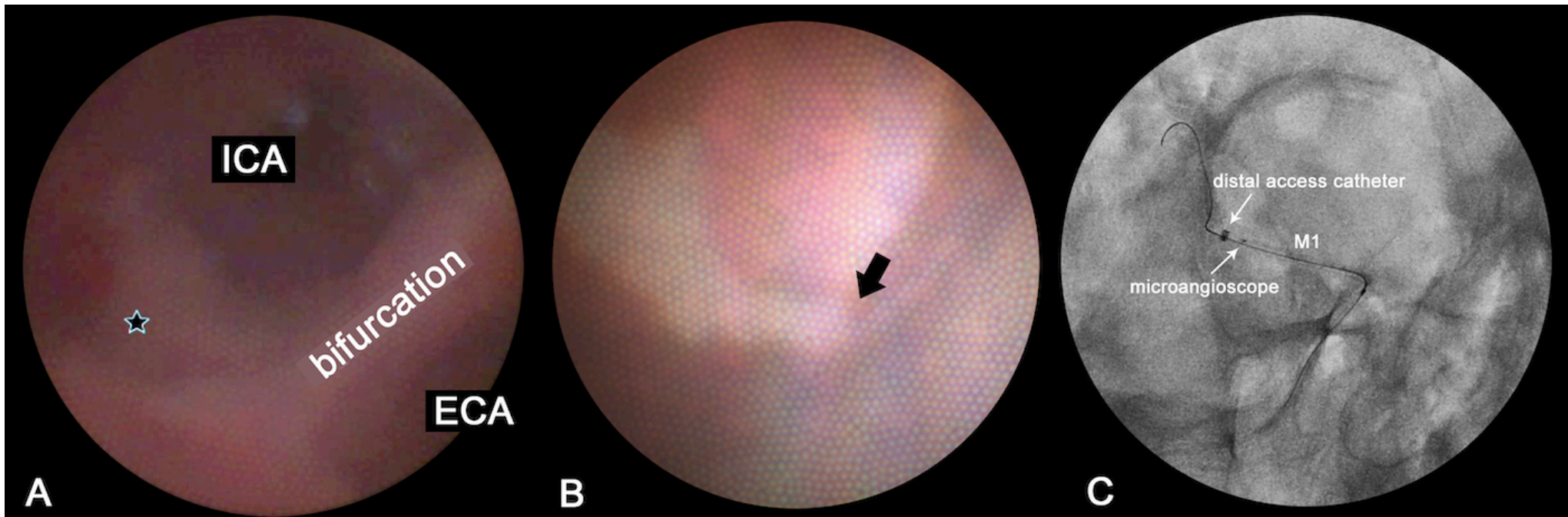


Figure 1: Microangioscope workflow during thrombectomy



(A) Artist's rendering of the workflow of the microangioscope in the angiography suite during a thrombectomy case. The device is seen on the left of the screen by fluoroscopy. On the right of the screen, the device is simultaneously visualized directly by the microangioscope, and is inspected for residual thrombus. This demonstrates the natural integration of these complementary methods of cerebrovascular visualization. **(B)** First-generation microangioscope image, which is limited by resolution and illumination. **(C)** Current-generation microangioscope image of clearly delineates an arterial bifurcation, with higher resolution and much better illumination.

Figure 3: Identification of atherosclerotic disease in human cadaver model



(A) Microangioscope view of the human carotid bifurcation. At the proximal internal carotid artery, a mural atherosclerotic plaque is seen (star). This correlated with the external transluminal visualization of the surgical exposure. The arterial bifurcation is clearly visualized. (B) Microangioscope view of an intracranial atherosclerotic plaque in near the MCA bifurcation with corresponding view on fluoroscopy (C). The plaque is seen and its yellow color is clearly distinguished from the pale pink of the normal artery.

Supplement 1: ARRIVE Guidelines

Animal experimental methodology

Below is the description of animal experiments according to the essential 10-point ARRIVE checklist. Percie du Sert N, Ahluwalia A, Alam S, Avey MT, Baker M, et al. (2020) Reporting animal research: Explanation and elaboration for the ARRIVE guidelines 2.0. PLOS Biology 18(7): e3000411. <https://doi.org/10.1371/journal.pbio.3000411>

- 1) Study design: the animal experiments conducted were proof of concept only, with a single group (no comparator).
- 2) Sample size: n=1 rabbit, n=3 swines.
- 3) Inclusion and exclusion criteria: No criteria were set for either inclusion or exclusion. All animals were used.
- 4) Randomization: not applicable
- 5) Blinding: there were no groups allocated and as such, no blinding.
- 6) Outcome measures: outcome measures were as listed in Table 1, for quality of imaging in diagnostic utility and separately, interventional utility.
- 7) Statistical methods: Statistical analysis was performed in Microsoft Excel for typical descriptive statistics; mean ratings are displayed as mean \pm standard deviation.
- 8) Experimental animals: Swine as described in Neurosurg Focus. 2017 Apr;42(4):E6. doi: 10.3171/2017.1.FOCUS16501. Rabbit as described in Radiology. 1999 Oct;213(1):223-8. doi: 10.1148/radiology.213.1.r99oc15223. We have not included the size/sex/weight of the animals as it does not significantly influence this proof of concept study.
- 9) Experimental procedures: as described in above description of the models with modifications and details as in the Methods section of the main manuscript.
- 10) Results: not applicable due to low number of subjects, precluding statistical analyses.

Supplement 2: Experiment Details and Videos

PROOF-OF-CONCEPT

MICROANGIOSCOPY

Porcine Experiments

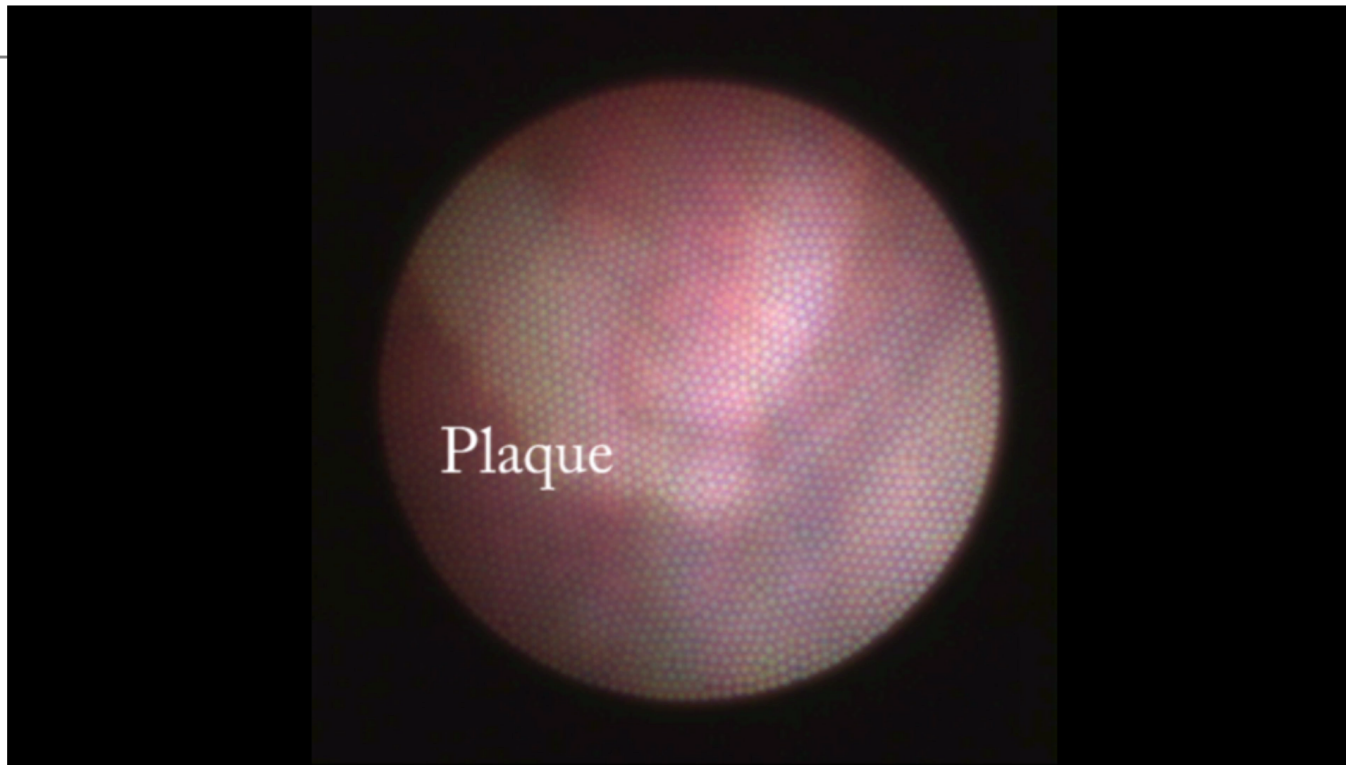
PROOF-OF-CONCEPT

COMPATIBILITY WITH HUMAN CEREBROVASCULATURE

Cadaver Experiments

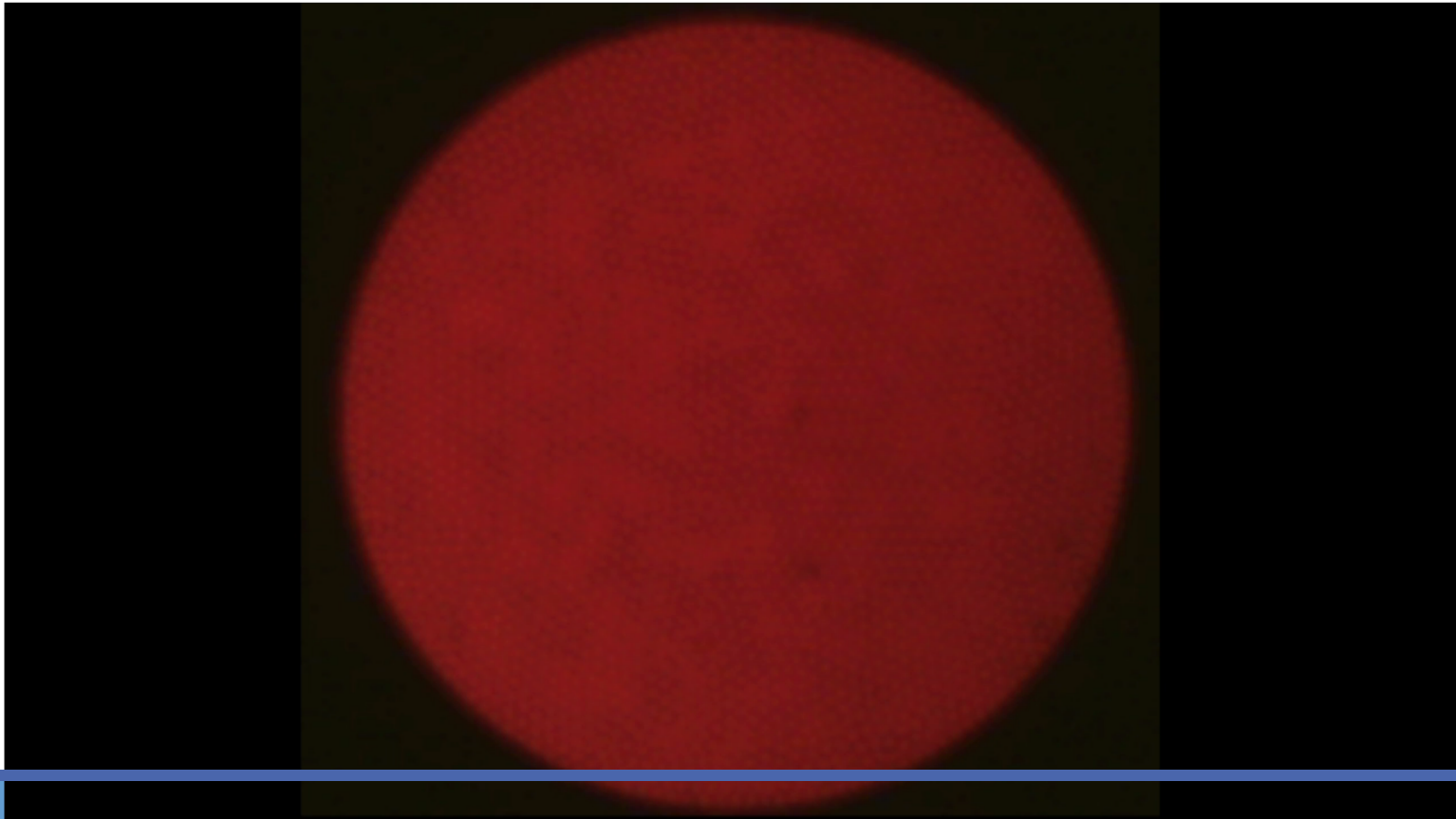
Diagnostic - cadaver carotid

Video link: <https://bit.ly/2yes6SQ>



Video link: <https://bit.ly/2ygjRpi>

Microangioscope Human Cadaver Model

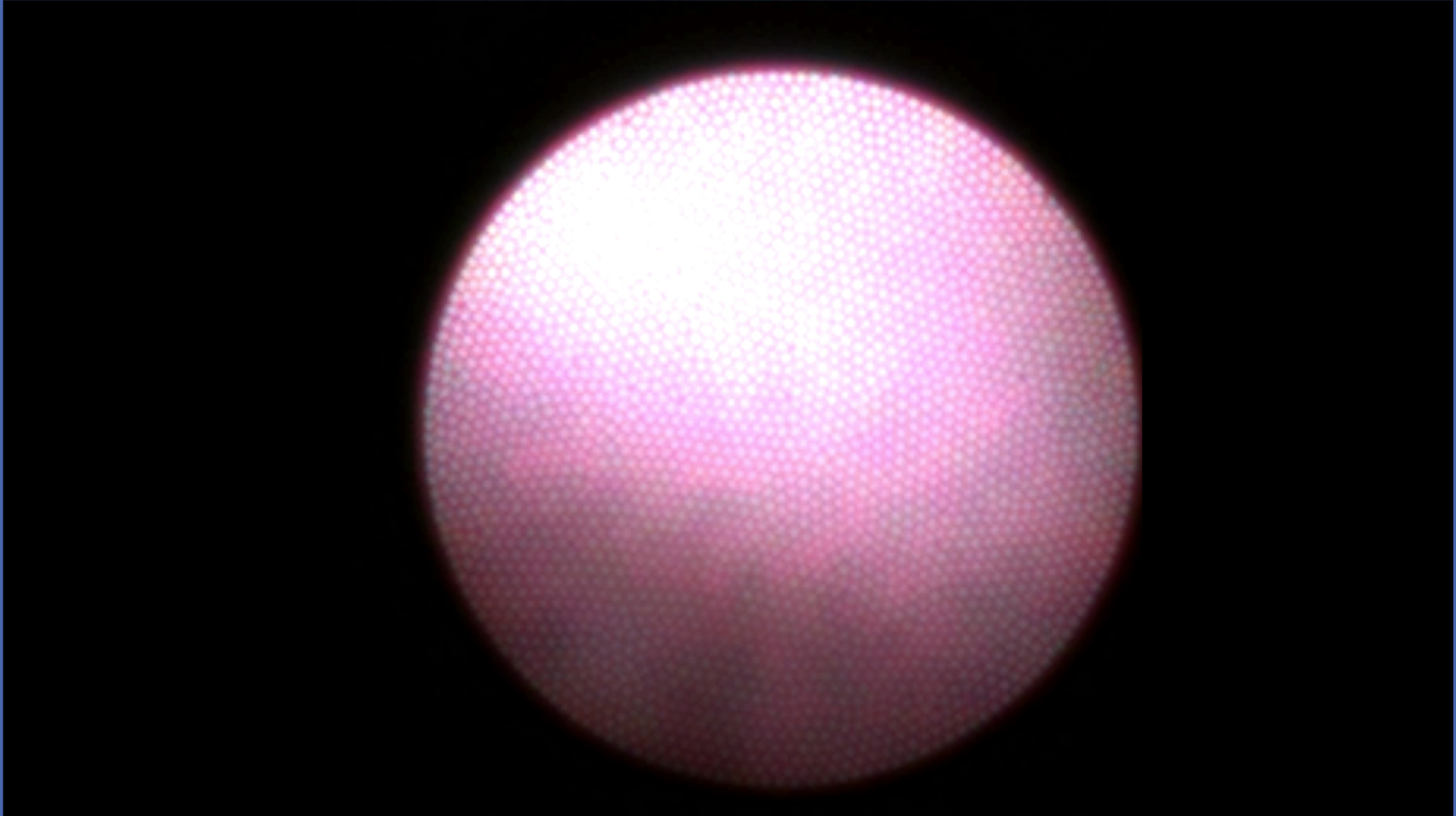


Diagnostic – clot identification/differentiation

Video Link: <https://bit.ly/2RuECVh>

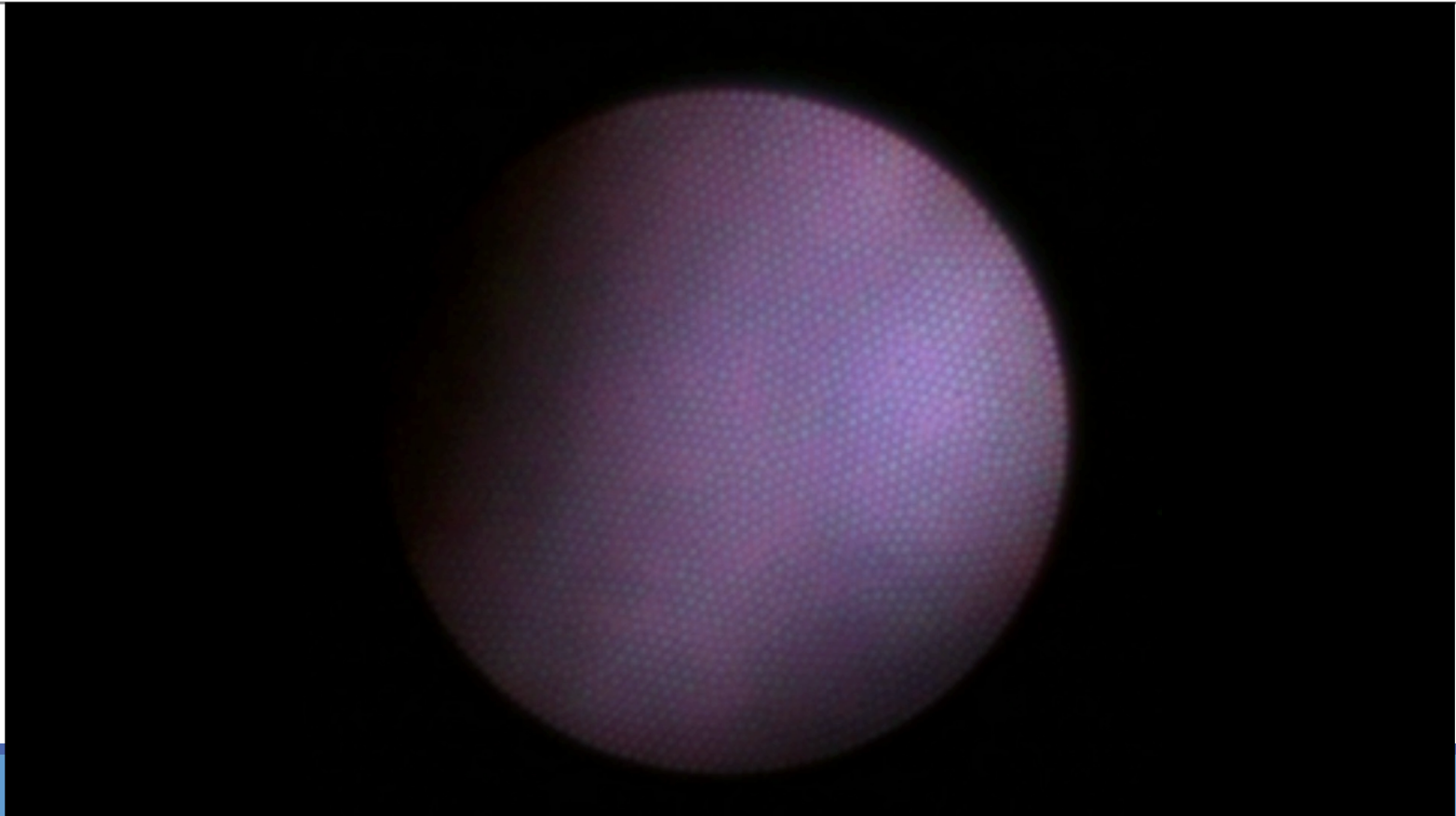
VESSEL INJURY

Video Link: <https://bit.ly/3bbqHv2>



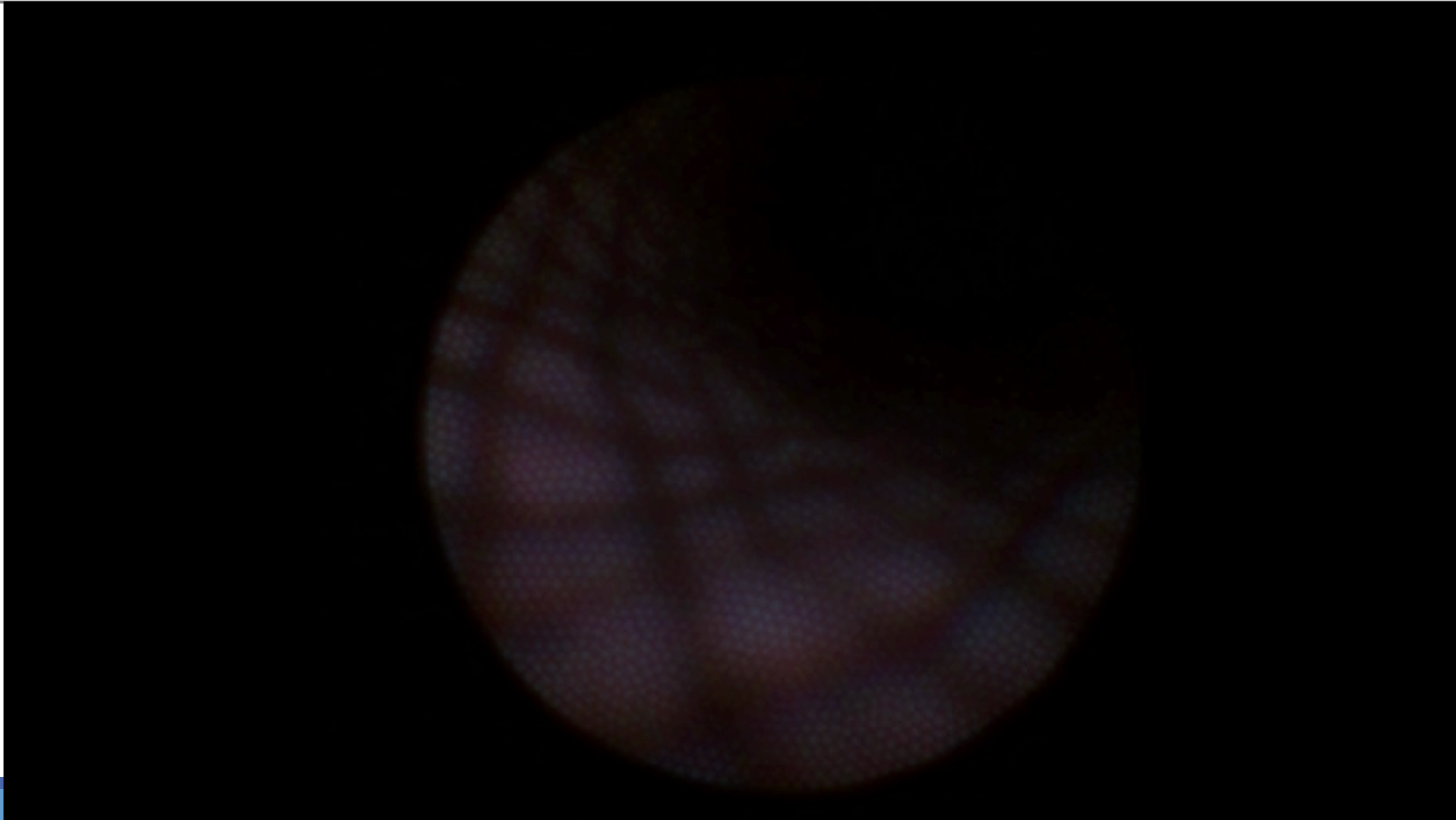
Diagnostic – Flow diversion Follow-up (Endothelialization)

Video link: <https://bit.ly/2K3BQC8>



Adjunct to aneurysm treatment - Pipeline

Video Link: <https://rb.gy/vhyndk>



PROOF-OF-CONCEPT:

ENDOSCOPIC-ASSISTED THROMBECTOMY

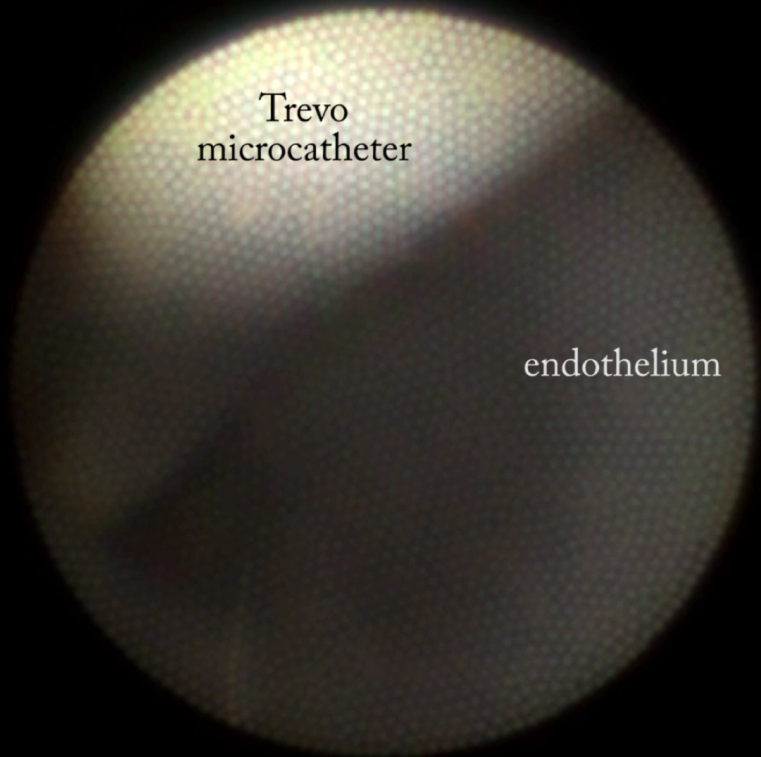
Porcine Experiments

Thrombectomy by ADAPT Technique



Video Link: <https://rb.gy/hbmjcw>

Video Link: <https://rb.gy/zo352b>



Trevo
microcatheter

This is an intraoperative fluorescence image showing a circular field of view. A bright, textured area at the top represents the Trevo microcatheter, while the darker, smoother area below represents the endothelium.

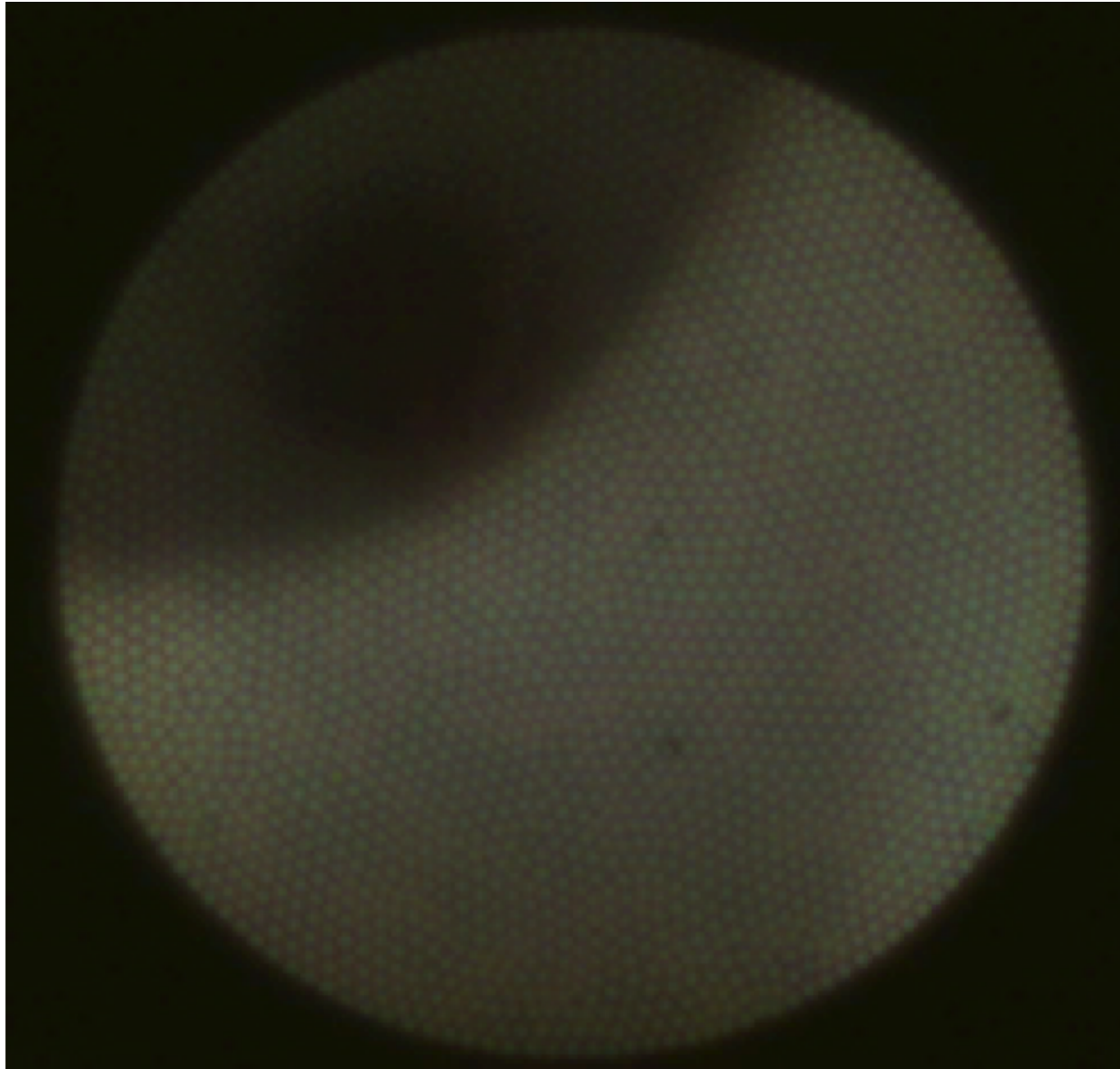
endothelium

Trevo Deployment

Video Link: <https://rb.gy/rjcru0>



Video Link: <https://rb.gy/r0hspp>



EMBOTRAP2



Direct real-time
visualization of an
EmboTrap2 procedure from
start to finish

Video Link:

<https://rb.gy/xqb1a1>

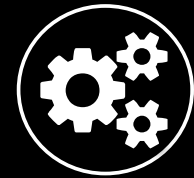
PROOF-OF-CONCEPT:

ENDOSCOPIC-ASSISTED COIL EMBOLIZATION

Porcine Experiments

Video Link: <https://rb.gy/dj7wcf>

COILING PROCEDURE



Direct real-time
visualization of simulated
aneurysm coiling

INTRASACCULAR DEVICE



Direct real-time
visualization of the WEB
device

Video Link:

<https://rb.gy/b286nj>

Potential Advantages for Endoscopic-assisted Mechanical Thrombectomy

Distinguish between clot composition

- Fibrin clots are more recalcitrant

Refractory cases

- Identify underlying ICAD

Identification of residual clots and vascular injury

Other Applications

Diagnosis

- Thrombus and ulceration on carotid plaques

Treatment

- Device apposition
- Thrombus formation on device surface
- Other procedures (eg. coil embolization)

Follow-up

- Endothelialization and intimal hyperplasia
- 
- A solid blue horizontal bar spanning the width of the slide, located at the bottom.

Limitations

Cannot see distal to pathology

Balloon occlusion for visualization

The fiber optics are embedded inside the microcatheters