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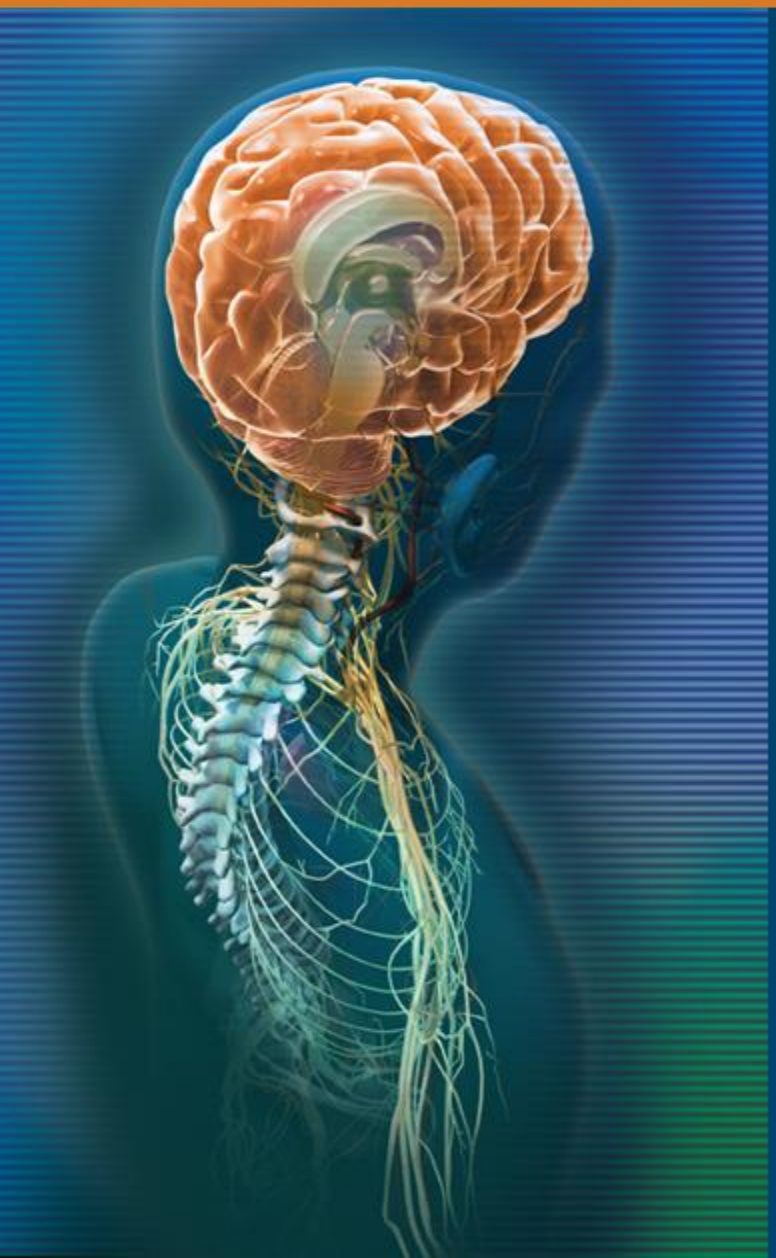

Perils of Mechanical Thrombectomy in Acute Asymptomatic Large Vessel Occlusion

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Disclosures

- Consultant: Penumbra, Inc. and Medtronic Inc.

Outline

- Current Indications
- Risks of Mechanical Thrombectomy (MT)
- Patient Subgroups with Asymptomatic Large Vessel Occlusion (LVO)
- Outcomes with IV tPA

Background

- In 2015, 5 randomized controlled trials demonstrated superiority of endovascular thrombectomy to IV tPA alone for acute ischemic stroke (AIS) caused by an anterior circulation emergent large vessel occlusion (ELVO)
  - Next-generation devices
    - More effective recanal
    - Faster recanalization
  - Advanced imaging algorithms
    - Better patient selection

So… We have the ability to open a vessel

But the important questions for asymptomatic or low NIHSS is:

Should we?

Do we need to?

Current Indications

Most trials supporting MT **excluded** patients with low NIHSS.

	MR CLEAN	EXTEND-IA	ESCAPE	SWIFT PRIME	REVASCAT
inclusion NIHSS	≥ 2	NA	> 5	≥ 8	≥ 6
median NIHSS	17	17	16	17	17

Current Indications

2015 AHA/ASA Guidelines

2. **Patients should receive endovascular therapy with a stent retriever if they meet all the following criteria *(Class I; Level of Evidence A)*.** (New recommendation):
   a. **Prestroke mRS score 0 to 1,**
   b. **Acute ischemic stroke receiving intravenous r-tPA within 4.5 hours of onset according to guidelines from professional medical societies,**
   c. **Causative occlusion of the ICA or proximal MCA (M1),**
   d. **Age ≥18 years,**
   e. **NIHSS score of ≥6,**
   f. **ASPECTS of ≥6, and**
   g. **Treatment can be initiated (groin puncture) within 6 hours of symptom onset**

Powers et al. Stroke, 2015.

Current Indications

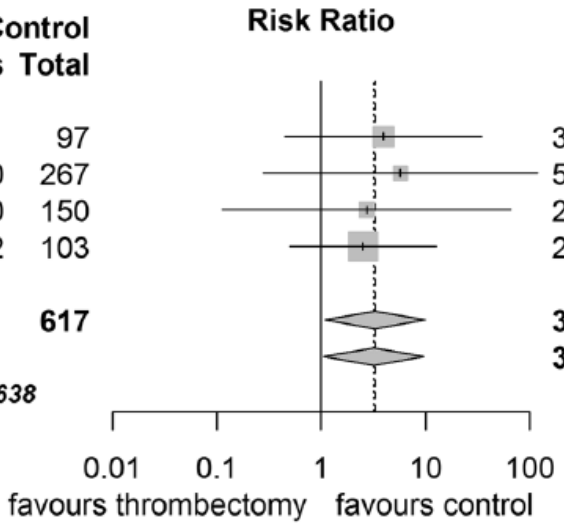
- Currently little data **for** or **against** thrombectomy for NIHSS $\leq$ 6
- Need to weigh
  - Risk of deterioration
  - Risks of procedure including hemorrhage and stroke to distal or other territory

Risks: Hemorrhage

Meta-Analysis of Trials

Study	Experimental Events	Experimental Total	Control Events	Control Total	RR	95%-CI	W(fixed)	W(random)
SWIFT PRIME	4	98	1	97	3.96	[0.45; 34.79]	25.2%	26.4%
MR CLEAN	2	233	0	267	5.73	[0.28; 118.71]	11.7%	13.6%
ESCAPE	1	165	0	150	2.73	[0.11; 66.46]	13.1%	12.2%
REVASCAT	5	103	2	103	2.50	[0.50; 12.59]	50.1%	47.7%
Fixed effect model		**599**		**617**	**3.27**	**[1.08; 9.91]**	**100%**	**--**
Random effects model					**3.19**	**[1.04; 9.76]**	**--**	**100%**

Heterogeneity: I-squared=0%, tau-squared=0, p=0.9638



~3x risk of hemorrhage

Emprechtinger et al. J Neurol, 2017.

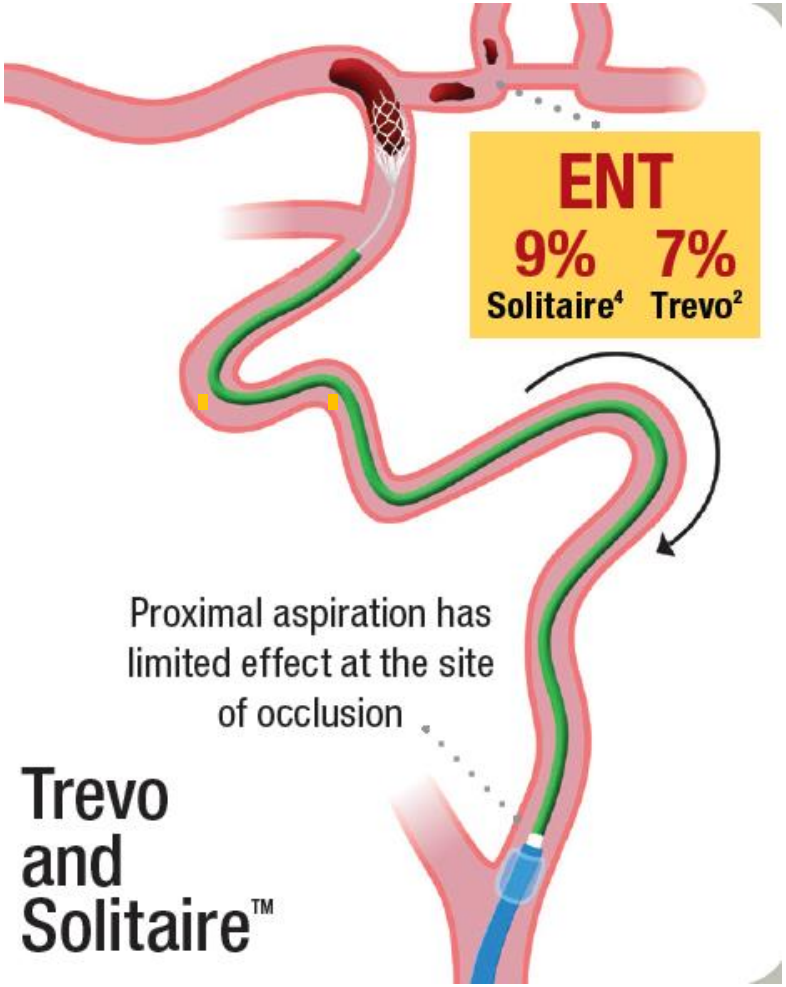
Risks Persist in Patients with Low NIHSS

Retrospective Studies of Thrombectomy in low NIHSS

- Bhogal et al 2016, NIHSS ≤ 5 :
  - hemorrhage in 7 of 44 (2 symptomatic)

- Pfaff et al 2016, NIHSS ≤ 8:
  - hemorrhage in 5 of 33
  - 2 fatal hemorrhages, 1 from vessel perforation during thrombectomy
  - 1 case of closure device failure requiring surgical removal and femoral endarterectomy

Risks: Emboli to New Territory



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[1] Solitaire Retrospective Study. Presented at WFITN, 2011.
[2] Trevo 2 Trial. Presented at ESC, 2012.
[3] Klinikum Stuttgard Experience, Val d'Isere, 2013

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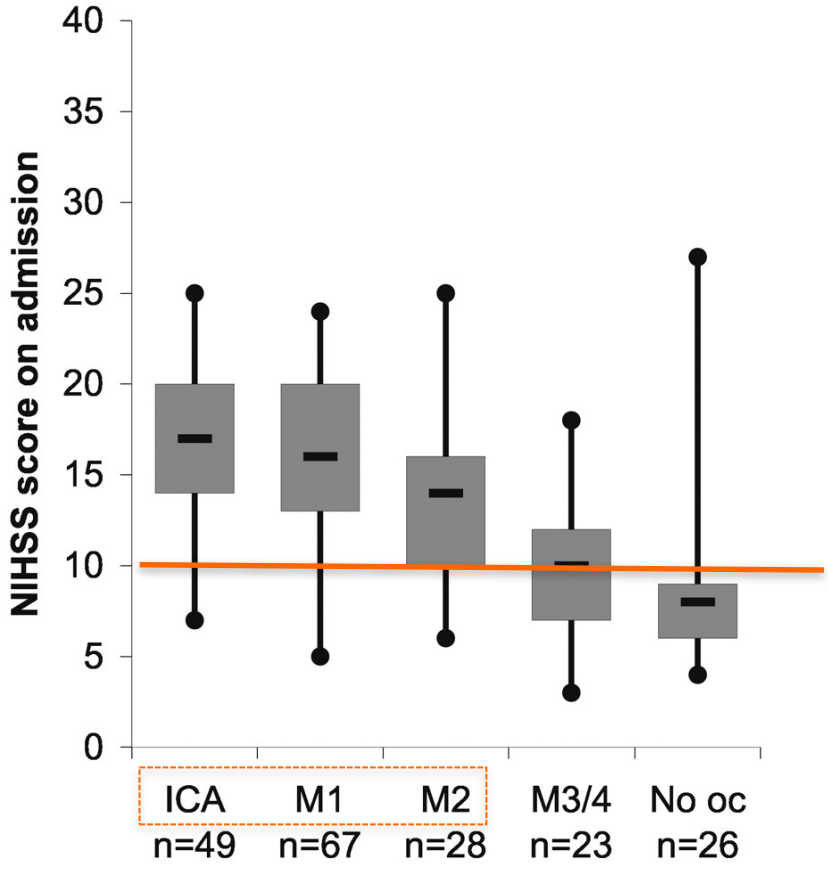
Asymptomatic Patient Subgroups: Generally benign

Who presents with asymptomatic LVO?

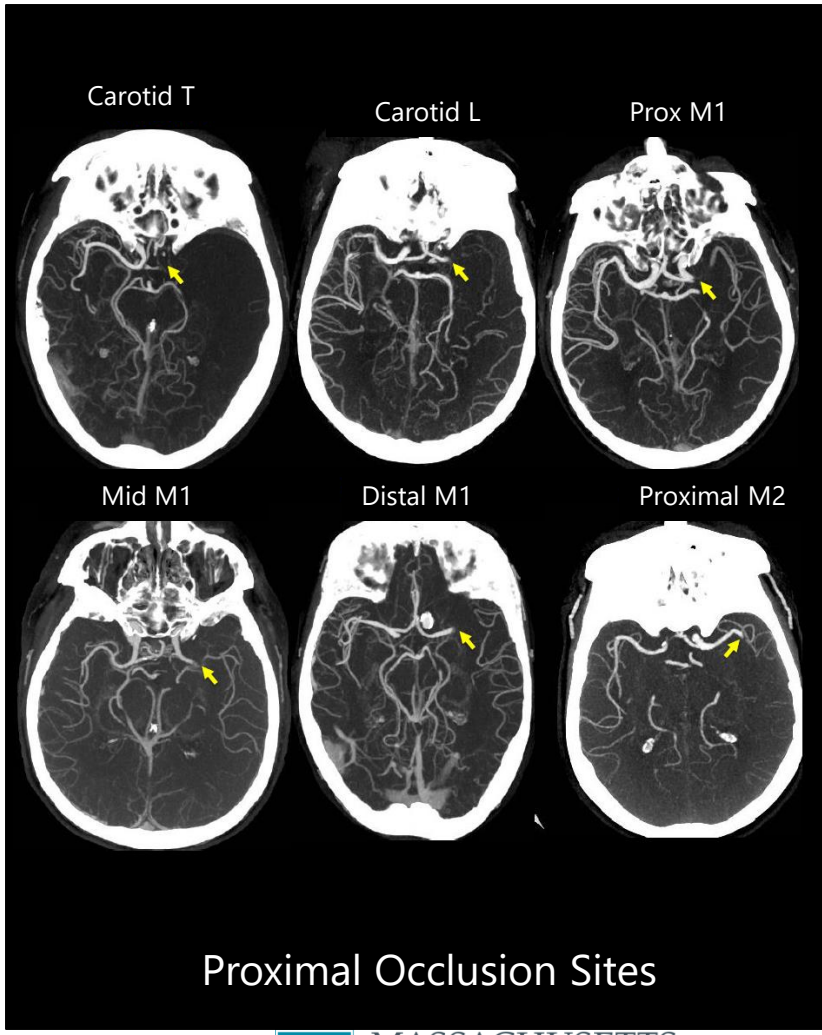
- Distal occlusion, small infarct
- Good collaterals, small or absent infarct
  - Chronic stenosis / occlusion
  - Baseline good collaterals

Distal Occlusion, Small Infarct

Low NIHSS Suggests Distal Occlusion



NIHSS (median, first and third quartile, and range) on admission and location of the vessel occlusion as seen on DSA for 226 patients. No oc indicates no occlusion.



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Fischer et al. Stroke, 2005

Low Risk of Stroke in Chronic Occlusion: Carotid

Table 3. Meta-Analysis of Event Rates

Outcome	Studies, n	Events, n	Annual Event Rate, % (95% CI)	Heterogeneity, I^2
Ipsilateral stroke	13	29	1.3 (0.4–2.1)	53
Total stroke	12	39	2.0 (0.9–3.0)	40
Ipsilateral TIA	11	19	1.0 (0.3–1.8)	40
Total TIA	9	32	3.0 (1.9–4.1)	0
Death (all cause)	7	151	7.7 (4.3–11.2)	83
Death (stroke related)	6	17	1.1 (0.07–2.1)	63
Death (cardiac)	6	62	3.3 (1.2–5.4)	83

CI indicates confidence interval; and TIA, transient ischemic attack.

Hackam et al. Stroke, 2016.

Meta-analysis of 718 pts with asymptomatic carotid occlusion followed for average of 3 years

- low risk of stroke and stroke-related mortality
- high mortality from cardiac causes
- supports medical rather than interventional therapy

Low Risk of Stroke in Chronic Occlusion: MCA

Kremer et al. J Neurol Neurosurg Psychiatry, 2004

50 pts with asymptomatic MCA stenosis followed for 2 years

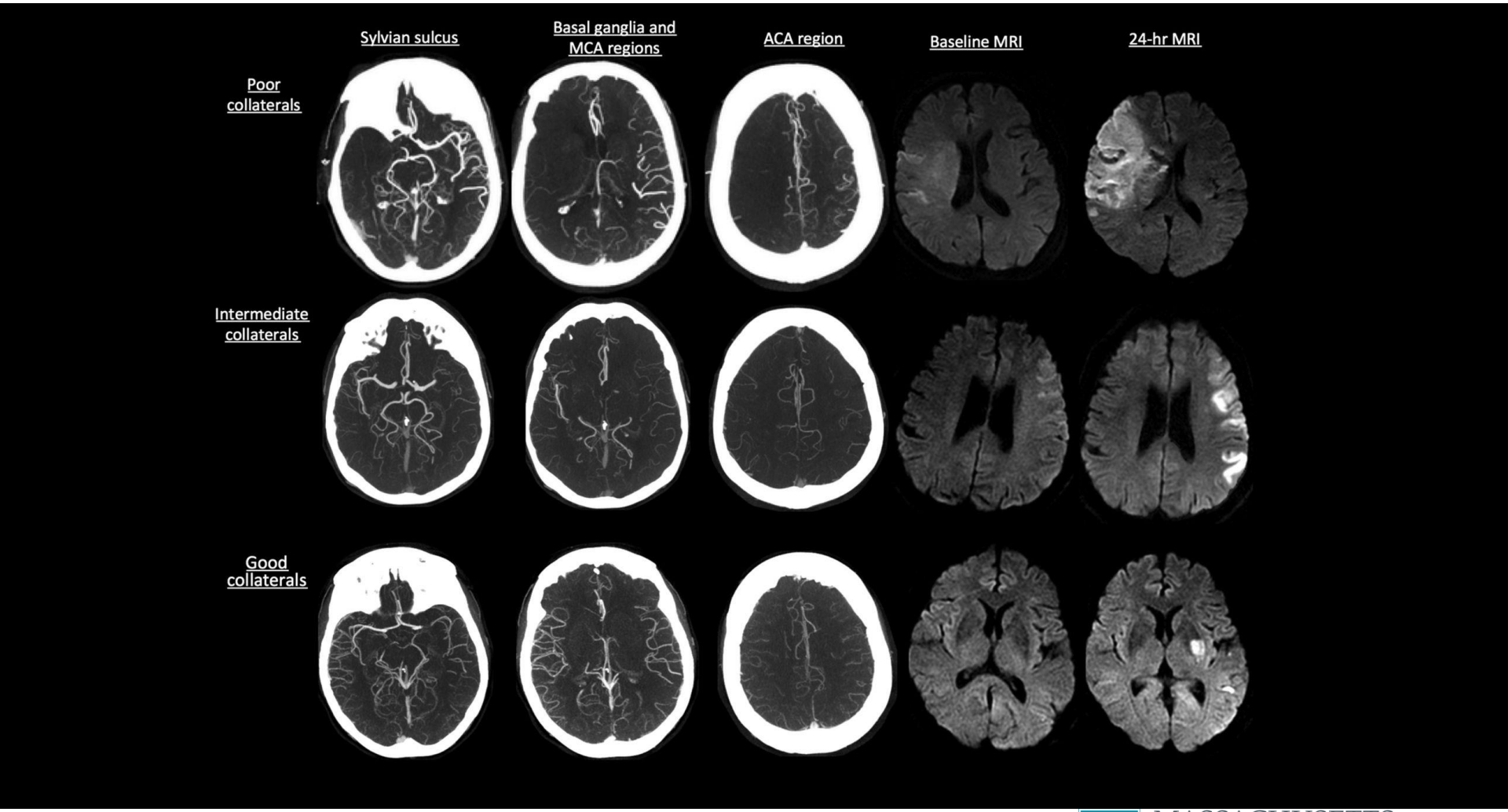
- no infarcts; 1 TIA
- 3 deaths: 1 subdural on Coumadin; 2 non-stroke related
- supports medical rather than interventional therapy

Good Collaterals, Small Infarcts

Maas et al 2009: compared 134 LVO with 235 no LVO patients presenting with symptoms of acute ischemia

- rate of clinical worsening the same between LVO/no LVO groups with good collaterals (18.4% vs. 16.6%)
- LVO patients with poor collaterals had much higher rate of worsening (55.6% vs 16.6%)
- suggests **recanalization not critical for outcome in good collateral patients**

Collaterals Determine Stroke Volume



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Collateral status on with baseline and 24-hour infarct volume on MR DWI

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Souza et al. AJNR 2012
V. Nambiar et al. AJNR 2014

Management with IV tPA is enough: Outcomes after tPA for mild NIHSS

Laurencin et al 2015: 170 patients, NIHSS ≤ 4

- 54% had occlusion (28% proximal)
- **77% had good outcome (mRS ≤ 2)**
- low risk of of hemorrhage (5%, no symptomatic)

Recanalization doesn't affect outcome in asymptomatic LVO?

- Skagen et al 2015: 152 patients with LVO
  - mild NIHSS associated with good outcome irrespective of treatment
  - no association between recanalization and good outcome in low NIHSS group (NIHSS $\leq$ 15)

Deterioration – what about it?

- Ali et al. Stroke, 2016: 360 patients, NIHSS ≤ 5
  - "too good" to receive **IV tPA** or thrombectomy
  - independent predictors of poor prognosis: age, initial NIHSS per point, location (posterior circ)

- Similar analysis needed for thrombectomy

- Haussen et al. JNIS, 2016: 32 pt w LVO, NIHSS ≤ 5
  - 9 of 22 in medical cohort deteriorated and got MT
  - bigger N needed to determine characteristics predictive of deterioration

Conclusions: Thrombectomy in Low NIHSS LVO

- Little data for or against thrombectomy for NIHSS ≤ 6.
- Non-negligible risks of hemorrhage and recurrent stroke from thrombectomy.
- Most patients with asymptomatic LVO, including chronic stenosis/occlusion, have good outcomes without thrombectomy.
- Treatment should be reserved for patients at risk for deterioration (further work to define criteria).

Conclusions

- Remember you cannot make an asymptomatic patient ANY better acutely

- Treatment of an asymptomatic LVO is treatment to prevent a “future” Stroke
  - Like treatment of asymptomatic carotid disease
  - Need to select patients at high risk of “future” stroke in immediate future

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Do we need to?

So… We have the ability to open a vessel

IT DEPENDS!!!!

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