·综 述 General review·

Stent-assisted recanalization of atherosclerotic intracranial stenosis

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Intracranial atherosclerosis is a major cause of ischemic stroke, and depending on the studied population, it accounts for 8% ~ 15% of all strokes that are due to cerebral atherosclerosis. The prognosis of patients with symptomatic intracranial stenoses seems to depend on the location and extent of intracranial atherosclerosis. Currently, the primary treatment in intracranial atherosclerosis is the control of vascular risk factors such as hypertension, diabetes, hypercholesterolemia, and smoking. Secondary prevention with antiplatelet therapy has been shown to reduce the risk of subsequent vascular events in patients who have suffered a recent ischemic stroke or transient ischemic attack (TIA). Unfortunately, a significant number of patients with intracranial atherosclerosis continue to suffer from repeated strokes or TIA despite maximal medical treatment. Although endovascular revascularization for symptomatic intracranial stenoses remains at the investigational stage and much of the pertinent information is anecdotal, intracranial angioplasty and stenting are being increasingly performed to treat stenotic lesions. This article reviews basic principles involved in the patient selection, premedication, angio-interventional procedures, angiographic and clinical results, periprocedural complication, patients aftercare.

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Patient selection

In general, stent placement was recommended to decrease the risk of new or recurrent cerebral infarction in patients with significant atherosclerotic stenosis of the middle cerebral artery (MCA) in these situations: ①TIA or infarction recurred or progressed despite optimal medical therapy, including anticoagulation or antiplatelet treatment. ②Angicoagulation or antiplatelet treatment was contraindicated. ③Patients had previous ischemic events or asympromatic severe stenosis (more than 70%) with poor collateral cerebral circulation, or they had decreased cerebral perfusion on technetium-99m ethyl cysteinate dimmer (ECD) intravenous administration of acetazolamide 1 g(Zoladin; FarEast Pharmaceuticals, Seoul, Korea). ④Coronary artery bypass grafting was planned.

The exclusion criteria included the followings: 1) stenosis distal to the M1 bifurcation to the M1 bifurcation;2)severe neurologic deficits in the affected MCA territory;3) life expentancy less than 5 years;4)cardiac lesions likely to cause cardioembolism;5)failure of the kidney, liver, or lung; and 6) chronic complete occlusion of the MCA.

Premedication

The patients are premedicated with 100 mg of acetylsalicylic acid (ASA) and either 75 mg of clopidogrel or 250 mg of ticlopidine at least three days before the procedure. One hundred milligrams of ASA (low-dose regimen) once daily was continued as a permanent medication. In addition, 75 mg of

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clopidogrel were given once daily for more than six months following the procedure. In case of emergency, ASA 200 mg plus 300 or 600 mg Clopidogrel can be introduced.

Angio-interventional procedures

All the procedures are performed under local anesthesia, and during the procedures, ECG, arterial oxygen saturation, and blood pressure are appropriately monitored. Each patient receives 5000 – 8000 IU of intravenous heparin to attain and activated clotting time (ACT) of more than 250 seconds. Prior to treatment, diagnostic cerebral angiography is performed via the transfemoral approach. The procedure started with a common carotid artery injection, and this is followed by selective angiography of both the internal carotid and vertebral arteries.

A 6F sheath is introduced and it is then positioned in either the internal carotid artery or the vertebral artery. The sidearm of the guiding catheter is continuously flushed with pressurized, heparinized normal saline, and this catheter is used for angiography treatment steps. The stenotic segment of the MCA is crossed with a 160 cm long 0.011 – 0.014 inch microwire that is navigated into the insular portion of the MCA to ensure maximal support; this allows tracking of the balloon-mounted stent catheter. Occasionally, predilatation with a coronary balloon is required, especially when the diameter of the stenotic segment is less than the profile of the stent catheter. In general, a 1.5 – 2 mm balloon diameter is used to allow advancement of the stent catheter.

The stent is advanced over the microwire and positioned across the stenosis by using the roadmap imaging and external stent markings. The correct position of stent is angiographically confirmed. The deploy of the stent is performed using the roadmap image.

Recently we routinely use double guiding catheter technigue with a combination of a 6F shuttle (Cook, Bloomington, MN) and a 6F Guider (Target, Boston Scientific, Plymouth, MN) for carotid artery and a combination of a 5F Shuttle and a 5F Envoy (Cordis-Johnson & Johnson, Miami Lakes, FL) for vertebral artery.

After crossing the lesion with a 0.010 – 0.014 inch outer diameter microguidewire, the balloon catheter is placed over the microguidewire and next directed across the lesion. The diameter of balloon catheter ranges form 2 to 3 mm and length of 10 – 20 mm according to the target vessel size, not to allow any over-dilatation. Balloon inflation is performed slowly and maintained for 10 to 20 seconds with a disposable inflation device that allow for exact pressure control.

Each stent is selected according to the size of the target vessel. The residual stenosis of the treated intracranial artery is measured via post-procedural angiography.

The percentage of the diameter of the stenosis is calculated by dividing the narrowest linear diameter at the stenotic segment by the distal diameter at the segment of the same vessel that has a normal appearance. Lesion length and eccentricity are measured and categorized according to Mori's classification and these parameters are analyzed for comparison of treatment outcomes.

Angiographic and clinical results

We evaluate the procedural success rate. Procedural success, calculated on a per-vessel basis, was defined as residual stenosis < 50%. We evaluated any adverse event including TIA, minor stroke, major stroke, and death within 30 days, six months, and one year.

Minor stroke was defined as a new, non-disabling neurologic deficit or as an increase in the National Institutes of Health Stroke Scale by 3 which completely resolved within 30 days. Major stroke was defined as a new neurologic deficit that persisted beyond 30 days and increased by 4 according to the National Institutes of Health Stroke Scale. Major stroke and death were regarded as fatal AEs in contrast to TIA and minor stroke.

Periprocedural complications

The complication rates of intracranial angioplasty

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and stenting are known to be very high, i.e. from 0 to 50%. The mortality was 4% in our study. The peri-procedural mortality and morbidity rates also seem to be higher after stenting than in angioplasty alone. Hyperperfusion and subacute thrombosis are the two major complications within 30 day postoperative period in our data. Hemorrhage due to hyperperfusion is a serious complication in intracranial stenting as was seen in two of our study patients. Strict and meticulous blood pressure control is mandatory in order to avoid hyperperfusion after the procedure because two of eight at-risk patients developed seizures and transient ischemic attacks in spite of rigorous blood pressure control. Bleeding is a serious complication in intracranial stenting. Other causes of bleeding include a bleeding tendency due to aggressive antiplatelet and anticoagulation therapy, vessel rupture or dissection due to ballooning and/or stenting, and guidewire injury.

Subacute stent thrombosis is another serious complication leading to major deficit. A number of procedural and patient factors have been shown to predict the occurrence of subacute stent thrombosis, including longer stent length, smaller minimum luminal diameter, persistent dissection, and multivessel intervention. Inadvertent discontinuation of the antiplatelet agent as in a patient of our study should be avoided because antiplatelet therapy consisting of a regime of aspirin and clopidogrel is for the prevention of subacute stent thrombosis.

Restenosis

SSYLVIA reveals that stenosis of > 50% at 6 months was seen in 12 of 37 (32.4%) intracranial stents and 6 of 14 (42.9%) extracranial vertebral stents (including 3 occlusions read by the investigator only). Of these extracranial stenoses, 67% (4/6) occurred in vertebral ostium lesions.

Symptomatic restenosis is relatively low in Suh et al study after angioplasty and/or stenting of intracranial stenosis, i.e. 6% during mean 22 months of FU. The symptomatic recurrence rate in any vascular territory was 9% during the same FU period.

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·消　息·

中华医学会放射学分会第十三届全国学术会议
网上注册开通通知

中华医学会放射学分会第十三届全国学术会议(CCR13)的论文征集工作已与 8 月 31 日结束。共收到各类投稿 2400 余篇,目前审稿工作正在紧张进行中。

1.CCR13 网上注册页面于 2006-9-2 日正式开通，请拟参会的同道登陆 CCR13 网站（http://www.rc-csr.org/ccr13/reg/)提交注册信息。

2.CCR13 的正式参会通知(第三轮通知)现正在印制中,将在 9 月中、下旬通过邮寄方式寄给所有通过网上注册的同道。请拟参会的同道尽快完成网上注册,以便组委会方尽早寄发正式参会通知。

3.10 月 1 日 0:00 前注册者,会务费 800 元;

10 月 1 日 0:00 后注册者,会务费 900,且会务组方不能保证会议礼品及住宿安排。

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