Advances in Stroke

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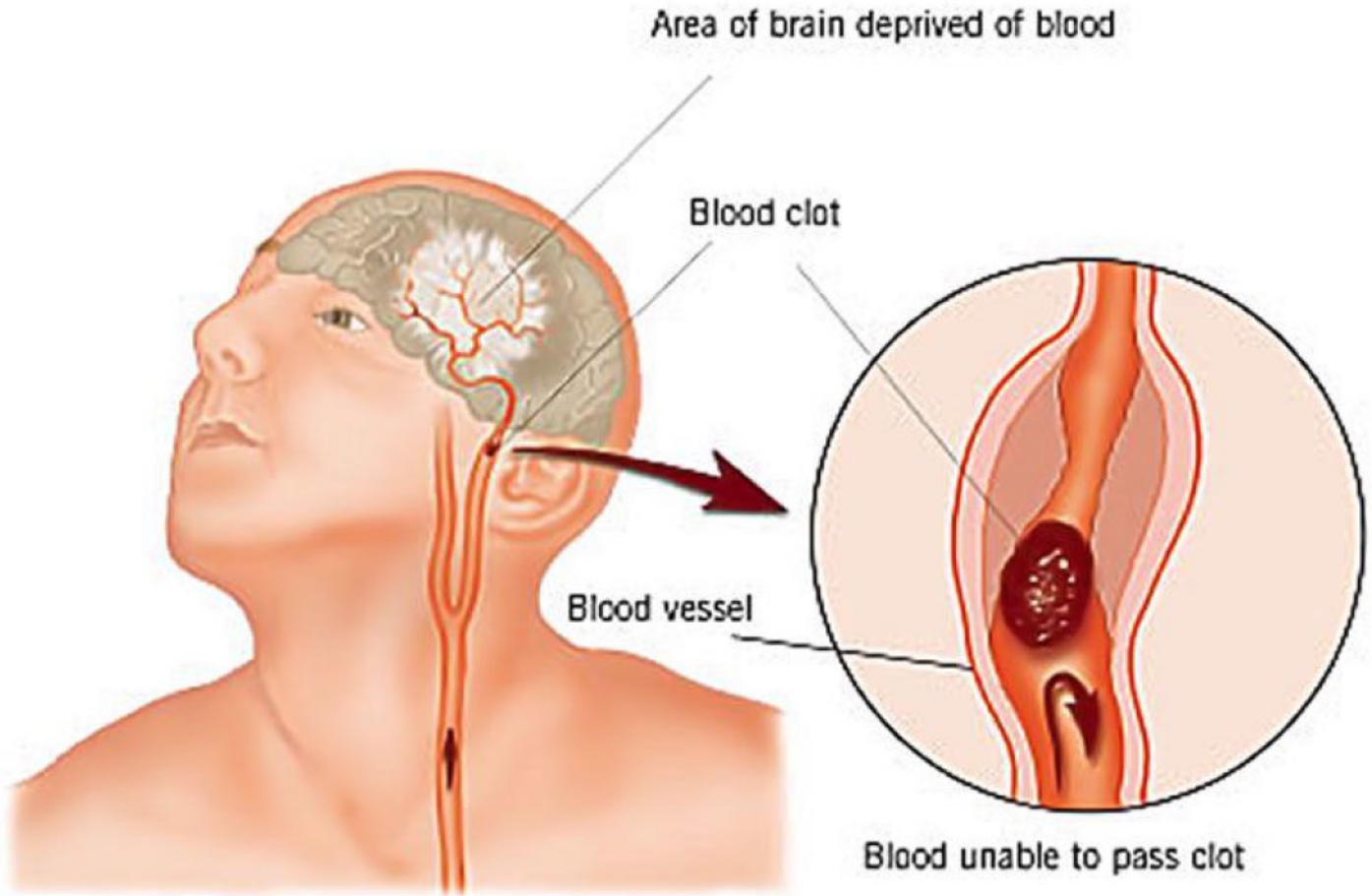
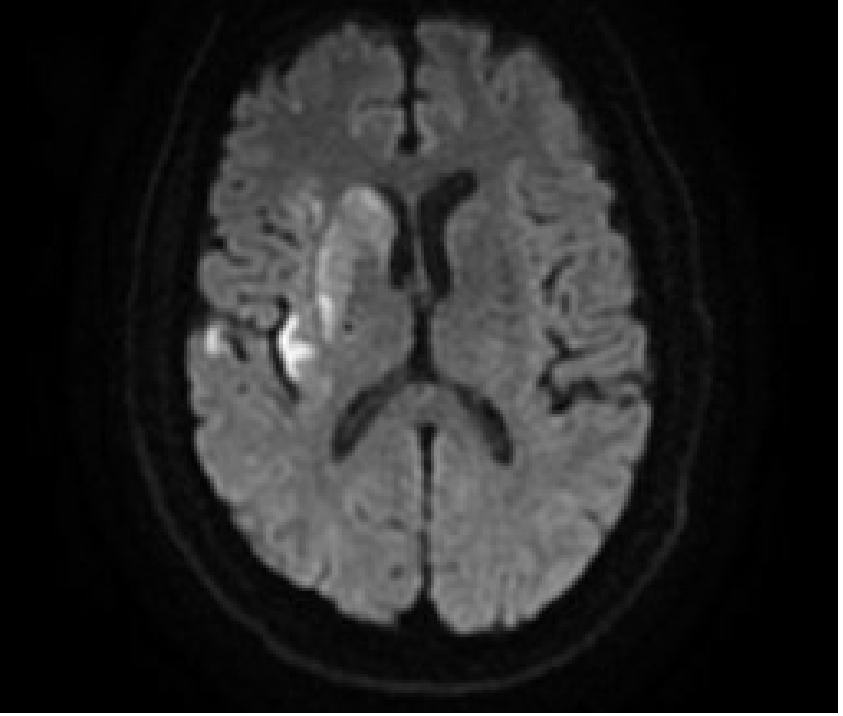
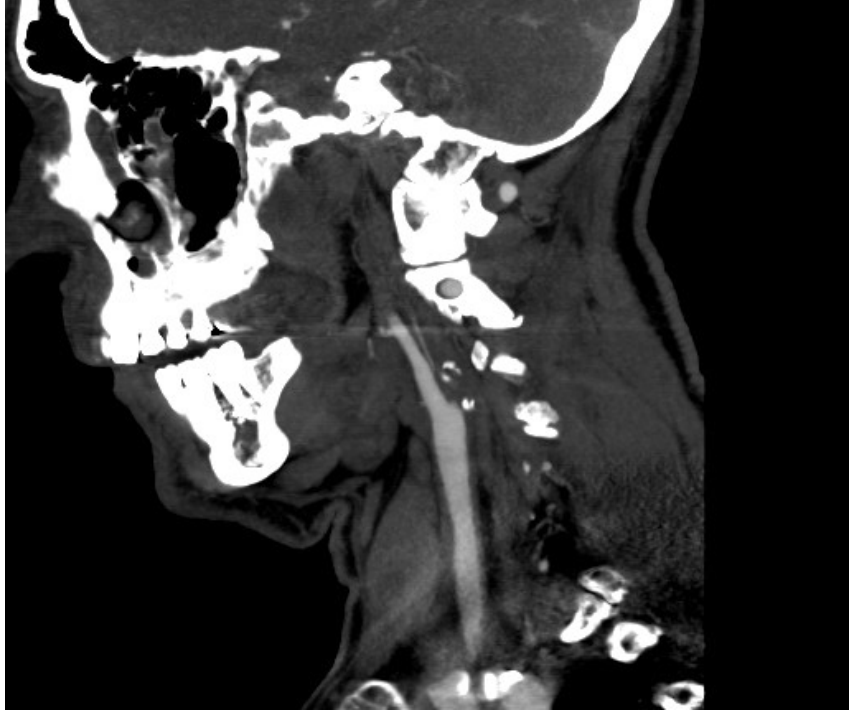
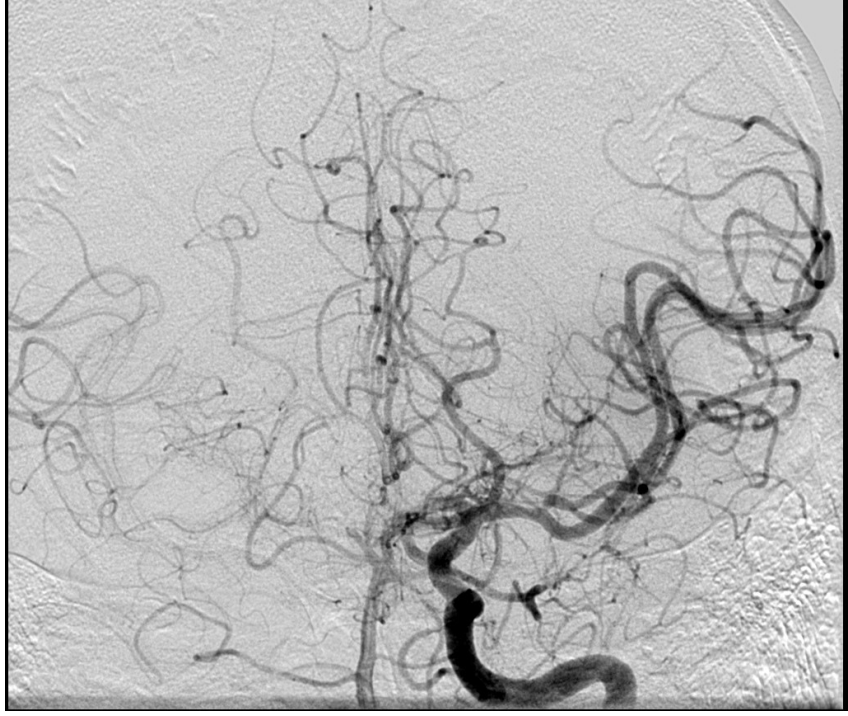
Nov 27 2019

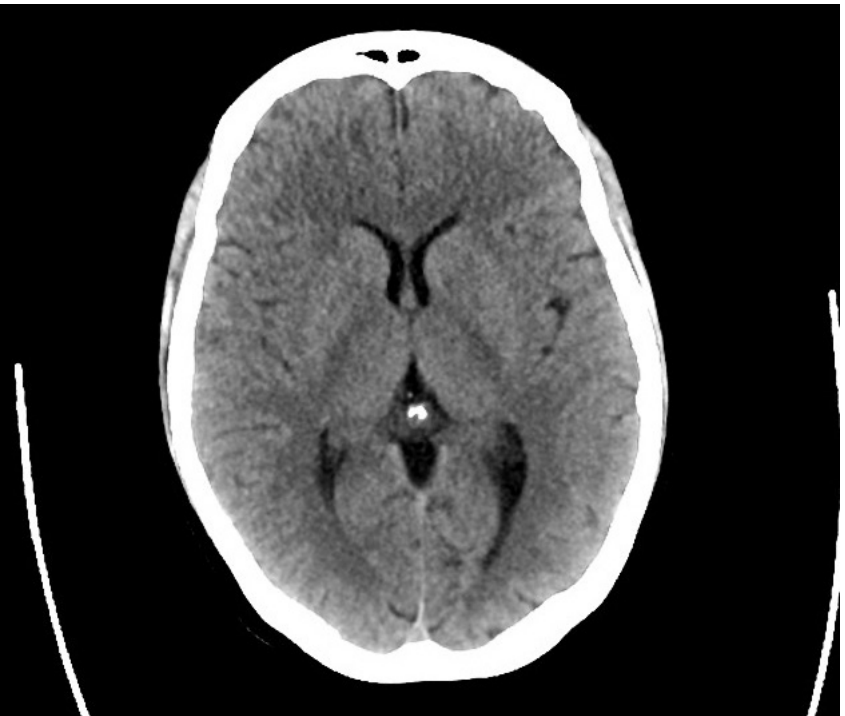

Area of brain deprived of blood
Blood clot
Blood vessel
Blood unable to pass clot

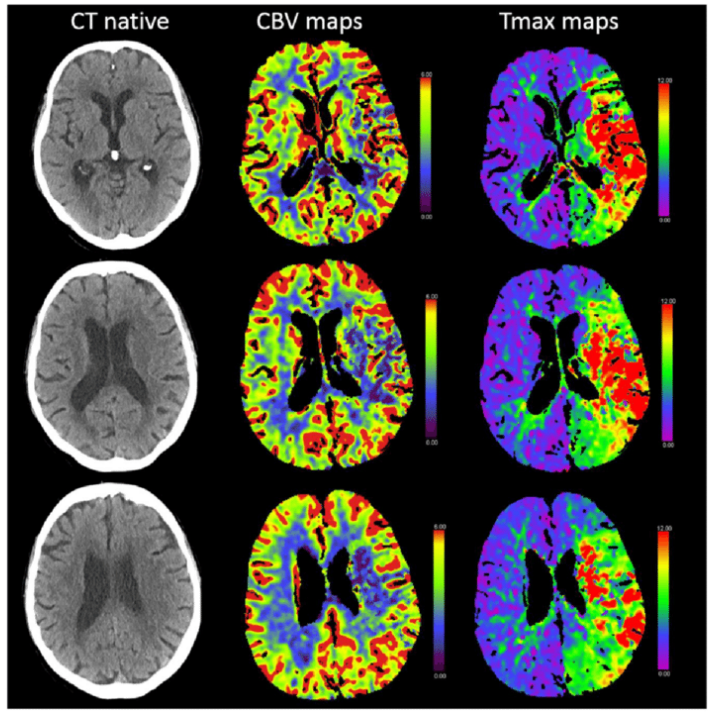
SPOT A STROKE F.A.S.T.



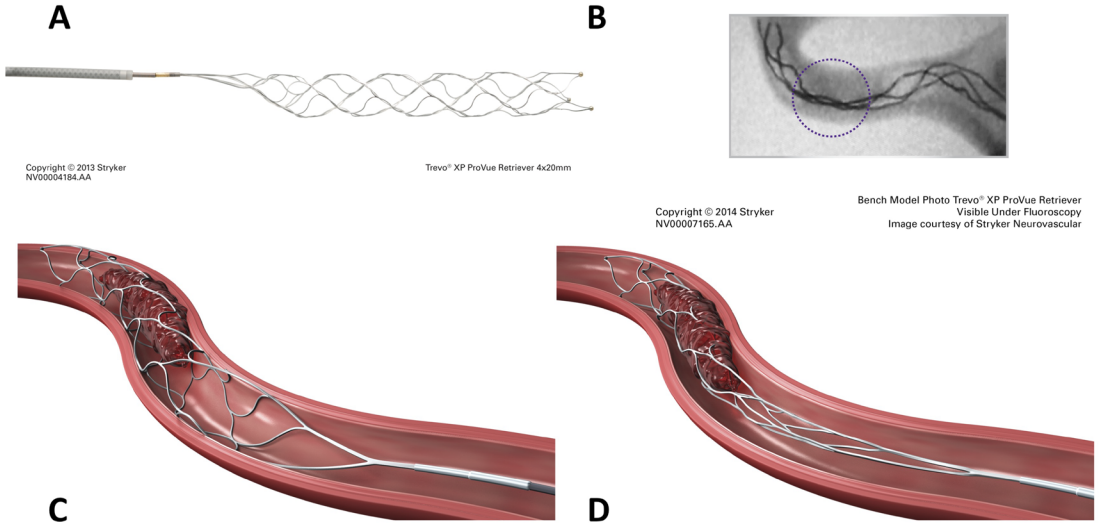







CT native
CBV maps
Tmax maps

Thrombolysis (tPA)



Endovascular Thrombectomy

Evolution of stroke imaging

Imaging of the brain

Imaging of the blood vessels

Imaging of the blood flow

Treatment time windows

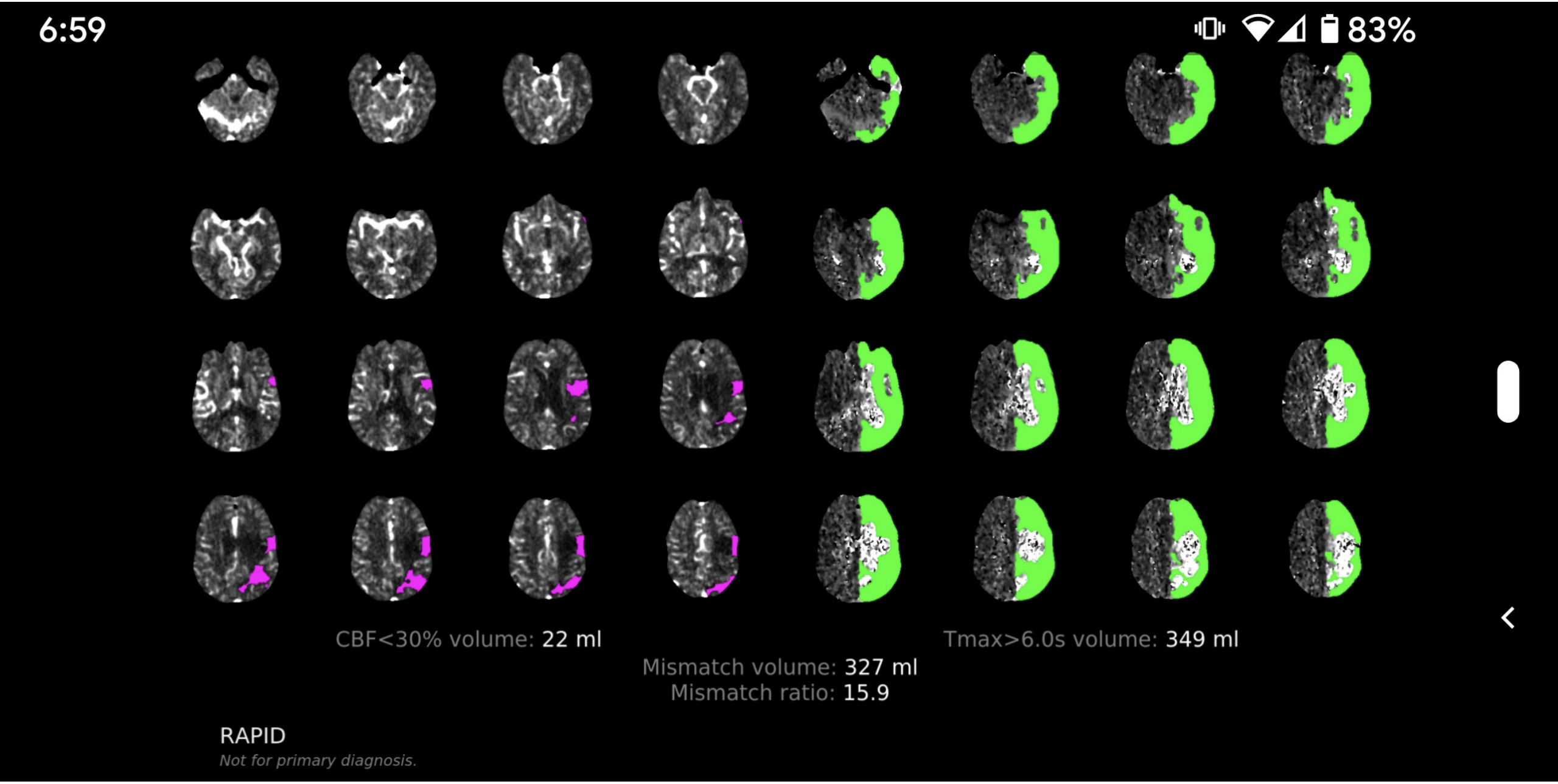
tPA – upto 3 hours

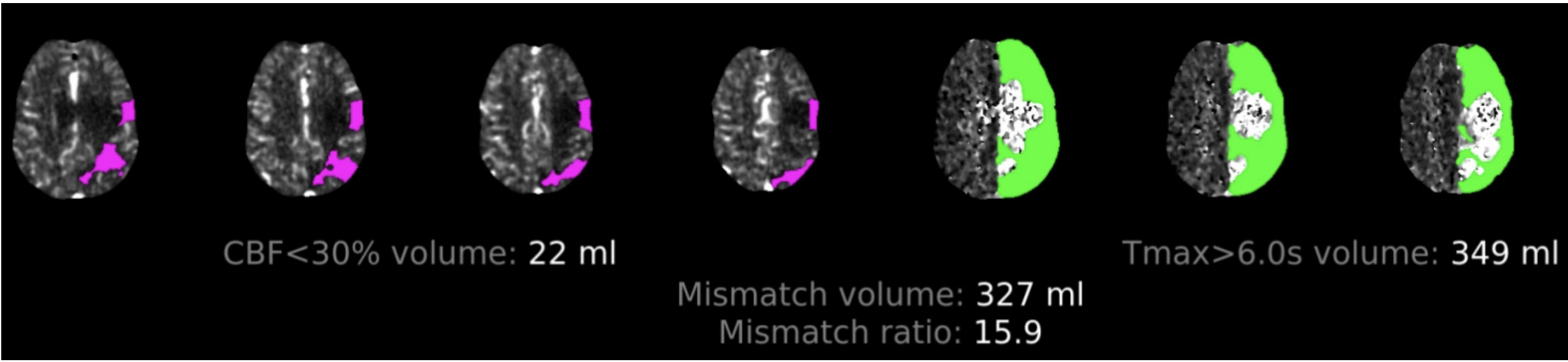
tPA upto 4.5 hours

EVT upto 6 hours

CT Perfusion imaging

- Cerebral blood flow provides useful information on
  - Core – ischemic brain already irreversibly damaged
  - Penumbra – ischemic brain that can be saved
- Helps in
  - Selecting patients with salvageable brain.
  - Selecting patients beyond 6 hours
  - Avoid futile recanalization


6:59
83%
CBF<30% volume: 22 ml
Tmax>6.0s volume: 349 ml
Mismatch volume: 327 ml
Mismatch ratio: 15.9
RAPID
Not for primary diagnosis.


CBF<30% volume: 22 ml
Mismatch volume: 327 ml
Mismatch ratio: 15.9
Tmax>6.0s volume: 349 ml

Thrombolysis

- Updates on tPA
  - Don't have to wait for CTA / CTP to decide on thrombolysis
  - Extension of time window up to 9 hours – EXTEND trial
    - Using CTP / MRP
    - Promising results

Thrombolysis for Wake-up stroke

- 15-30% of acute strokes can be wake up strokes
- Often not eligible for tPA as their time of onset(LSN) > 4.5 hours
- Wakeup trial
  - MRI can be used (DWI/Flair) : Wake up trial : 53% vs 42% Mrs 0-1 $p<0.02$

Tenecteplase for stroke thrombolysis

- Genetically engineered mutant tPA
- Potentially superior efficacy
- Better safety profile
- Easier administration
- Higher affinity binding to fibrin
- Greater resistance to inactivation by plasminogen activator inhibitor-1
- Less disruption of hemostasis
- Longer free plasma half life allowing single IV bolus administration.

Tenecteplase for stroke thrombolysis

Trial	Year	Study design	TNK dose groups (mg/kg)	Non-TNK thrombolytic comparator group	N
Haley[30]	2005	RCT	0.1 vs. 0.2 vs. 0.4 vs. 0.5	No	88
Parsons[31]	2009	Obs	0.1	No	15
Haley[38]	2010	Obs	0.1 vs 0.25 vs 0.4	Alteplase 0.9 mg/kg	112
Parsons[28]	2012	RCT	0.1 vs. 0.25	Alteplase 0.9 mg/kg	75
ATTEST[27]	2015	RCT	0.25	Alteplase 0.9 mg/kg	104
TEMPO-1[33]	2015	Obs	0.1 vs. 0.25	No	50
NOR-TEST[35]	2017	RCT	0.4	Alteplase 0.9 mg/kg	1100
EXTEND-IA TNK[36]	2018	RCT	0.25	Alteplase 0.9 mg/kg	202
Kate[39]	2018	Obs	0.25	No	16

RCT: randomized-controlled trial; Obs: observational study.

Trial	TNK dose groups (mg/kg)	Non-TNK thrombolytic comparator group	Timing	N
ATTEST-2 (NCT02814409)	0.25	Alteplase 0.9 mg/Kg	<4.5 h	1870
TASTE-2 (ACTRN12613000243718)	0.25	Alteplase 0.9 mg/Kg	<4.5 h	Up to 1024[a]
EXTEND-IA TNK II (NCT03340493)	0.25 vs. 0.4	No		Up to 656[a]
TWIST (NCT03181360)	0.25	No (non-thrombolytic standard of care)	<4.5 h from awakening	500
TEMPO-2 (NCT02398656)	0.25	No (non-thrombolytic standard of care)	<12 h	1274

Coutts, et al. International Journal of Stroke 2018, Vol. 13(9) 885–892

Large vessel occlusion (LVO)

- ICA / MCA
- Candidates for EVT
- When to suspect LVO?
  - LVO predictors – multiple
  - NIHSS is the best prediction instrument.
  - NIHSS threshold for LVO
    - ≥10 would provide the optimal balance between sensitivity (73%) and specificity (78%)
    - ≥6 would have 87% sensitivity and 52% specificity

How to detect LVO?

- Vascular imaging is needed
- CTA / MRA
- Head and Neck vessels

Confirmed LVO – what next?

- Before 6 hours :CT / CTA
- LVO 6-24 Hours :
  - CT/CTA + CTP

  or
  - MRI with DWI +/- MRP

Endovascular thrombectomy

A

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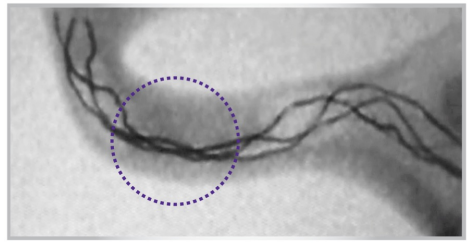
Trevo® XP ProVue Retriever 4x20mm

B



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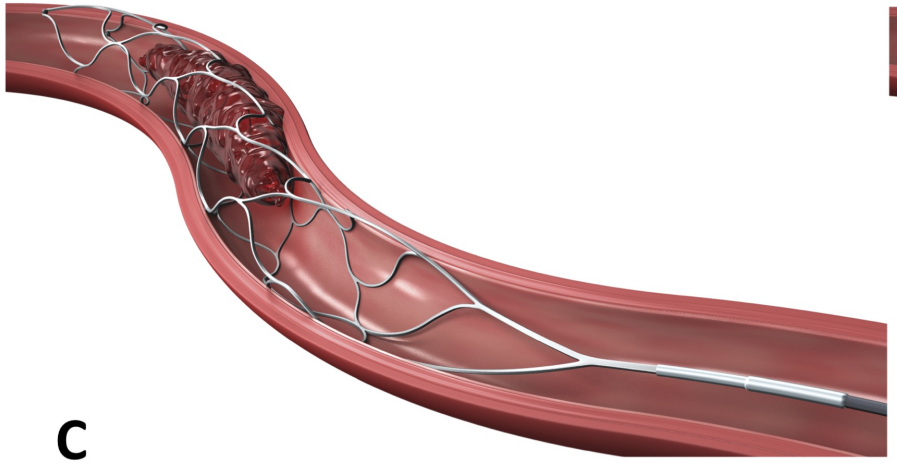
Bench Model Photo Trevo® XP ProVue Retriever
Visible Under Fluoroscopy
Image courtesy of Stryker Neurovascular



C

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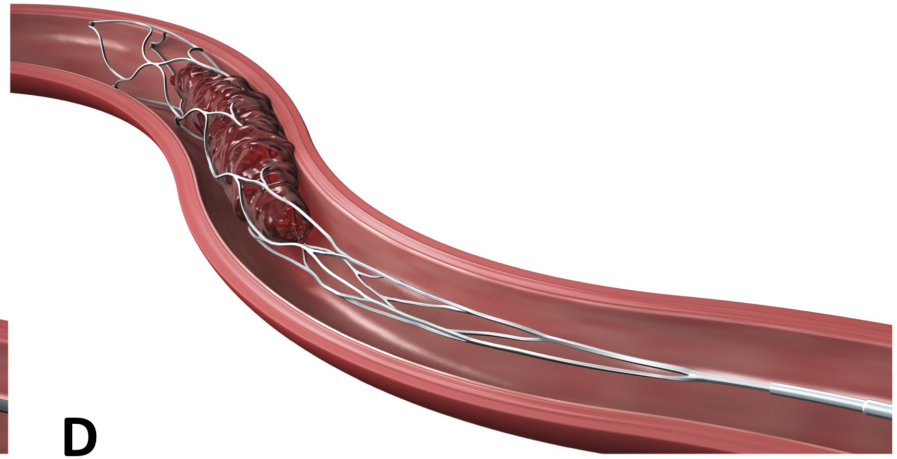
Clot Integration into Trevo® XP ProVue Retriever
Image courtesy of Stryker Neurovascular



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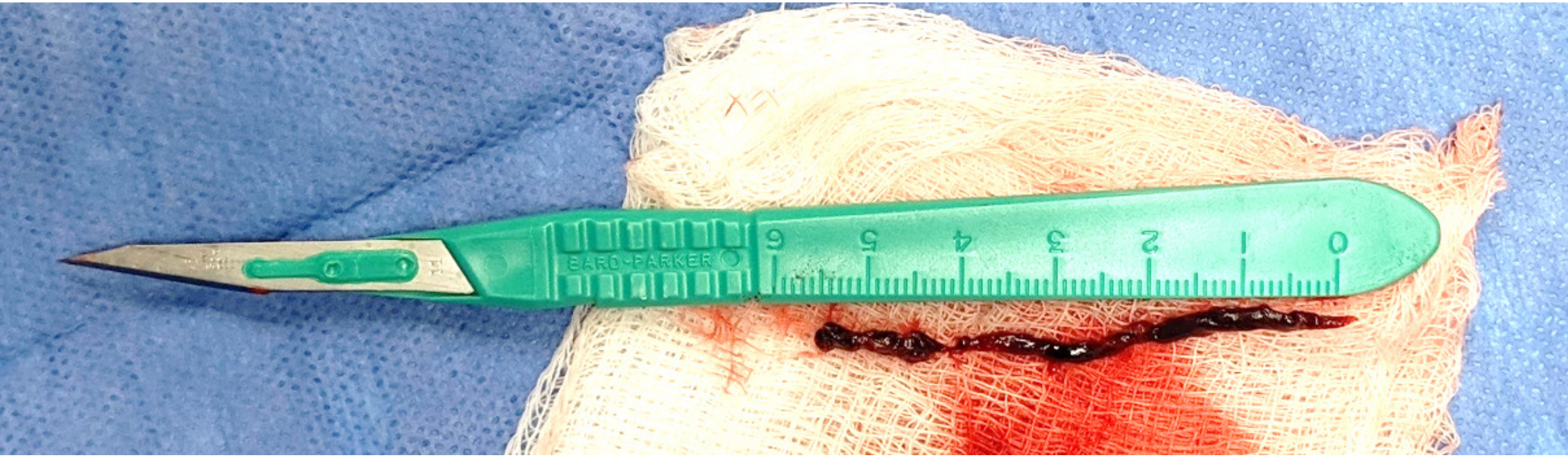
Trevo® XP ProVue Retriever secures clot during retrieval
Image courtesy of Stryker Neurovascular


LEFT


LEFT


BARD-PARKER
6
5
4
3
2
1
0

EVT beyond 6 hours to 24 hours.

- Evidence present that it is helpful
- CT Perfusion imaging is needed to select patients.
- Ischemic core is a good predictor of outcome
- CSBPG recommend treatment up to 24 hours in highly selected patients.
- Current Ontario EMS protocols
  - Patients with stroke < 6 hours - transferred to designated stroke centers
  - Patients with stroke > 6 hours – transferred to nearest hospital
- Telestroke – currently filling the gap for decision making for 6-24 hours
- Work in progress..

Choice of thrombolysis before thrombectomy

- tPA vs TNK before 4.5 hours
- TNK after 4.5 hours

BP target for secondary stroke prevention

- Intensive blood pressure treatment significantly reduced stroke recurrence by 22%.
- <130/80

JAMA Neurol. 2019;76(11):1309-1318

PFO Closure

- Cryptogenic stroke
- 1/3rd are cryptogenic strokes
- 25% of adults have a PFO
- 40% of cryptogenic strokes have a PFO

Antiplatelet therapy after TIA or minor stroke

- ASA + Plavix for 3-4 weeks in now standard of care
- POINT Trial

Emergency Triage tools for stroke

- ACT – FAST
  - 3-step paramedic triage tool for pre-hospital recognition of large vessel occlusion (LVO)
  - 100% sensitivity
  - 87% specificity

- KGH ED uses ACT FAST

Questions