Why Indications For Invasive Treatment Of Carotid Stenosis Are Much Fewer In Women Than Men

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Although less represented in studies, it has been clearly shown that women are less likely to benefit & more likely suffer carotid procedural stroke or death (harm) than men…

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Procedural Benefit

Symptomatic Women & CEA
Pooled data from NASCET & ECST

- 70-99% NASCET stenosis (no near occlusion)*
- CEA performed < 2-3 weeks from last event +
- 30-day procedural stroke/death <6.9% +
- Satisfied trial inclusion/exclusion criteria *

* Reduction in 5-year absolute risk of peri-procedural stroke/death or later ipsilateral stroke: 41.7% (approx. 95% CI: 25-60)
Rothwell et al, Stroke 2004;35(12):2855-61
Symptomatic Women & CEA…
Pooled data from NASCET & ECST
No benefit if
● 70-99% NASCET stenosis CEA >2-3 weeks from last event
● 50-69% NASCET stenosis no matter timing
● Symptomatic men had more benefit

Rothwell et al, Stroke 2004;35(12):2855-61

Asymptomatic Women & CEA
ACAS, ACST-1
● No clear benefit from CEA in RTs
● Did not benefit in ACAS
● The closest to benefit in ACST were aged <75: only borderline statistically significant at 10yrs
● Asymptomatic men had more benefit

Executive Committee, JAMA 1995; Halliday et al 2004 & 2010

Symptomatic & Asymptomatic Women & CAS
ACT-1, CREST-1, ICSS, BACASS, SPACE-1, EVA-3S, CAVATAS, Leicester RT
RTs: Women (& men) have not been shown to benefit from CAS compared to
- Medical intervention alone or
- CEA (?Less harm from CAS in ACT-1)

Rosenfield et al 2016; Brott et al 2010; Bonati et al Cochrane review 2012

Women & Men Much Less Likely to Benefit from Any Carotid Procedure Now…
≥50-75% ACS & ‘Medical Revascularisation’ Alone…

Annual Ipsilateral Stroke Rate (Raw data, %)
1.7% fall in Absolute Rate
67% fall in Relative Rate to 0.8%
1985-2013

Updated meta-analysis to the end of 2013.
Abbott et al, Frontiers in Neurology, 18 October 2017
https://doi.org/10.3389/fneur.2017.00537
56% lower since ACAS in 1995!

Procedural Harm
Symptomatic & Asymptomatic Women & CEA
NASCET, ECST, ACAS, ACST-1, Other Studies¹ ²

- **RTs:**
  - Women more peri-operative strokes/deaths vs men
  - 2004 Systematic Review, 62 studies, ACS/SCS¹: Women 1.3x more CEA stroke/death than men: OR 1.31 (95% CI 1.17-1.47, P < 0.001)

¹ Bond et al Systematic review, 2005; ² Touze et al 2013

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Trans-Femoral/Aortic CAS

Symptomatic Women & CAS
CREST-1, ICSS, BACASS, SPACE-1, EVA-3S, CAVATAS, Leicester RT, other studies¹

- **RTs/other studies** have been underpowered to compare outcomes with CAS in symptomatic women vs men but across both sexes CAS was significantly more harmful.

- **RT meta-analysis:** Symptomatic women had 1.5x more peri-procedural strokes/deaths with CAS vs CEA: OR 1.53 (95% CI 1.02-2.29)²

¹ Touze et al 2009; ² Bonati et al, Cochrane review of RTs, 2012

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Asymptomatic Women & CAS
CREST-1, ACT-1, Other studies

- **RTs/other studies** underpowered to compare CAS in asymptomatic women vs men but across both sexes the trend was that CAS was more harmful

- **RTs:** CREST-1: The 872 asymptomatic/symptomatic women who had CAS had 1.8-2.6x more 30-day strokes/deaths +/- MIs vs CEA


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Trans-Carotid CAS: TCAR

An indication is unlikely to be established for anyone due to an apparent lack of planned adequate randomised comparison with current optimal medical intervention ...
Summary: Randomised Trials / Other Studies

Procedural Benefit:
- Only symptomatic women: 70-99% + CEA <2-3 weeks

Procedural Harm:
- All women more likely to be harmed by - CEA (vs men)
  - CAS (vs CEA)
- Everyone less likely to benefit from CEA/CAS now
- So why are so many procedures done in women?