CONTROVERSES ET ACTUALITÉS EN CHIRURGIE VASCULAIRE
CONTROVERSIES & UPDATES IN VASCULAR SURGERY
JANUARY 19-21 2017
MARRIOTT RIVE GAUCHE & CONFERENCE CENTER
PARIS, FRANCE

Forget filters, cervical access with reverse flow is a game changer

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Disclosure

Jordi MAESO

x I do not have any potential conflict of interest

CAROTID STENTING INDICATIONS

High local risk:

- Contralateral laryngeal nerve paralysis
- Hostile neck (irradiation, previous surgery)
- Restenosis
- High stenosis

High general risk:

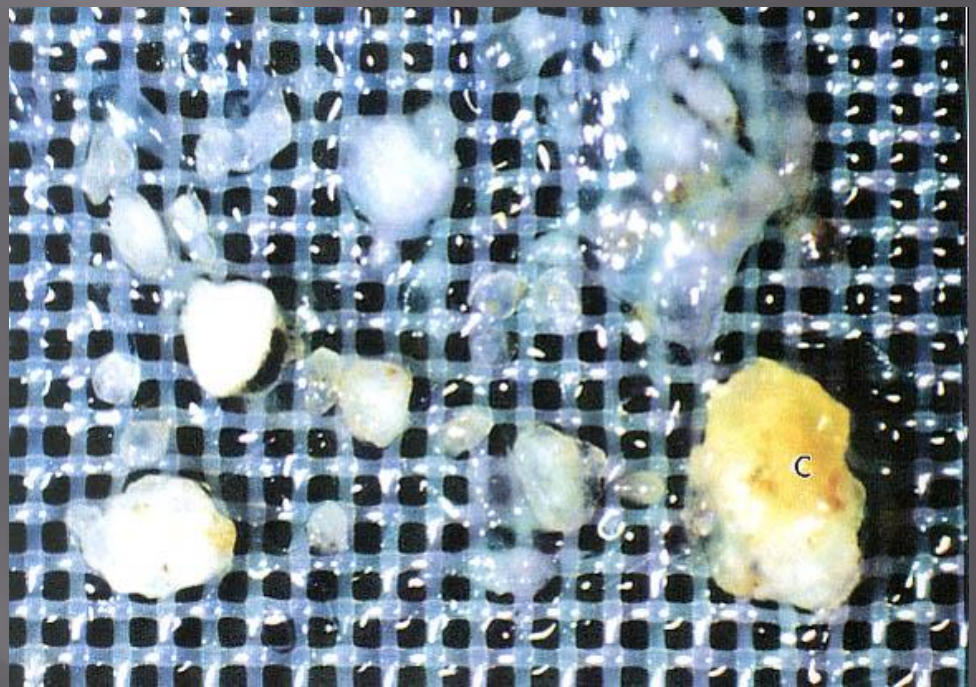
- Heart disease
- Severe pulmonary disease

Octogenarians

CAROTID STENTING DRAWBACKS

-EMBOLISATION

-RE-STENOSIS



CRITICAL STEPS IN CAS

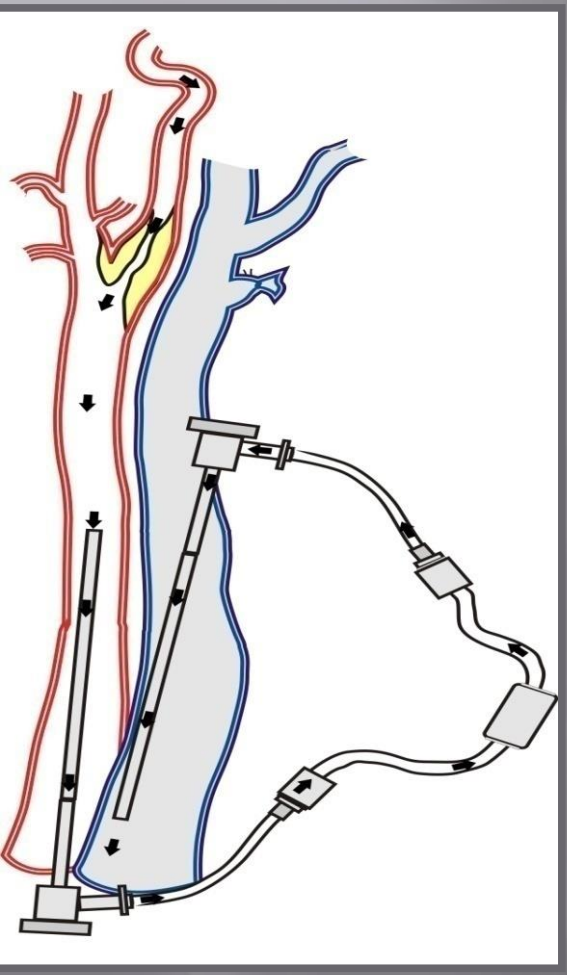
Accessing the aortic arch and supra-aortic trunks with guidewires and catheters

Advancing the guiding catheter or sheath into the CCA

Crossing the stenotic lesions with the guidewire or filter

Deploying the stent and balloon inflation

TRANSCERVICAL CAROTID STENTING WITH FLOW REVERSAL



TRANSCERVICAL APPROACH

FLOW REVERSAL

Criado E, Doblas M, Fontcuberta J, Orgaz A, Flores A. Transcervical carotid artery angioplasty and stenting with carotid flow reversal.: surgical technique. Ann Vasc Surg. 2004;18: 257-261

Transcranial Doppler Monitoring of Transcervical Carotid Stenting With Flow Reversal Protection

A Novel Carotid Revascularization Technique

Marc Ribo, MD, PhD; Carlos A. Molina, MD, PhD; Beatriz Alvarez, MD, PhD; Marta Rubiera, MD; Jose Alvarez-Sabin, MD, PhD; Manel Matas, MD

Background and Purpose—Transfemoral carotid stenting, despite becoming very frequent, has some limitations such as difficult groin access in few patients, lack of distal protection during filter placement, or embolization despite protection. Transcervical stenting (TCS) is a novel technique during which a common carotid to jugular vein shunt is placed creating a protective reversal flow in the internal carotid artery after proximal common carotid artery (CCA) clamping. We aim to study, with transcranial Doppler (TCD), cerebral flow changes and microemboli detection during transcervical stenting.

Methods—From September 2005 to March 2006, of 65 consecutive patients eligible for carotid revascularization, 23 were considered high risk (sapphire criteria) and underwent TCS. Neurologic examination was performed before and after the procedure by a neurologist and a preprocedure vascular reactivity TCD examination was done in all patients.

Results—After CCA clamping, flow inversion was observed in the anterior cerebral artery, supplying blood to the middle cerebral artery (MCA) and internal carotid artery (reversal). TCD did not detect any air/solid emboli during stent deployment and angioplasty confirming the reversal flow protection hypothesis. Mean reversal flow time was 15.4 minutes; in all cases, substantial MCA flow was present during CCA clamping (initial mean velocity 30 cm/s), and a slow gradual increase was observed traducing collateral flow recruitment (mean velocity after 5 minutes 36 cm/s, $P<0.001$). Flow increase was observed in all patients except in those with preprocedural exhausted ipsilateral vascular reactivity (16% versus 2%, $P=0.036$). The only in-procedure complication was one transient ischemic attack. After CCA unclamping, normal antegrade flow was restored in anterior cerebral artery and mean final MCA velocity increased 16% according to preprocedure flow.

Conclusions—TCS with protective internal carotid artery flow reversal can eliminate showers of micoremboli during stent deployment making it a promising carotid revascularization technique in high-risk patients with carotid stenosis.

(*Stroke*. 2006;37:2846-2849.)

A Prospective Evaluation of Cerebral Infarction following Transcervical Carotid Stenting with Carotid Flow Reversal

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Objective: Cerebral embolisation constitutes the main source of complications during transfemoral carotid artery stenting (CAS) and is associated with a high incidence of silent brain infarction. The goal of this study is to evaluate the incidence of new ischaemic cerebral lesions following transcervical CAS with carotid flow reversal for neuroprotection.
Materials and Methods: Thirty-one consecutive patients underwent transcervical CAS with carotid flow reversal. A stroke scale and diffusion-weighted magnetic resonance imaging (DW-MRI) were performed within 24 h before and after the procedure. DW-MRI studies were compared blindly by two independent neuroradiologists. New hyper-intense DW signals were interpreted as ischaemic infarcts. The progress of all patients was followed for at least 30 days following intervention.

Conclusions: These data suggest that transcervical carotid stenting with carotid flow reversal carries a low incidence of new ischaemic infarcts, significantly lower than that reported with transfemoral CAS. The transcervical approach with carotid flow reversal may improve the safety of CAS and has the potential to produce results comparable to those of carotid endarterectomy.

Eur J Vasc Endovasc Surg (2010) 39, 661–666

Transcervical carotid stenting with flow reversal protection: Experience in high-risk patients

Manel Matas, MD,[a] Beatriz Alvarez, MD,[a] Marc Ribo, MD,[b] Carlos Molina, MD,[b] Jordi Maeso, MD,[a] and Jose Alvarez-Sabin, MD,[b] *Barcelona, Spain*

Methods: From January 2005 to June 2006, 62 CAS were performed in our center in high-risk patients with >70% stenosis (38.7% had a previous neurologic event and 61.3% were asymptomatic). The indications for CAS were severe heart disease (45.1%), severe pulmonary disease (6.4%), paralysis of the contralateral laryngeal nerve (6.4%), recurrent stenosis (3.2%), and high carotid lesion (1.6%). Twenty-one patients were >80 years old. A complete neurologic examination was performed by a stroke neurologist in all patients before and after stenting. The protection system used was carotid flow reversal by transcervical access. Transcranial Doppler monitoring was done during the procedure in 35 patients. We analyzed technical success, the presence of high-intensity transient signals during the procedure, neurologic morbidity and mortality at 30 days and 6 months, and stent patency at 6 months (range, 1 to 18 months). Technical success was 96.8%. Perioperative high-intensity transient signals were observed in two patients (5.7%). In the immediate postoperative period, one patient had a transient ischemic attack of the anterior cerebral artery and another had a stroke, with contralateral hemiplegia. At 48 hours after discharge, a third patient returned to the hospital with a severe cerebral hemorrhage that required surgical drainage; hence, neurologic morbidity was 4.9%. There were no deaths at 6 months. Among the total, 98.4% of the stents remained patent, two showed restenosis of 50% to 70%, and one restenosis of >70%. No patients presented a neurologic event during the follow-up.

Conclusions: Transcervical carotid artery stenting with flow reversal cerebral protection is a relatively simple, safe technique that avoids instrumentation of the aortic arch and crossing the target lesion without protection. It is less expensive than techniques requiring a filter device and provides excellent outcome with an acceptable incidence of complications.

4,9%

J Vasc Surg 2007;46:49-54.

Transcervical carotid stenting with flow reversal is safe in octogenarians: A preliminary safety study

Beatriz Alvarez, MD, PhD,[a] Marc Ribo, MD, PhD,[b] Jordi Maeso, MD,[a] Manuel Quintana,[b] Jose Alvarez-Sabin, MD, PhD,[b] and Manel Matas, MD,[a] *Barcelona, Spain*

Methods: The study included 81 patients, ≥80 years, a retrospective cohort of 45 consecutive patients treated with CEA (January 2002 to January 2005), and a prospective cohort of 36 consecutive patients treated with TCS with protective flow reversal (January 2005 to January 2007). Patients were considered symptomatic according to the North American Symptomatic Carotid Endarterectomy Trial (NASCET) criteria. Stenting indication was established on the SAPPHIRE criteria. General anesthesia was used in patients undergoing CEA, and local anesthesia in those receiving TCS. Primary endpoints were: stroke, death, or acute myocardial infarction within 30 days. Secondary endpoints were peripheral nerve paralysis and cervical hematoma. Statistical significance for between-group differences was assessed by Pearson χ^2 or Fisher exact test, and Student *t* test. A *P* value of <.05 was considered statistically significant. Follow-up was limited to 30 days.

Results: Baseline epidemiological characteristics and revascularization indications were similar between both groups. Mean age was significantly higher in the TCS group (83.5 ± 3.35) than the CEA group (81.7 ± 1.55) ($P = .004$). Percentage of symptomatic lesions was similar: 30.6% in TCS vs 44.4% in CEA ($P = .2$). Comorbid conditions (respiratory or cardiac) were more frequent in TCS group (61.6% vs 26.6%; $P = .002$). There were no significant differences between groups for the primary endpoints: 4.4% (one stroke, one acute myocardial infarction) for CEA vs 0% for TCS ($P = .5$). Among CEA patients, there were two peripheral nerve palsies (4.4%) and one cervical hematoma (2.2%); there were no such complications with TCS ($P = .5$ and $P = 1$, respectively). In one asymptomatic TCS patient, Doppler study at 24 hours following the procedure showed a common carotid artery dissection, which was treated by a common carotid to internal carotid bypass.

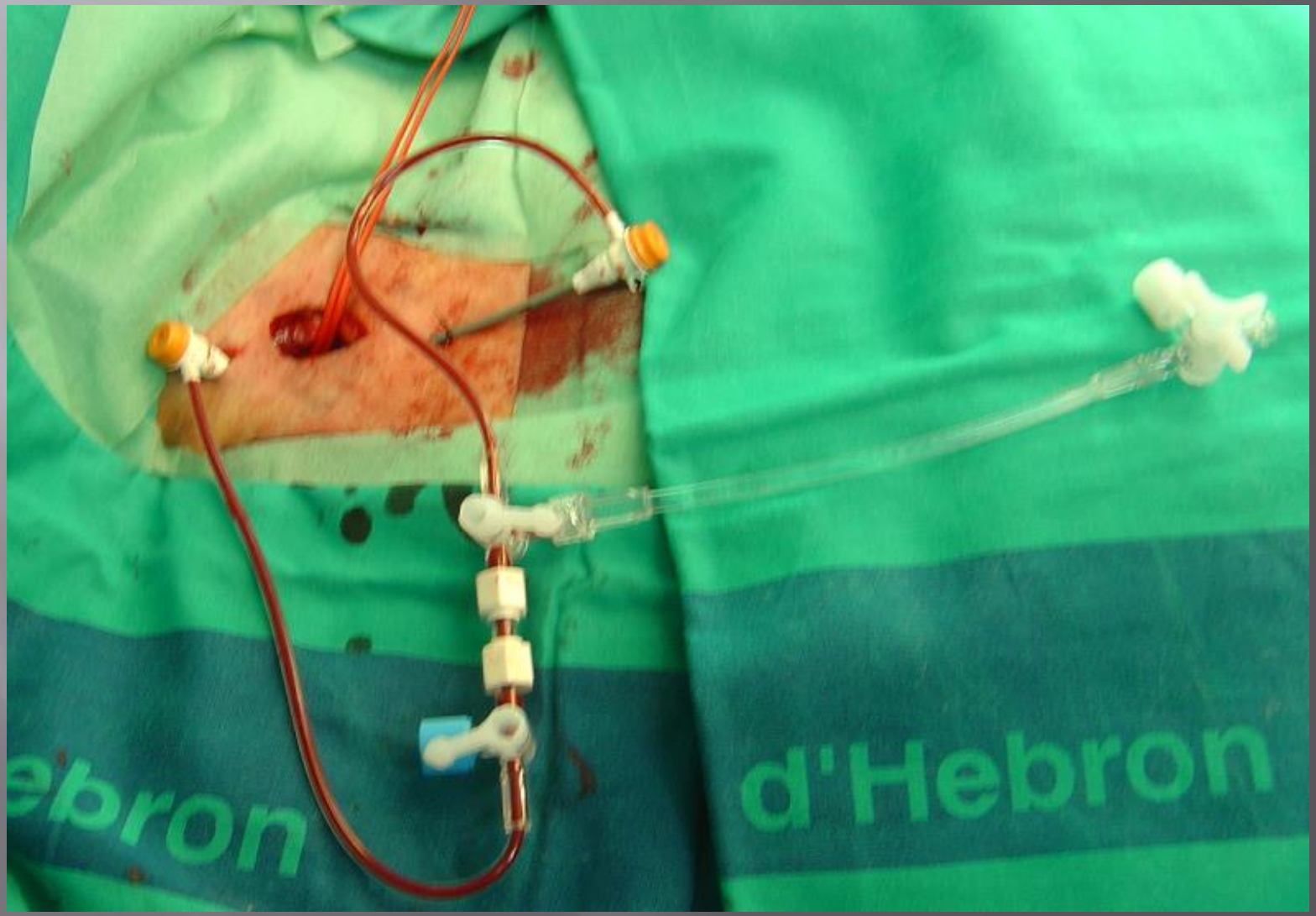
Conclusions: In this preliminary experience, transcervical carotid angioplasty and stenting with flow reversal for cerebral protection was as safe at short term as carotid endarterectomy in octogenarian patients, who additionally had considerable comorbidity; thus, it may be possible to extend the indications for carotid revascularization in this population. Studies in larger patient series are required to confirm the trends observed in this study.

4,4% for CEA

0% for CAS

(J Vasc Surg 2008;47:96-100.)

A-V FISTULA



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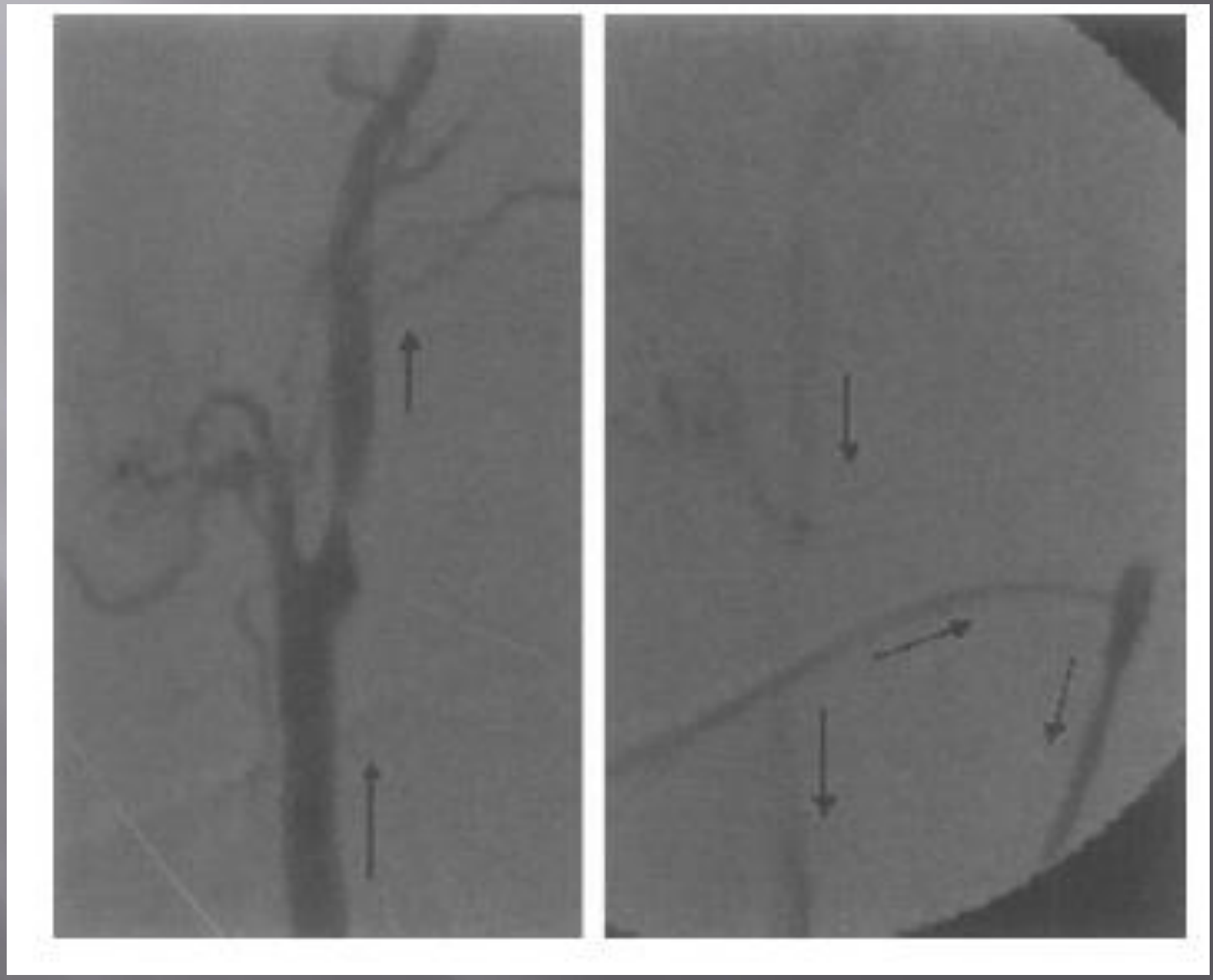
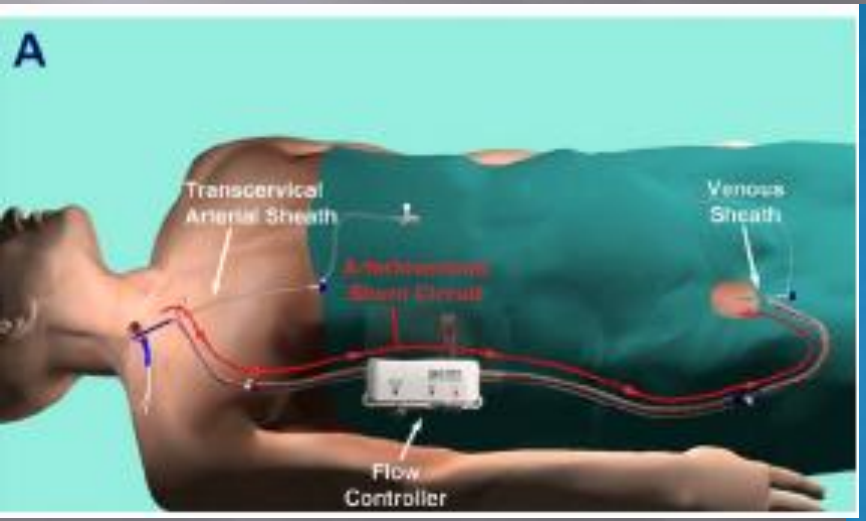


Safety and feasibility of a novel transcervical access neuroprotection system for carotid artery stenting in the PROOF Study

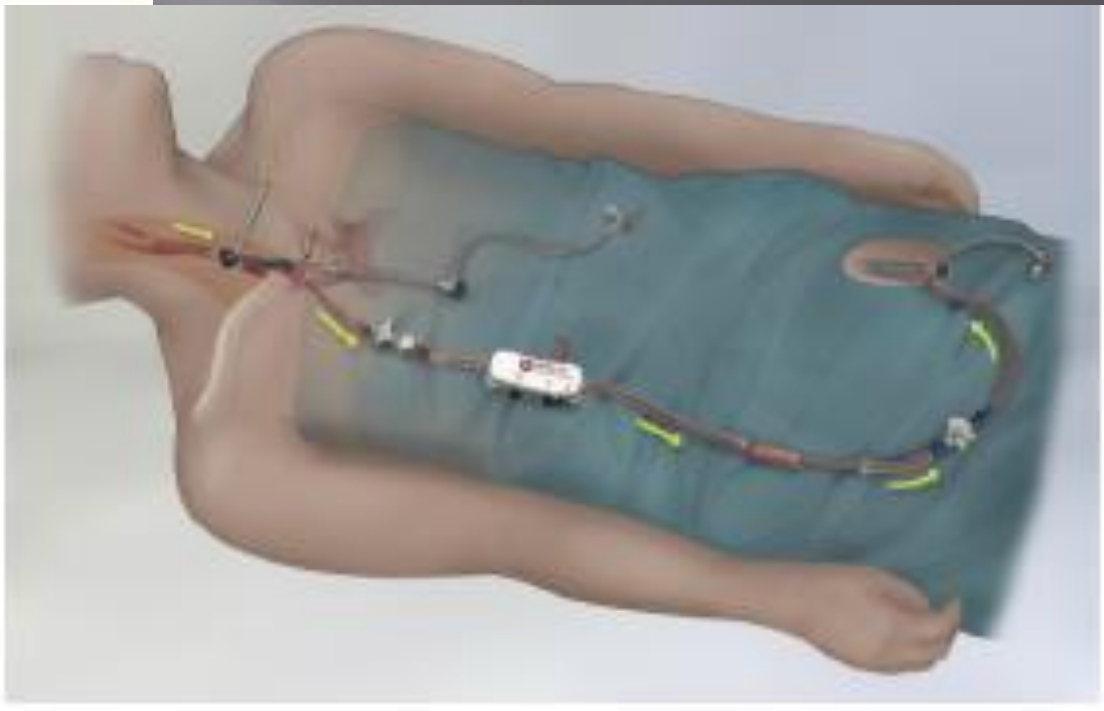
Laszlo Pinter, MD,[a] Marc Ribo, MD,[b] Christopher Loh, MD,[c] Barton Lane, MD,[d] Tracy Roberts, MT (ASCP),[c] Tony M. Chou, MD,[e,f] and Ralf R. Kolvenbach, MD, PhD,[a]

Düsseldorf, Germany; Barcelona, Spain; and Los Angeles, Palo Alto, Sunnyvale, and San Francisco, Calif

Conclusion: **In this first-in-man experience, FAST-CAS using the MICHI Neuroprotection System was shown to be a safe and feasible method for carotid revascularization. DW-MRI findings suggest controlled reverse flow provides cerebral embolic protection similar to that seen with CEA. (J Vasc Surg 2011;54:1317-23.)**



ENROUTE Transcarotid NPS



Results of the ROADSTER multicenter trial of transcarotid stenting with dynamic flow reversal

Christopher J. Kwolek, MD,[a] Michael R. Jaff, DO,[b] J. Ignacio Leal, MD,[c] L. Nelson Hopkins, MD,[d] Rasesh M. Shah, MD,[e] Todd M. Hanover, MD,[f] Sumaira Macdonald, MD,[g] and Richard P. Cambria, MD,[a]
Boston, Mass; Toledo, Spain; Buffalo, NY; Norfolk, Va; Greenville, SC; and Sunnyvale, Calif

Results: Between November 2012 and July 2014, 208 patients were enrolled at 18 sites. Sixty-seven patients were enrolled as lead-in cases, and 141 were enrolled in the pivotal phase. In the pivotal cohort, 26% were symptomatic and 75% were asymptomatic. Acute device and technical success were 99% (140 of 141). By hierarchical analysis, the all-stroke rate in the pivotal group was 1.4% (2 of 141), stroke and death was 2.8% (4 of 141), and stroke, death and MI was 3.5% (5 of 141). One patient (0.7%) experienced postoperative hoarseness from potential Xth cranial nerve injury, which completely resolved at the 6-month follow-up visit.

Overall stroke rate of 1,4%

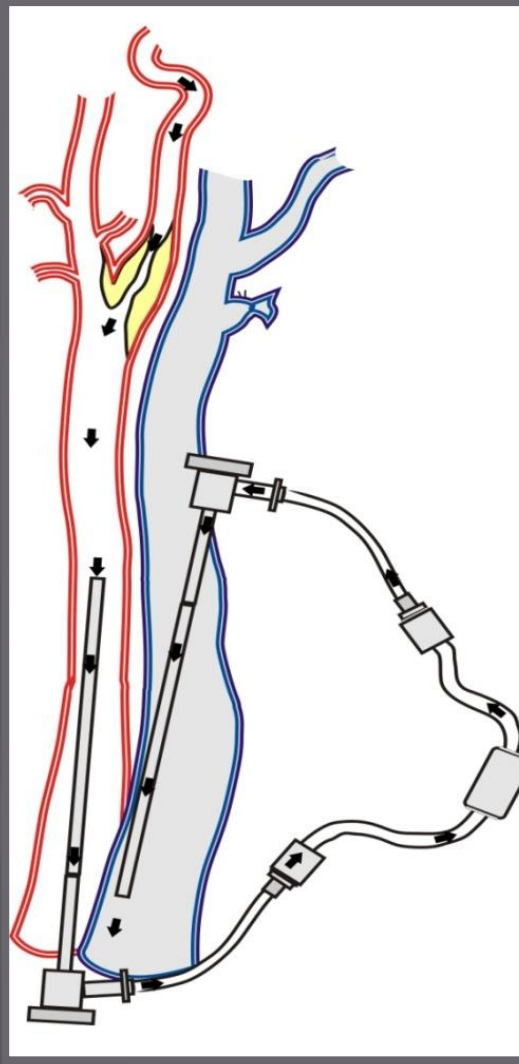
Conclusions: The results of the ROADSTER trial demonstrate that the use of the ENROUTE Transcarotid NPS is safe and effective at preventing stroke during CAS. The overall stroke rate of 1.4% is the lowest reported to date for any prospective, multicenter clinical trial of CAS. (J Vasc Surg 2015;62:1227-35.)


Courtesy Pascual Lozano

CONCLUSIONS

Advantages of transcervical carotid angioplasty and stenting

1. Target lesion is not crossed without protection
2. No instrumentation of aortic arch
   - Aortic arch types II and III
   - Bovine trunk
   - Tortuous supra-aortic vessels
3. Avoids difficulties of femoral access
4. Shorter duration of radiation exposure
5. Smaller volume of contrast
6. Shorter duration of procedure
7. Lower cost



Transcervical carotid stenting with flow reversal protection: Experience in high-risk patients M Matas, B Alvarez, M Ribo, C Molina, J Maeso, J Alvarez-Sabin, J Vasc Surg 2007;46:49-54

LIFE IS EASY

SO EASY…