

A new access to the fetal brain: fluoroscopy-guided in utero embolization of a pial arteriovenous fistula

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BACKGROUND

Pial arteriovenous fistulas are rare, high-flow intracranial shunts. Unlike vein of Galen malformations, no prenatal endovascular access route had previously been reported.

CASE

- 32 weeks: high-flow pial fistula, no encephalomalacia
- Progressive high-output cardiac failure with hydrops
- A short cortical vein drained into the superior sagittal sinus, enabling retrograde transvenous access
- Following multidisciplinary review and parental decision, prenatal rescue embolization was performed

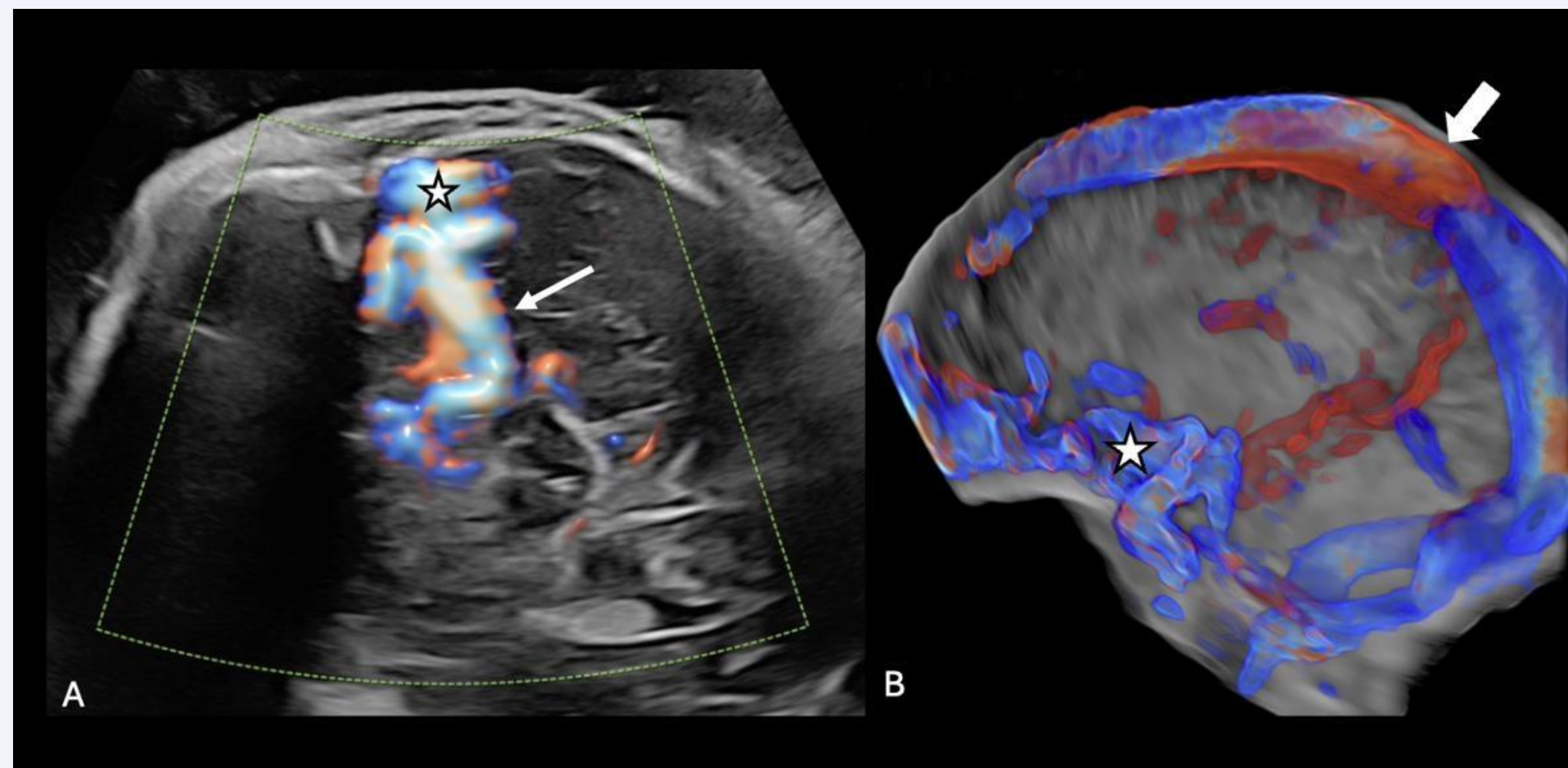


Figure 1 · Right frontal pial arteriovenous fistula (star) at 32 weeks, supplied by the right middle cerebral artery (arrow) and anterior cerebral artery, with drainage through a superficial cortical vein into the superior sagittal sinus (arrowhead): axial ultrasound (A) and 3D Doppler reconstruction (B).

IN UTERO PROCEDURE

- Hybrid angiography suite: maternal epidural, fetal analgesia and neuromuscular blockade
- Ultrasound-guided transuterine puncture of the superior sagittal sinus (18-G Chiba needle)
- Retrograde microcatheterization to the arteriovenous junction; partial coil embolization

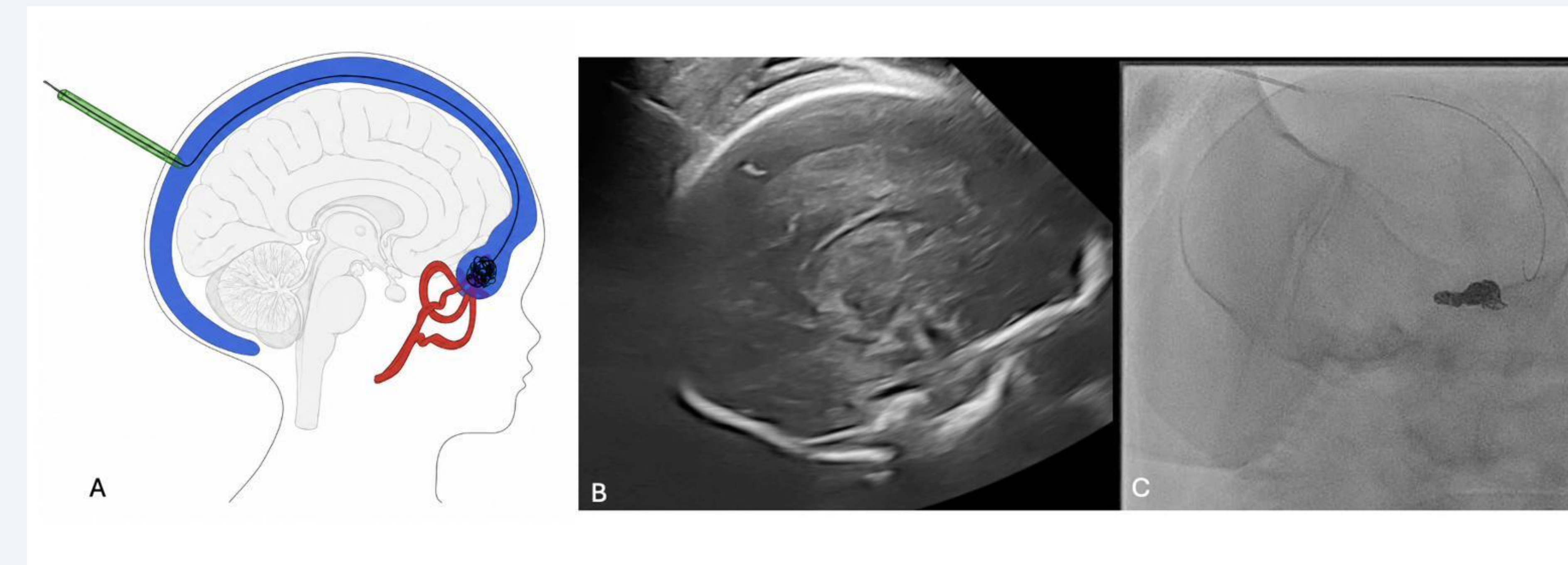


Figure 2 · Endovascular treatment of the fetal pial arteriovenous fistula. (A) Schematic of transfontanellar access to the superior sagittal sinus and retrograde catheterization of the fistula. (B) Ultrasound-guided puncture through the posterior fontanelle. (C) Fluoroscopic microcatheter navigation and coil embolization of the fistulous connection.

35 weeks

Gestational age at procedure

Superior sagittal sinus

Direct transvenous fetal access

First

reported in utero transvenous embolization of a cerebral pial fistula

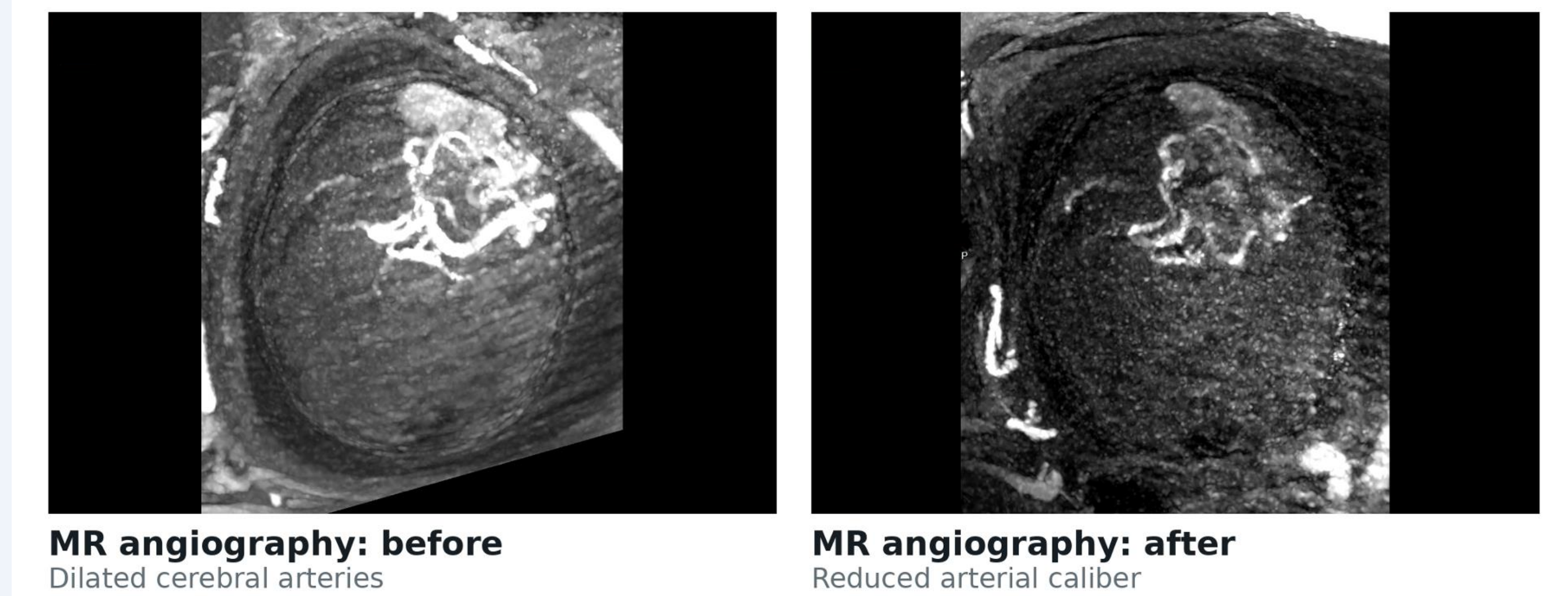
RESULTS

IMMEDIATE

- Combined cardiac output normalized within 24 h
- Sinus arterialization and hydrops resolved
- No procedure-related complications

LATER COURSE (37 weeks)

- Recurrent high cardiac output without decompensation prompting delivery
- Stable at birth; partial embolization on day 1
- Residual fistula hemorrhage at 3 months caused diffuse encephalomalacia; death at 6 months after palliative care



CONCLUSION

- A new feasible access route to the fetal cerebral venous system
- Reserved for exceptional cases in specialized centers

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