Long-term clinical and angiographic outcomes in patients with cervico-cranial dissections treated with stent placement: a meta-analysis of case series

Hassan AE, Zacharatos H, Souslian F, Suri MFK, Qureshi AI

CRD summary
The authors concluded that evidence supported the feasibility, safety and effectiveness of endovascular stent reconstruction of cervico-cranial arterial dissections. Given the differences between studies, retrospective observational nature and paucity of evidence, the authors’ conclusions should be interpreted with caution as they may not be reliable.

Authors’ objectives
To determine the short- and long-term clinical and angiographic outcomes in patients with cervico-cranial dissections treated with stent placement.

Searching
PubMed and Cochrane Database of Systematic Reviews were searched between 1980 and 2009; search terms were reported. No language restrictions were applied. The search was supplemented by studies identified by the review authors.

Study selection
Eligible for inclusion were observational studies (with a sample size of at least seven) in patients with confirmed carotid or vertebral arterial dissection (spontaneous, traumatic or iatrogenic) treated with endovascular stent placement. Diagnosis of dissection had to be made either through computed tomography angiography, magnetic resonance angiography or ultrasound (for extracranial carotid arterial dissection), with confirmation by digital subtraction angiography. The location and number of dissections, and number of stents placed, had to be reported. Eligible studies had to report post-procedure imaging follow-up at least one month from the initial procedure, either by cerebral angiogram or ultrasound to evaluate in-stent or peri-stent stenosis. Clinical outcomes of interest were transient ischaemic attack, stroke and death during follow-up periods ranging from immediately to one year post-procedure. Studies that reported immediate post-procedure complications (those occurring during the procedure and until time of discharge) and follow-up post-procedure complications were also eligible for inclusion.

Included patients presented with different clinical conditions, including Horner syndrome, ischaemic stroke, left neck pain and subarachnoid haemorrhage. The mean age of patients was 47 years (range 19 to 83 years) and approximately half were male. Lesion sites included internal carotid artery vertebral artery common carotid artery and vertebrobasilar artery. Included studies used different stents, and administered antiplatelet treatment; most gave aspirin (81 or 325mg daily) and clopidogrel (75mg daily) for four to six weeks, followed by indefinite aspirin at the original dose.

Two reviewers independently assessed studies at initial screening.

Assessment of study quality
The level of evidence (type and strength of the evidence) was assessed using the American Heart Association’s criteria. No other quality assessment tools were used.

Data extraction
Means and standard deviations (SD) were extracted for continuous outcomes. The number of complications per patient and per stent placed were also extracted.

Two reviewers independently extracted the data, any discrepancies were resolved through discussion or referral to a third reviewer.

Methods of synthesis
Data were combined and presented as a narrative synthesis. Data were also presented by dissection type. Further analyses were undertaken to assess event rates of ischaemic stroke and transient ischaemic attack, death and stent
occlusion by dissection type.

**Results of the review**

Five case series (46 patients) were included in the review. Seventy-four stents were placed to treat 28 spontaneous, 11 traumatic and seven iatrogenic dissection patients (there were slight discrepancies in figures those reported in the text were used here). Mean angiographic or ultrasound follow-up duration was nine months (range one to 25 months). The included studies were considered level of evidence C (evidence from expert opinion, case studies or standards of care) and Class IIb (the usefulness/efficacy of the recommendation was less well established by evidence/opinion).

Overall, the mean (SD) pre-procedural stenosis was 71 (26%) and post-stent stenosis was six (15%) in the 51 treated vessels. Both the immediate and follow-up 6 complication rates per procedure were 11%.

**Spontaneous dissections (28 patients):** Treatment improved the proportion of patients with stent stenosis from a mean pre-stent stenosis of 75% to a mean post-stent stenosis of 7%. Immediate complication rates were low; per patient (7%; two patients) and per procedure (4%; two patients). These figures doubled at follow-up. There were nine patients with fibromuscular dysplasia and 16 patients with pseudoaneurysms.

**Traumatic dissections (11 patients):** Treatment improved stent stenosis, which improved the mean pre-stent stenosis of 57% to a mean post-stent stenosis of 4%. The immediate complication rates were 36% (four patients) per patient and 25% (four patients) per procedure. Follow-up complication rates per patient and per procedure reduced by half. Of the 11 patients who underwent follow-up angiography, two (18%) had in-stent restenosis and none had pseudoaneurysms.

**Iatrogenic dissections (seven patients):** Mean pre-stent stenosis of 76% improved to a mean post-stent stenosis of 6% after treatment. Both immediate and follow-up complication rates per patient were 29% (two patients) and the rates per procedure were 22% (two patients). There were no pseudoaneurysms identified, but one in four patients had fibromuscular dysplasia.

Further analysis showed that there were no immediate procedure-related deaths or ischaemic strokes, but 4% (two patients) of traumatic dissection patients had transient ischaemic attack. Other results were reported in the review.

**Authors’ conclusions**

The evidence supported the feasibility, safety and effectiveness of endovascular stent reconstruction of cervico-cranial arterial dissections.

**CRD commentary**

The review question was clear and was supported by strict inclusion criteria. A few relevant sources were searched for relevant studies without language restrictions. Screening of studies and data extraction was performed in duplicate, which minimised potential for reviewer error and bias. Formal quality assessment was not undertaken, but the authors acknowledged that all studies were retrospective observational studies. Sample sizes were small and there was some clinical and methodological heterogeneity in studies.

Given the differences between studies a narrative synthesis was appropriate, but this was limited by the small number of patients. Given the nature and paucity of evidence, the authors’ conclusions should be interpreted with caution as the evidence may not be reliable.

**Implications of the review for practice and research**

**Practice:** The authors stated that the results enabled clinicians to provide their patients or families with objective descriptions of short- and long-term risk to benefit profiles of stent placement.

**Research:** The authors did not state any implications for research.

**Funding**

Not stated.

**Bibliographic details**

Hassan AE, Zacharatos H, Souslian F, Suri MFK, Qureshi AI. Long-term clinical and angiographic outcomes in patients...

PubMedID
22188127

DOI
10.1089/neu.2011.1963

Original Paper URL

Indexing Status
Subject indexing assigned by NLM

MeSH
Adult; Aged; Angioplasty, Balloon /instrumentation /mortality; Blood Vessel Prosthesis Implantation /instrumentation /mortality; Carotid Artery, Internal, Dissection /pathology /radiography /therapy; Cerebrovascular Trauma /mortality; Cohort Studies; Female; Graft Occlusion, Vascular /mortality /prevention & control; Humans; Male; Middle Aged; Postoperative Complications /mortality; Retrospective Studies; Stents /trends; Treatment Outcome; Vertebral Artery Dissection /pathology /radiography /therapy

AccessionNumber
12012023552

Date bibliographic record published
23/08/2012

Date abstract record published
04/01/2013

Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.