·急性缺血性卒中血管内治疗·

颅内动脉狭窄部位对支架成形术安全性影响研究

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【摘要】 **目的** 探讨颅内动脉狭窄部位对支架成形术安全性的影响。**方法** 共73例症状性颅内动脉粥样硬化性狭窄患者，根据颅内动脉狭窄部位分为颈内动脉颅内段组（18例）、大脑中动脉M1段组（11例）、椎动脉颅内段组（27例）和基底动脉组（17例），均行颅内动脉支架成形术，记录颅内动脉狭窄改善情况，脑血管并发症（包括穿支事件、动脉夹层、支架内血栓形成、支架远端动脉栓塞和脑组织过度灌注等）和神经系统并发症（包括短暂性脑缺血发作、缺血性卒中和颅内出血），术后30 d采用改良Rankin量表（mRS）评价临床预后。**结果** 73例患者共植入支架73个，包括Apollo球囊扩张式支架35例和Wingspan自膨式支架38例，其中，颈内动脉颅内段组应用Apollo支架10例（10/18），Wingspan支架8例（8/18）；大脑中动脉M1段组应用Apollo支架5例（5/11），Wingspan支架6例（6/11）；椎动脉颅内段组应用Apollo支架16例（59.26%，16/27），Wingspan支架11例（40.74%，11/27）；基底动脉组应用Apollo支架4例（4/17），Wingspan支架13例（13/17），4组患者术中应用支架类型差异无统计学意义（$\chi^2 = 7.422$，$P = 0.201$）。治疗后颈内动脉颅内段组[（10.94 ± 1.99）%对（90.89 ± 7.71）%；$t = 69.545$，$P = 0.000$]、大脑中动脉M1段组[（10.37 ± 2.14）%对（87.64 ± 9.46）%；$t = 26.000$，$P = 0.000$]、椎动脉颅内段组[（11.02 ± 1.99）%对（89.11 ± 7.97）%；$t = 50.726$，$P = 0.000$]和基底动脉组[（10.99 ± 3.39）%对（91.35 ± 5.62）%；$t = 69.545$，$P = 0.000$]血管狭窄率均较治疗前改善。73例患者中11例（15.07%）发生脑血管并发症，分别为穿支事件4例、动脉夹层4例、支架内血栓形成1例、支架远端动脉栓塞2例，其中，颈内动脉颅内段组3例（3/18），为动脉夹层2例、支架远端动脉栓塞1例，基底动脉组8例（8/17），为穿支事件4例、动脉夹层2例、支架内血栓形成1例、支架远端动脉栓塞1例，而大脑中动脉M1段组和椎动脉颅内段组无一例发生脑血管并发症，组间差异有统计学意义（$H = 63.134$，$P = 0.000$）；6例（8.22%）发生神经系统并发症，包括短暂性脑缺血发作4例、缺血性卒中2例，其中，颈内动脉颅内段组1例（1/18），为缺血性卒中，基底动脉组5例（5/17），包括短暂性脑缺血发作4例、缺血性卒中1例，而大脑中动脉M1段组和椎动脉颅内段组无一例发生神经系统并发症，组间差异亦有统计学意义（$H = 65.698$，$P = 0.003$）。术后30 d颈内动脉颅内段组有1例、基底动脉组有1例mRS评分1分，预后良好率为97.26%（71/73）。**结论** 颅内动脉支架成形术围手术期脑血管和神经系统并发症风险与支架植入部位密切相关，且总体预后良好。

【关键词】 颅内动脉硬化； 血管成形术； 支架； 手术后并发症； 血管造影术，数字减影

Study on the effect of location of intracranial arterial stenosis on the safety of stenting

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【**Abstract**】 **Objective** To investigate the effect of location of intracranial arterial stenosis on the safety of intracranial stenting. **Methods** A total of 73 patients with symptomatic intracranial atherosclerotic stenosis (ICAS) were divided into intracranial internal carotid artery (IICA, N = 18), middle cerebral artery (MCA)-M1 segment (MCA-M1, N = 11), intracranial vertebral artery (IVA, N = 27) and basilar artery (BA, N = 17). All of them underwent intracranial stenting. The improvement of intracranial arterial stenosis, cerebrovascular complications including perforating events, artery dissection, in-stent thrombosis, distal stent arterial embolism and cerebral hyperperfusion, and neurological complications including transient ischemic attack (TIA), ischemic stroke and intracranial hemorrhage were recorded. Modified

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Rankin Scale (mRS) was used to evaluate the prognosis 30 d after operation. **Results** A total of 73 stents were implanted in 73 patients (35 Apollo balloon-expandable stents and 38 Wingspan self-expandable stents). Among them, 10 cases (10/18) were treated with Apollo stents and 8 cases (8/18) with Wingspan stents in IICA group, 5 cases (5/11) were treated with Apollo stents and 6 cases (6/11) with Wingspan stents in MCA-M1 group, 16 cases (59.26%, 16/27) were treated with Apollo stents and 11 cases (40.74%, 11/27) with Wingspan stents in IVA group, and 4 cases (4/17) were treated with Apollo stents and 13 cases (13/17) with Wingspan stents in BA group. No significant difference was seen in stent type among 4 groups ($\chi^2 = 7.422$, $P = 0.201$). The stenosis rate of IICA group after treatment [(10.94 ± 1.99)%] was significantly improved than before treatment [(90.89 ± 7.71)%; $t = 69.545$, $P = 0.000$]. The stenosis rate of MCA-M1 group after treatment [(10.37 ± 2.14)%] was significantly improved than before treatment [(87.64 ± 9.46)%; $t = 26.000$, $P = 0.000$]. The stenosis rate of IVA group after treatment [(11.02 ± 1.99)%] was significantly improved than before treatment [(89.11 ± 7.97)%; $t = 50.726$, $P = 0.000$]. The stenosis rate of BA group after treatment [(10.99 ± 3.39)%] was significantly improved than before treatment [(91.35 ± 5.62)%; $t = 69.545$, $P = 0.000$]. In 73 patients, cerebrovascular complications occurred in 11 cases (15.07%), including 4 cases of perforating events, 4 cases of artery dissection, one case of in-stent thrombosis and 2 cases of distal stent arterial embolism. There were 3 cases (3/18) in IICA group, including 2 cases of artery dissection and one case of distal stent arterial embolism, and 8 cases (8/17) in BA group, including 4 cases of perforating events, 2 cases of artery dissection, one case of in-stent thrombosis and one case of distal stent arterial embolism. No cerebrovascular complications occurred in MCA-M1 group and IVA group. The difference among 4 groups was statistically significant ($H = 63.134$, $P = 0.000$). Neurological complications occurred in 6 cases (8.22%), including 4 cases of TIA and 2 cases of ischemic stroke. There was one case (1/18) of ischemic stroke in IICA group, and 5 cases (5/17) in BA group, including 4 cases of TIA and one case of ischemic stroke. No neurological complications occurred in MCA-M1 group and IVA group. The difference among 4 groups was statistically significant ($H = 65.698$, $P = 0.003$). At 30 d after operation, there was one case with mRS 1 score in IICA group and one in BA group. The total rate of good prognosis 30 d after operation was 97.26% (71/73). **Conclusions** The location of intracranial arterial stenosis have a great influence on the risk of perioperative cerebrovascular and neurological complications in the intracranial stenting, and the overall prognosis is good.

【Key words】 Intracranial arteriosclerosis; Angioplasty; Stents; Postoperative complications; Angiography, digital subtraction

颅内动脉粥样硬化性狭窄(ICAS)是缺血性卒中的重要原因[1-2]。亚洲脑卒中患者颅内动脉粥样硬化性狭窄比例高达30%～50%[3]。经药物治疗后,症状性颅内动脉粥样硬化性狭窄患者的脑卒中复发风险仍较高[4]。随着血管内治疗技术的发展,支架成形术可以降低颅内动脉狭窄率并减少脑卒中复发风险[5]。然而,2011年发表的支架成形术和强化药物治疗预防颅内动脉狭窄患者脑卒中复发研究(SAMMPRIS)并未显示出支架成形术治疗颅内动脉粥样硬化性狭窄的优势,结果显示,支架成形术组患者30天内脑卒中发病率和病死率高于单纯强化药物治疗组[6],究其原因,主要与支架成形术围手术期脑卒中发病率和病死率密切相关。支架成形术围手术期常见脑血管事件包括穿支事件、动脉夹层、支架内血栓形成、支架远端动脉栓塞和脑组织过度灌注等,其所引起的神经系统并发症包括短暂性脑缺血发作(TIA)、缺血性卒中和颅内出血等,严重者可以导致残疾甚至死亡。影响支架成形术安全性的因素众多,如缺血性卒中发病时间、梗死灶体积、责任血管部位、对抗血小板药的反应及粥样硬化斑块性质和长度等。如果能够预测手术风险、减少手术并发症,则可能使支架成形术的获益得以展现。本研究回顾分析采用颅内动脉支架成形术的症状性颅内动脉粥样硬化性狭窄患者的临床资料,探讨颅内动脉狭窄部位对支架成形术安全性的影响,以为临床应用颅内动脉支架成形术提供依据。

资料与方法

一、临床资料

1.纳入标准 (1)参照华法林-阿司匹林治疗症状性颅内动脉狭窄研究(WASID)标准[7-8],症状性颅内动脉粥样硬化性狭窄程度为70%～99%。(2)经数字减影血管造影术(DSA)证实责任血管为颈内动脉颅内段(IICA)、大脑中动脉M1段(MCA-M1)、椎动脉颅内段(IVA)和基底动脉(BA),且病变长度 ≤

10 mm。(3)发病前至少服用一种抗血小板药并控制危险因素。(4)本研究经青岛大学附属医院道德伦理委员会审核批准,所有患者或其家属均知情同意并签署知情同意书。

2. 排除标准 (1)非颅内动脉粥样硬化性狭窄,如心源性栓塞(CE)、烟雾病(MMD)、动脉夹层、中枢神经系统血管炎、颅内动-静脉畸形(AVM)等。(2)存在≥2个重度狭窄或合并颅外动脉病变,或同一病变血管重度狭窄合并动脉瘤。(3)既往有颅内出血病史。(4)不能耐受肝素和阿司匹林等抗凝药和抗血小板药。(5)存在严重心、肺、肝、肾等功能障碍。(6)临床病史和影像学资料不完整。

3. 一般资料 根据上述纳入与排除标准,选择2014年1月–2016年10月在青岛大学附属医院神经介入科行颅内动脉支架成形术的73例症状性颅内动脉粥样硬化性狭窄患者,男性51例,女性22例;年龄46~80岁,平均(63.16±9.39)岁。DSA显示责任血管为颈内动脉颅内段18例(24.66%)、大脑中动脉M1段11例(15.07%)、椎动脉颅内段27例(36.99%)、基底动脉17例(23.29%);狭窄病变长度4.28~22.15 mm、平均(10.99±3.85) mm。发病前改良Rankin量表(mRS)评分均为0分。

二、研究方法

1. 颅内动脉支架成形术 术前予双联抗血小板药(阿司匹林100 mg/d和氯吡格雷75 mg/d)、他汀类调脂药(阿托伐他汀20 mg/d或瑞舒伐他汀10 mg/d)口服,连续治疗≥3 d。患者仰卧位,以腹股沟皮肤皱褶下1 cm股动脉搏动最强点为穿刺点,利多卡因(0.40 g/20 ml×2 ml)局部麻醉穿刺血管周围;以穿刺点做一平行皮肤皱褶的手术切口约0.50 cm,血管钳充分分离皮下组织;采用Seldinger技术,股动脉穿刺成功后置入6F动脉鞘(日本Terumo公司),将6F MPD ENVOY导引导管(美国Cordis公司)远端置于颈内动脉C1中段或椎动脉V2段;0.014英寸Transend微导丝(美国Boston Scientific公司)预先塑形后小心通过狭窄段血管;根据血管病变选择适宜直径的Gateway球囊(美国Boston Scientific公司)扩张病变,术中根据DSA确定狭窄改善情况和有无动脉夹层形成。根据病变特点选择Apollo球囊扩张式支架(中国微创医疗公司)或Wingspan自膨式支架(美国Stryker公司),沿微导丝精确定位病变并释放支架,再次复查DSA,根据支架成形状态决定是否行球囊后扩张。术中予肝素钠10~15 mg静脉滴注抗凝治疗。术后严格予双联抗血小板药(阿司匹林100 mg/d和氯吡格雷75 mg/d)、他汀类调脂药(阿托伐他汀20 mg/d或瑞舒伐他汀10 mg/d)口服。

2. 疗效评价 (1)颅内动脉狭窄改善:术后记录颅内动脉狭窄改善情况,残留狭窄率<20%。(2)临床结局:术后30 d电话或临床随访时,采用mRS量表评价预后,≤2分,预后良好;>2分,预后不良。

3. 安全性评价 (1)脑血管并发症:记录患者是否发生穿支事件、动脉夹层、支架内血栓形成、支架远端动脉栓塞、脑组织过度灌注等脑血管并发症,并于术后24~48 h复查头部CT。(2)神经系统并发症:根据临床表现,结合影像学检查,记录患者是否发生短暂性脑缺血发作、缺血性卒中和颅内出血等神经系统并发症。

4. 统计分析方法 采用SPSS 22.0统计软件进行数据处理与分析。计数资料以相对数构成比(%)或率(%)表示,采用Kruskal-Wallis秩和检验(H检验)。呈正态分布的计量资料以均数±标准差($\bar{x}\pm s$)表示,采用单因素方差分析;各组治疗前后血管狭窄率的比较采用配对t检验。以$P\leq 0.05$为差异具有统计学意义。

结 果

本组73例患者根据颅内动脉狭窄部位分为颈内动脉颅内段组、大脑中动脉M1段组、椎动脉颅内段组和基底动脉组。(1)颈内动脉颅内段组:18例患者,男性11例,女性7例;年龄47~74岁,平均(63.94±8.41)岁;DSA显示狭窄病变长度5.37~22.15 mm,平均(10.75±4.22) mm;治疗前血管狭窄率81.12%~97.86%,平均(90.89±7.71)%。(2)大脑中动脉M1段组:11例患者,男性5例,女性6例;年龄46~74岁,平均(61.91±10.69)岁;DSA显示狭窄病变长度5.48~17.64 mm,平均(10.50±3.74) mm;治疗前血管狭窄率70.22%~97.96%,平均(87.64±9.46)%。(3)椎动脉颅内段组:共计27例患者,男性21例,女性6例;年龄46~76岁,平均(62.26±10.27)岁;DSA显示狭窄病变长度4.89~17.68 mm,平均(11.36±3.66) mm;治疗前血管狭窄率为70.42%~96.87%,平均(89.11±7.97)%。(4)基底动脉组:共17例患者,男性14例,女性3例;年龄49~80岁,平均(64.59±8.55)岁;DSA显示狭窄病变长度4.28~20.02 mm,平均(11.00±4.09) mm;治疗前血管狭窄率80.12%~98.86%,平均(91.35±

5.62)%。4组患者性别($\chi^2 = 5.526$, $P = 0.135$)、年龄($F = 0.312$, $P = 0.817$)、DSA所示狭窄病变长度($F = 0.160$, $P = 0.923$)和治疗前血管狭窄率($F = 0.716$, $P = 0.546$)差异均无统计学意义,具有可比性。

本组73例患者共植入支架73个,包括Apollo支架35例和Wingspan支架38例,其中,颈内动脉颅内段组应用Apollo支架10例(10/18),Wingspan支架8例(8/18);大脑中动脉M1段组应用Apollo支架5例(5/11),Wingspan支架6例(6/11);椎动脉颅内段组应用Apollo支架16例(59.26%,16/27),Wingspan支架11例(40.74%,11/27);基底动脉组应用Apollo支架4例(4/17),Wingspan支架13例(13/17),4组患者术中应用支架类型差异无统计学意义($\chi^2 = 7.422$, $P = 0.201$)。治疗后颈内动脉颅内段组血管狭窄率7.65%~16.54%、平均(10.94±1.99)%,较治疗前改善($t = 69.545$, $P = 0.000$);大脑中动脉M1段组血管狭窄率8.78%~11.78%、平均(10.37±2.14)%,较治疗前改善($t = 26.000$, $P = 0.000$);椎动脉颅内段组血管狭窄率6.89%~16.12%、平均(11.02±1.99)%,较治疗前改善($t = 50.726$, $P = 0.000$);基底动脉组血管狭窄率4.30%~17.30%、平均(10.99±3.39)%,较治疗前改善($t = 69.545$, $P = 0.000$)。73例患者中11例(15.07%)发生脑血管并发症,包括穿支事件4例、动脉夹层4例、支架内血栓形成1例、支架远端动脉栓塞2例,无一例发生脑组织过度灌注;其中,颈内动脉颅内段组3例(3/18)发生脑血管并发症,包括动脉夹层2例、支架远端动脉栓塞1例;大脑中动脉M1段组(0/11例)和椎动脉颅内段组(0/27例)均未发生脑血管并发症;基底动脉组8例(8/17)发生脑血管并发症,分别为穿支事件4例、动脉夹层2例、支架内血栓形成1例、支架远端动脉栓塞1例;4组患者脑血管并发症发生率比较,差异具有统计学意义($H = 63.134$, $P = 0.000$)。73例患者中6例(8.22%)发生神经系统并发症,分别为短暂性脑缺血发作4例、缺血性卒中2例,无一例发生颅内出血;其中,颈内动脉颅内段组1例(1/18)发生神经系统并发症,为缺血性卒中;大脑中动脉M1段组(0/11例)和椎动脉颅内段组(0/27例)均未发生神经系统并发症;基底动脉组5例(5/17)发生神经系统并发症,为短暂性脑缺血发作4例、缺血性卒中1例;4组患者神经系统并发症发生率比较,差异具有统计学意义($H = 65.698$, $P = 0.003$)。

术后30 d电话或临床随访时,颈内动脉颅内段组有1例、基底动脉组有1例发生缺血性卒中患者mRS评分为1分,余71例均为0分,术后30 d预后良好率为97.26%(71/73),表明颅内动脉支架成形术后预后较好。

讨 论

颅内动脉粥样硬化性狭窄是缺血性卒中的重要原因,经药物治疗仍有较高的年脑卒中复发率。尽管SAMMPRIS研究显示支架成形术较强化药物治疗并无明显优势,且公布的Vitesse颅内支架治疗缺血性卒中研究(VISSIT)结果与SAMMPRIS研究一致:术后30天主要终点事件支架成形术组高于药物治疗组[9]。但其后续的随访研究显示,相对于术后30天内脑卒中发病率和病死率,30天后长期趋势二者趋于平行[10]。2015年的一项关于中国症状性颅内动脉粥样硬化性狭窄支架成形术疗效的Meta分析显示,药物治疗联合支架成形术组与单纯药物治疗组围手术期30天内不良事件发生率差异无统计学意义,但术后1和3年随访时药物治疗联合支架成形术组预后优于单纯药物治疗组[11]。有研究显示,颅内动脉支架成形术可以明显改善低灌注造成的神经系统症状[12]。筛查症状性颅内动脉粥样硬化性狭窄高危患者和定位病变部位,对提高颅内动脉支架成形术围手术期安全性尤为重要,因此,本研究探讨颅内动脉狭窄部位对支架成形术围手术期安全性的影响。

在本研究中,颅内动脉狭窄部位不同,神经系统并发症发生率亦不同,颈内动脉颅内段组终点事件发生率为1/18、基底动脉组为5/17、大脑中动脉M1段组和椎动脉颅内段组未发生不良事件,组间差异有统计学意义,表明在现有手术器械和手术方式下,基底动脉支架成形术后并发症发生率较高,应在准确评价风险后再行支架成形术。本研究基底动脉组有5例(5/17)发生神经系统并发症,其中4例与穿支动脉受累有关。基底动脉支架成形术较高的并发症发生率首先与基底动脉解剖学结构密切相关[13],基底动脉众多穿支多源自背外侧,其中近段血管走行与基底动脉近端呈锐角、中段呈直角、远段呈钝角,且基底动脉前壁无穿支发出,与血流方向相反的近段穿支动脉更易发生动脉粥样硬化,即斑块易累及穿支动脉。基底动脉深穿支发自基底动脉后外侧壁,有(17.18±5.23)支[14]。其次,球囊扩张术或支架植入术过程中对血管壁的牵拉和

对斑块的挤压均不可避免地损伤穿支动脉。穿支动脉卒中系由不稳定型斑块挤压造成邻近细小动脉闭塞所致，相对较粗的穿支动脉损伤较轻微，即使是开口位于梗死灶的责任血管[15]。通常基底动脉穿支较细小，DSA难以发现或识别，发生动脉夹层或斑块挤压后很可能出现穿支事件，如球囊扩张术过程中部分患者形成的动脉夹层可以使深穿支动脉起始部血流受阻。最后，脑干是神经纤维最集中的区域，神经功能缺损症状明显且代偿血管发育较差，临床症状更明显。

大脑中动脉M1段穿支多源自上壁[16]，基于高分辨力MRI（HRMRI）的研究显示，斑块多位于大脑中动脉前壁和下壁[17]，HRMRI可以完成颅内动脉管壁和斑块的评价[18-20]，且在解剖学上M1段走行相对平直，球囊扩张术或支架植入术过程中动脉夹层发生率较低，这可能是本研究大脑中动脉M1段组未出现神经系统并发症的原因。尤其是穿支区域伴局部缺血症状的患者穿支动脉因血流受阻而发生缺血的风险较高[10,21]。颈内动脉颅内段和椎动脉颅内段穿支较少，发生穿支动脉卒中的概率相对较低。本研究颈内动脉颅内段组有1例（1/18）发生神经系统并发症，系手术路径复杂、病变血管弯曲较大，球囊扩张术损伤血管并造成动脉夹层引起急性血栓栓塞事件所致。术中发生动脉夹层并非一定出现临床症状，但却是术后发生终点事件的重要原因，穿支事件所形成的缺血性卒中机制常与动脉夹层有关，本研究中基底动脉发生的2例动脉夹层均同时伴穿支事件的发生，若在球囊扩张中动脉夹层的发生未累及穿支动脉，并在支架释放后覆盖夹层则不发生神经系统并发症。椎动脉颅内段组未出现神经系统并发症，究其原因主要是椎动脉颅内段穿支较少，故斑块挤压时穿支事件发生率较低；椎动脉颅内段走行相对平直，动脉夹层发生率较低。

颅内动脉粥样硬化性狭窄的血管内治疗尚处于初级阶段。最终目的为改善狭窄远端脑组织灌注，采用颈内动脉颅内段和椎动脉颅内段支架成形术常可以实现这一目的。该手术方式对穿支动脉丰富部位的影响是较高的围手术期并发症发生率，尤以基底动脉显著。本研究穿支动脉损伤致短暂性脑缺血发作或缺血性卒中患者术后30天临床预后较好，可能与支架成形术避免动脉夹层进一步延展、同时静脉滴注抗血小板药有关。尽管基底动脉组围手术期并发症发生率高于其他3组，但颅内动脉支架成形术并未导致病残性脑卒中的发生，为该手术方式的可行性和安全性提供依据。

综上所述，颅内动脉狭窄部位不同，其支架成形术的安全性亦存在明显差异，穿支较少的颈内动脉颅内段和椎动脉颅内段较为安全，而基底动脉的安全性尚待进一步提高。由于本研究为回顾性研究，存在偏倚且样本量较小，其研究结论尚待进一步扩大样本量的前瞻性临床试验验证。

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·小词典·

中英文对照名词词汇(四)

球囊导引导管 balloon guide catheter(BGC)

躯体生活自理量表 Physical Self-Maintenance Scale(PSMS)

日常生活活动能力量表 Activities of Daily Living(ADL)

神经传导速度 nerve conduction velocity(NCV)

神经科重症监护病房 neurological intensive care unit(NICU)

生长激素 growth hormone(GH)

嗜铬素A chromogranin A(CgA)

噬血细胞性淋巴组织细胞增生症 hemophagocytic lymphohistiocytosis(HLH)

数字减影血管造影术 digital subtraction angiography(DSA)

髓鞘碱性蛋白 myelin basic protein(MBP)

锁骨下动脉 subclavian artery(SCA)

糖耐量异常 impaired glucose tolerance(IGT)

体重指数 body mass index(BMI)

同型半胱氨酸 homocysteine(Hcy)

痛觉相关诱发电位 pain-related-evoked potential(PREP)

痛觉诱发电位 pain-evoked potential(PEP)

α-突触核蛋白 α-synuclein(α-Syn)

突触素 synaptophysin(Syn)

完全前循环梗死 total anterior circulation infarct(TACI)

西班牙8小时内支架取栓与内科治疗随机对照试验 Randomized Trial of Revascularization with Solitaire FR Device versus Best Medical Therapy in the Treatment of Acute Stroke due to Anterior Circulation Large Vessel Occlusion Presenting within 8-Hours of Symptom Onset (REVASCAT)

细胞角蛋白8 cytokeratin 8(CK8)

纤维肌痛综合征 fibromyalgia syndrome(FMS)

小动脉闭塞 small artery occlusion(SAO)

小纤维神经病 small fiber neuropathy(SFN)