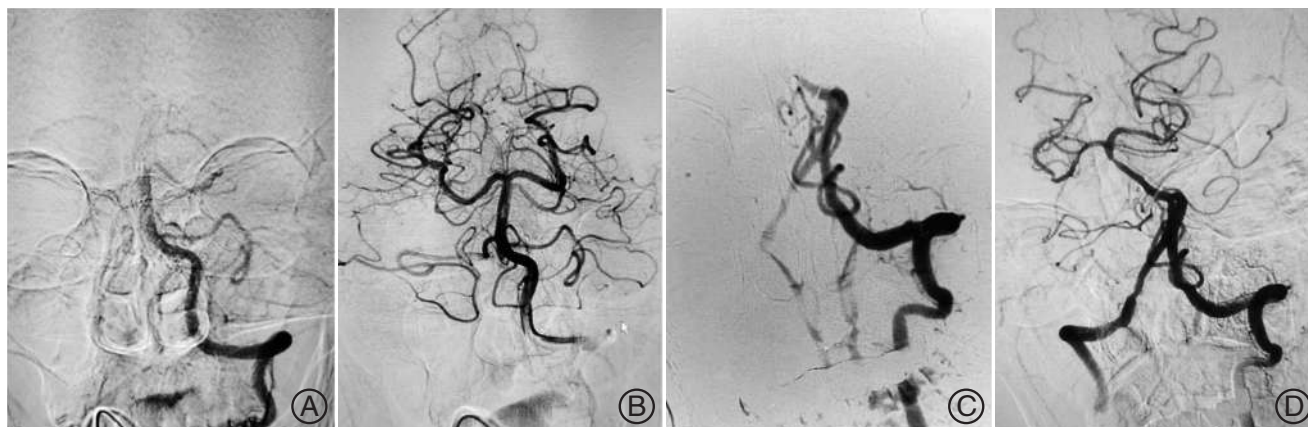


图1 A、B:无BAS患者术前后DSA;C、D:合并BAS患者术前后DSA

Figure 1 A-B: DSA before and after surgery in patients without BAS; C-D: DSA before and after surgery in patients with BAS

资料以百分率表示,组间比较采用卡方检验或 Fisher 精确检验。采用单因素和校正多因素 Logistic 回归模型分析自变量与临床结局的关系,计算比值比(OR 值)及 95%可信区间(95% CI),校正因素为基线比较有统计学差异的变量。 $P < 0.05$ 为差异有统计学意义。

2 结果

2.1 2组临床基线资料比较 共纳入BAS患者56例,

无BAS患者25例,2组患者在两家医院的分布为(19/12 vs 37/13, $P = 0.229$),具有可比性。2组患者性别差异有统计学意义($P < 0.05$),BAS组高血脂比例(25% vs 0, $P = 0.004$)、吸烟比例(53.6% vs 24.0%, $P = 0.013$)、入院低密度脂蛋白[2.96(2.60~3.59) vs 2.62(1.91~2.75), $P = 0.006$]高于无BAS组,BAS组的pc-ASPECTS评分低于无BAS患者[7(6~8) vs 8(7~8), $P = 0.01$]。见表1。

表1 2组患者的临床、影像基线资料比较

Table 1 Comparison of clinical and imaging baseline data between the two groups

变量	无BAS组 (n=25)	BAS组 (n=56)	P值
年龄/岁	70(54~75)	64(55~71)	0.210
女性/%	12(48.0)	11(19.6)	0.009
高血脂/%	0	14(25.0)	0.004
高血压/%	11(44.0)	27(48.2)	0.726
糖尿病/%	8(32.0)	12(21.4)	0.308
吸烟/%	6(24.0)	30(53.6)	0.013
饮酒/%	4(16.0)	15(26.8)	0.290
既往脑卒中/%	3(12.0)	10(17.9)	0.701
时间窗内/%	19(76.0)	36(64.3)	0.297
rt-PA/%	12(48.0)	15(26.8)	0.061
发病-首剂时间/min	114.5(91.5~177.5)	150(107~185)	0.347
入院NIHSS/分	22.40±9.57	22.11±9.46	0.830
pc-ASPECTS/分	8(7~8)	7(6~8)	0.010
术前ASTIN/SIR/分	1(0~1)	1(0~2)	0.549
后交通开放/%	4(16.0)	16(26.8)	0.290
基线收缩压/mmHg	146.44±21.78	155.70±24.46	0.108
基线舒张压/mmHg	86.08±13.14	86.80±15.60	0.840
基线血糖/(mmol/L)	6.73(5.38~9.8)	6.98(6.07~10.91)	0.771
糖化血红蛋白/(g/L)	6.0(5.7~7.7)	5.9(5.5~6.6)	0.318
甘油三酯/(mmol/L)	1.00(0.69~1.34)	1.11(0.88~1.54)	0.162
高密度脂蛋白/(mmol/L)	1.23±0.26	1.19±0.27	0.549
低密度脂蛋白/(mmol/L)	2.62(1.91~2.75)	2.96(2.60~3.59)	0.006
尿酸/(mmol/L)	329.60±90.24	348.50±98.72	0.419
中性粒细胞/淋巴细胞	6.83(3.71~9.87)	8.46(3.84~13.43)	0.162
D-二聚体/(mg/L)	1.01(0.49~3.24)	0.89(0.37~1.93)	0.328

注:rt-PA:重组组织型纤溶酶原激活;NIHSS:美国国家卫生研究院卒中量表;pc-ASPECTS:后循环 Alberta 卒中项目早期 CT 评分;ASTIN/SIR:美国介入和治疗神经放射学会/介入放射学会

2.2 2组患者手术情况比较 采用血管内成形术 BAS 患者高于无 BAS 患者 (33.9% vs 8.0%, $P=0.014$)。2 组的手术方式、术后 mTICI 2b-3 比例、病变血管部位、穿刺-复流时间等差异均无统计学意义 ($P>0.05$)。见表 2。

表 2 2组患者手术情况比较

变量	无BAS组 (n=25)	BAS组 (n=56)	P值
手术方式			0.237
抽吸	10(40.0)	13(27.1)	
支架拉栓	10(40.0)	20(41.7)	
抽拉结合	1(4.0)	0	
动脉内给药	4(16.0)	15(31.3)	
血管内成形术	2(8.0)	19(33.9)	0.014
病变部位			0.222
BA 尖端	8(32.0)	12(21.4)	
BA 主干	15(60.0)	31(55.4)	
椎动脉+BA	2(8.0)	13(23.2)	
发病-穿刺时间/min	262(190~366)	283.5(206~464)	0.355
穿刺-复流时间/min	50(35~75)	60(40~88)	0.136
发病-复流时间/min	293(240~435)	365(274~541)	0.194
术后 mTICI 2b~3	21(84.0)	44(78.6)	0.571

2.3 2组预后结局比较 经校正性别、年龄、吸烟、pc-ASPECTS、低密度脂蛋白、术后 mTICI 2b~3 比例等因素后, BAS 组相比无 BAS 组, 90 d 良好预后 mRS (0~2) 更低 $OR=0.20$, $95\% CI: 0.40\sim 0.96$, $P=0.044$, 90 d 有利预后 mRS (0~3)、症状性颅内出血、90 d 内死亡 2 组无统计学差异 ($P>0.05$)。见表 3。

2.4 BAS 组血管内成形术亚组的预后比较 基底动脉狭窄 BAS 组内, 根据有无血管内成形术亚组比较, 校正后显示: 90 d 良好预后比例、症状性颅内出血、

死亡无统计学差异 ($P>0.05$)。见表 4。

3 讨论

本研究显示, 不同病变性质导致的急性基底动脉闭塞血管内治疗有不同的预后结局, 合并 BAS 组患者的 90 d 良好预后率低于无 BAS 组患者, 而症状性颅内出血、死亡未显示出显著差异。分析入组的病例, BAS 组的发病-复流时间偏长 365 min (274~541) vs 293 min (240~435), 成功再灌注率偏低 (78.6% vs 84.0%), 虽无统计学差异, 可能和合并 BAS 的闭塞的病因相对复杂, 如继发原位血栓、串联病变动脉-动脉栓塞、低灌注等, 手术后容易再闭塞及反复血栓形成, 加大了手术的难度和复杂性, 可能会造成复流时间延长、再灌注率偏低。

2018 年急性缺血性卒中救治指南的强力推荐^[14-15], 前循环大血管闭塞的血管内治疗已成为标准治疗方式, 研究表明前循环急性大动脉闭塞患者中不同病变亚型的临床预后和死亡无显著差异^[16], 而后循环相对于前循环有着不同的解剖和病理特点, 病变性质和病因亚型的比例较前循环不同, 2019 年 BEST 研究^[8]入组的取栓患者中 56% 为大动脉粥样硬化, 2020 年 BASILAR 研究^[17]入组的取栓患者中动脉粥样硬化比例达 64.6%, 其中绝大部分合并有基底动脉狭窄, 现代取栓技术对于动脉粥样硬化狭窄病变往往无法实现一把通, 需要补救性血管成形术或动脉内给药, 参照前循环的经验过多的血管内操作是临床预后差的高危因素^[18], 很大比例的狭窄继发闭塞患者的手术过程血管内操作过多, 这或许是目前 ABAO 血管内治疗的大型随机研究未得出较药物治疗显著优势的原因之一。既往的研究将 ABAO 不同发病机制分为栓塞和动

表 3 2组患者预后结局比较

组别	n	90 d mRS 0~2	90 d mRS 0~3	症状性颅内出血	死亡
无BAS组	25	1.00	1.00	1.00	1.00
BAS组	56	0.20(0.40~0.96)	0.29(0.07~1.26)	2.29(0.24~21.39)	1.08(0.21~5.68)
P值		0.044	0.099	0.468	0.928

注: 校正因素: 性别、年龄、吸烟、pc-ASPECTS、低密度脂蛋白、术后 mTICI 2b~3 等混杂因素

表 4 BAS 组血管内成形术亚组的预后比较

组别	n	90 d mRS 0~2	症状性颅内出血	死亡
未血管内成形术	37	1.00	1.00	1.00
血管内成形术	19	1.97(0.42~9.18)	1.77(0.32~9.82)	0.58(0.14~2.43)
P值		0.391	0.514	0.114

注: 校正因素: 性别、年龄、pc-ASPECTS、术后 mTICI 2b~3 等混杂因素

脉原位血栓^[19],依靠影像学分椎动脉狭窄基础上动脉-动脉栓塞、无椎动脉狭窄基础栓塞及原位血栓^[11],及根据 TOAST 病因分型^[20]分动脉粥样硬化血栓和心源性栓塞^[21],然而基底动脉闭塞病变导致低灌注、累及重要穿支、血栓清除障碍等均是影响疾病严重程度的因素,基底动脉先前的狭窄参与了疾病的发展,故本研究将是否合并基底动脉狭窄分 BAS 和无 BAS 组,结果显示 BAS 和无 BAS 2 组动脉闭塞部位无显著差异, BAS 组合并椎动脉狭窄更多见,取栓后予残余狭窄如不能维持血流,则予血管内治疗处理,无 BAS 组支架取栓装置或抽吸导管容易到位且一把通比例较高,而合并 BAS 组,支架取栓或抽吸往往无法一次完全清除,残余狭窄进一步血管内治疗手段尚有争议^[22],我们的亚组分析显示血管内治疗未增加不良预后和死亡,但过多的炒作极易损伤内膜累及脑干穿支,此类患者或许可考虑血管内药物溶栓或直接血管成形术。

对于 ABAO 血管内治疗的研究证实术前低 NIHSS 评分、pc-ASPECTS,再通情况、发病-穿刺时间是良好预后的预测因子^[23],但仍未获得筛选 ABAO 血管内治疗的标准,正如两项基底动脉闭塞研究 (BEST、BASICS) 给我们的启示,经验显示血管内治疗在临床实践中已成功抢救了大量的 ABAO 患者^[24-25],如何将血管内治疗获益的那部分 ABAO 患者尽快的区分出来是下一步需要研究解决的问题,高级影像的参与筛选可能会有所帮助。我们研究了 BAS 和无 BAS 患者 ABAO,经校正性别、年龄、吸烟、pc-ASPECTS、低密度脂蛋白、成功再灌注等因素显示,无 BAS 患者血管内治疗较 BAS 患者更易获得良好结局,可能会对 ABAO 患者的取栓策略提供一些参考。本研究主要的局限性在于样本量较少,且为回顾性研究,为对基底动脉狭窄程度及长度是否影响预后进一步研究,较多病例是否合并 BAS 为结合术中、术后情况综合分析所得,本研究未涉及如何在术前尽快的进行 ABAO 的病因分类,术中应用微导管“首过效应”^[26]可能有助于判断是否合并狭窄病变,同样提示急需推广脑血管健康筛查工作,建立卒中筛查数据库,可帮助临床医生救治决策。

在 ABAO 患者中,血管闭塞的病变性质可能对血管内治疗预后产生影响^[27-43],合并 BAS 患者的 90 d 良好预后率低于无 BAS 患者,而症状性颅内出血、死亡组无显著差别。对于合并 BAS 的基底动脉闭塞患者,无论是否血管成形术,对预后均无显著影响。

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