

New interventional techniques in the treatment of carotid stenosis

Peter Corr

*MBChB, FFRAD(D)SA, FRCR,
M Med(UCT)*

*Department of Radiology,
University of Natal*

Abstract

Recent advances in catheter, guide wire and stent design have provided the interventional cardiologist and radiologist with the opportunity to treat cerebrovascular disease. The role of these new therapies is explored in relation to conventional medical and surgical options.

Stroke is the third most common cause of death in South Africa, accounting for 9.6 % of all deaths in 1990.¹ Stroke is also a major cause of morbidity and contributor to health costs in this country. Most strokes are due to atherosclerotic disease of the proximal internal carotid artery and bifurcation.² Prevention of stroke by treatment of carotid disease is the

most important goal of current therapy. Carotid endarterectomy is the treatment of choice if the lesion has a 70% or greater stenosis or by treatment with aspirin if there is a less significant stenosis.³

Carotid endarterectomy is a safe effective procedure if performed by an experienced surgeon. The Stroke Council of the American Heart Association recommends that for carotid endarterectomy to be effective the combined morbidity and mortality must be less than 6%.⁴ In the NASCET trial the complication rate was 5.8% for perioperative stroke and death and 7.5% in the ECS trial.⁵ Both trials were performed in centres of excellence by highly experienced surgeons. However a review of published data of 16 000 procedures in 50 studies showed a 1.6% mortality but stroke rates from 1 to 35%!⁶ The critical factor is the experience of the surgeon and the ICU and anaesthetic support in the hospital.

Both carotid angioplasty and self expandable stenting have become popular alternative therapies to the treatment of significant carotid stenosis. Angioplasty of the carotid artery was first performed in 1980 and a number of cardiologists and radiologists have large personal series. Theron recently published his experience with 259 angioplasties over a 12 year period.⁷ He reported a 5% dissection rate and 8% embolic complication rate with the first 38 angioplasties but after changing to a triple lumen catheter with a distal balloon to prevent embolism his complication rate decreased to 2%. Indications for angioplasty would probably be patients unsuitable for endarterectomy. This includes patients with very distal internal carotid artery stenosis above

to page 5

New interventional techniques in the treatment of carotid stenosis

from page 4

the angle of the mandible where surgical access is limited. Also included are patients with cardiovascular disease who are an anaesthetic risk. Theron had a restenosis rate of 16% (13 of 81 patients) within the first two years.⁸ Contraindications to this procedure are: calcified tortuous arteries that would be difficult to access and to balloon, and free floating thrombus on the angiogram-this is an absolute contraindication.

A major concern is the risk of distal embolisation. It is important that the patient is fully conscious during the procedure and is monitored by a neurologist so that subtle neurological signs can be detected and treated early. If procedural thrombosis occurs, urgent thrombolysis is indicated. If a dissection occurs, immediate placement of a stent is required. The CAVATAS trial which is a multicentre randomised study of angioplasty *vs* endarterectomy is currently being conducted and will provide some of the answers about the role of angioplasty.

New developments in stent technology and design have resulted in the arrival of carotid self expandable stents. The most commonly used is the Wallstent (Schneider, Switzerland). The balloon expandable stents have not proved popular because of the risk of distal embolization. Initially indicated for iatrogenic carotid dissection and as an adjunct to angioplasty this procedure has become popular as a primary treatment.^{9,10} Restenosis following stent insertion was seen in 4% of Theron's patients (4 out of 93 cases). The same indications and contraindications that apply to angioplasty also apply to primary carotid stenting. Technically this is a demanding procedure with a steep learning curve.

Familiarity with coronary guide wires and low profile coronary balloons is a distinct advantage. There have been no prospective trials of stent *vs* endarterectomy yet. The major concern is the risk of distal embolisation and thrombosis and the long term risk of restenosis. Immediate complications of primary stenting appear to be minimal if meticulous technique is used.

Perhaps the most important factor for a good outcome is careful patient selection and working in a team environment with a stroke neurologist and vascular surgeon.

References

1. Bradshaw D, Bourne DE, Schneider M, Sayed R. Mortality pattern of chronic disease of lifestyle in South Africa. In *Chronic Disease of Lifestyle* Eds Fourie J and Steyn K. MRC Technical report 1995.
2. Mohr J, Caplan L, Melski J. The Harvard cooperative stroke registry: a prospective registry. *Neurology* 1978;28:754-762.
3. North American Symptomatic Carotid Endarterectomy Trial Collaborators. Beneficial effect of carotid endarterectomy in symptomatic patients with high grade carotid stenosis. *NEJM* 1991;325:445-453.
4. American Heart Association. 1992. Heart stroke and facts. *Bethesda Md* 1992;2.
5. Hurst R. Carotid Angioplasty. *Radiology* 1996;201:613-616.
6. Rothwell P, Slattery J, Warlow C. A systematic review of the risks of stroke and death due to endarterectomy for symptomatic carotid stenosis. *Stroke* 1996;27:260-265.
7. Mullan S, Duda E, Petronas N. Some examples of balloon technology in neurosciences. *J Neurosurgery* 1980;52:321-329.
8. Theron J, Payelle G, Coskun O. Carotid artery stenosis: treatment with protected balloon angioplasty and stent placement. *Radiology* 1996;201:627-636.
9. Marks M, Dake M, Steinberg G, Norbash A, Lake B. Stent placement for arterial and venous cerebrovascular disease: preliminary experience. *Radiology* 1994;191:441-446.
10. Eskridge J. Neurovascular stents. *Radiology* 1994;191:313-314.

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG GAUTENG PROVINCIAL ADMINISTRATION

Chief Specialist/Professor (Radiology)

Applications are invited from suitably qualified candidates for the above post on the joint staff of the University of the Witwatersrand and the Gauteng Provincial Administration. The post normally carries the academic status of Professor. Applicants should be registrable as specialists with the Interim National Medical and Dental Council.

■ **SALARY:** R 191 712 per annum but the total remuneration package is in excess of R 350 000 per annum.

■ **ENQUIRIES:** For a detailed information sheet relating to this post, please contact the University's Personnel Office at: (011) 716-2954 / 716-3568. Alternatively, e-mail: 080amd@atlas.wits.ac.za.

■ To apply, submit a detailed CV with the names and addresses of 3 referees and certified copies of degrees/diplomas to: The Personnel Office (Academic), University of the Witwatersrand, Private Bag 3, WITS 2050.

CLOSING DATE: 29 AUGUST 1997.
QUOTE REF: SA J/RADIOLOGY 15565.



WITS UNIVERSITY

THE UNIVERSITY IS AN AFFIRMATIVE ACTION AND EQUAL OPPORTUNITY EMPLOYER