

Embolizácia prasknutej piálnej AVM v tehotenstve

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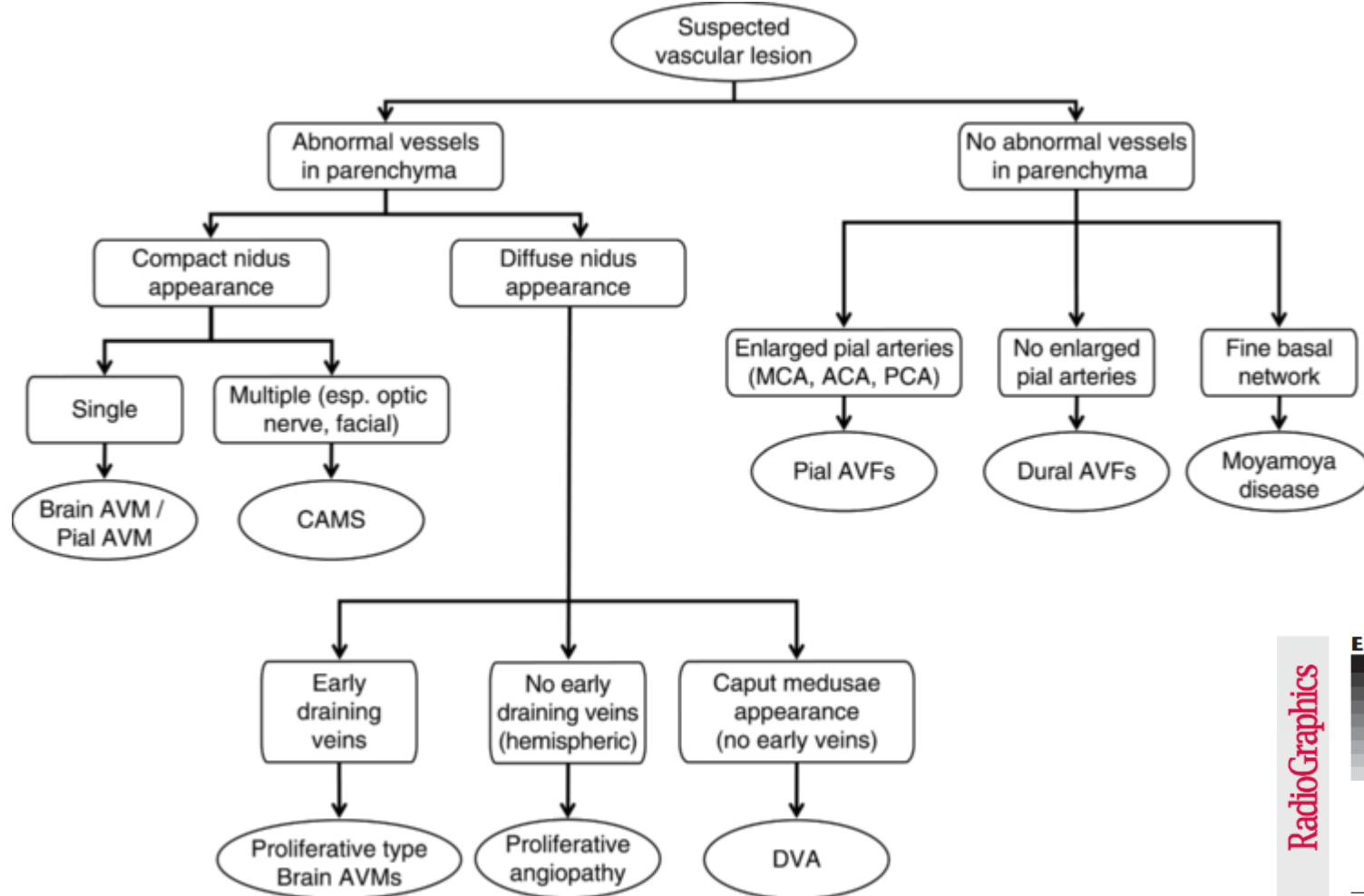
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Praktický algoritmus pre diagnostiku patologických cievnych štruktúr mozgu

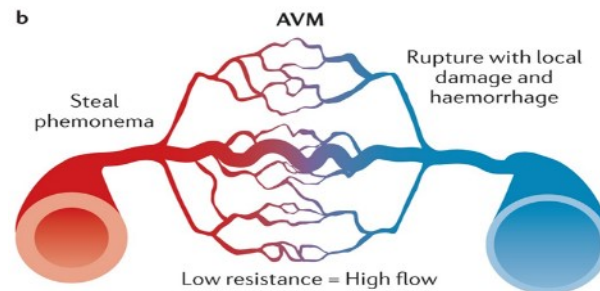
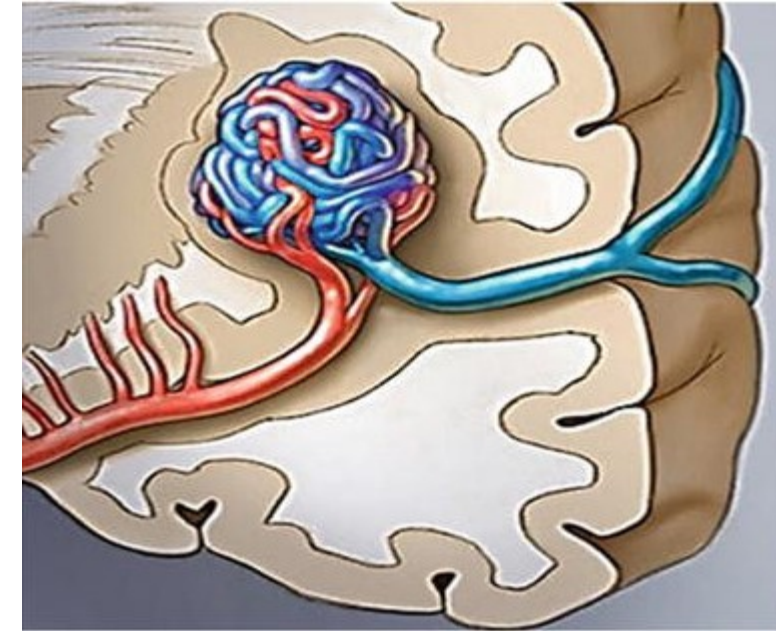


Radiologic Assessment of Brain Arteriovenous Malformations: What Clinicians Need to Know¹

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Mozgové AVM

- Incidencia 1 osoba / 100,000 obyvateľov / 1 rok
- Symptomatická versus nesymptomatická AVM
- Štruktúra: vyživujúce tepny, nidus (s cievny skratom) a drénujúce žily
- Obyčajne mladší pacienti, bolesti hlavy, epileptické záchvaty, intrakraniálne krvácanie
- 85% supratentoriálne (2/3 povrchová lokalizácia, 1/3 hlboká lokalizácia)
- 15% infratentoriálne



Riziko krvácania

- Ročné riziko krvácania

≈ 2 %

- Celoživotné riziko krvácania v %

105 – vek pacienta

- Riziko recidívy krvácania



najvyššie v prvom roku 6 – 15,8 %

hlboko lokalizovaná AVM

asociovaná aneuryzma

drenáž do hlbokého žilového systému mozgu

(priemer drénujúcej žily > 0,5 mm)

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Medical management with or without interventional therapy for unruptured brain arteriovenous malformations (ARUBA): a multicentre, non-blinded, randomised trial

Prof J P Mohr, MD¹, Prof Michael K Parides, PhD¹, Prof Christian Stapf, MD¹, Ellen Moquete, RN, Claudia S Moy, PhD, Jessica R Overbey, MS, Prof Rustam Al-Shahi Salman, FRCP, Prof Eric Vicaut, MD, Prof William L Young, MD¹, Prof Emmanuel Houdart, MD, Prof Charlotte Cordonnier, MD, Prof Marco A Stefani, MD, Andreas Hartmann, MD, Prof Rüdiger von Kummer, MD, Prof Alessandra Biondi, MD, Prof Joachim Berkefeld, MD, Catharina J M Klijn, MD, Kirsty Harkness, MD, Richard Libman, MD, Xavier Barreau, MD, and Prof Alan J Moskowitz, MD for the international ARUBA investigators[†]

Redukcia radiačnej zát'aže

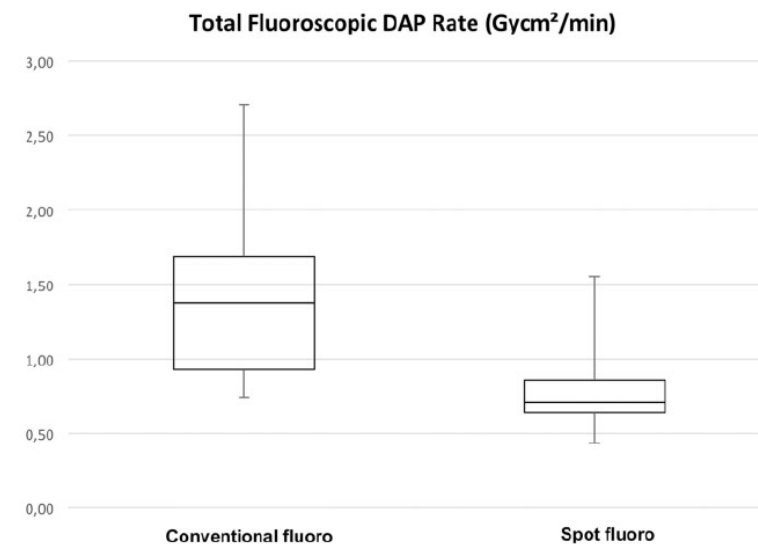
- Čas žiarenia (skúsený invazívny radiológ, nízka frekvencia snímkovania, postup katétrom cez inquinálnu, pelvickú a abdominálnu oblasť bez fluoroskopie)
- Vzdialenosť (čo najmenšia medzi žiaričom a detektorom – polohovanie)
- Tienenie (olovená pokrývka, ekvivalent 0,5 mm vrstvy Pb)
- Nové technológie

Original Article

Spot fluoroscopy: a novel innovative approach to reduce radiation dose in neurointerventional procedures

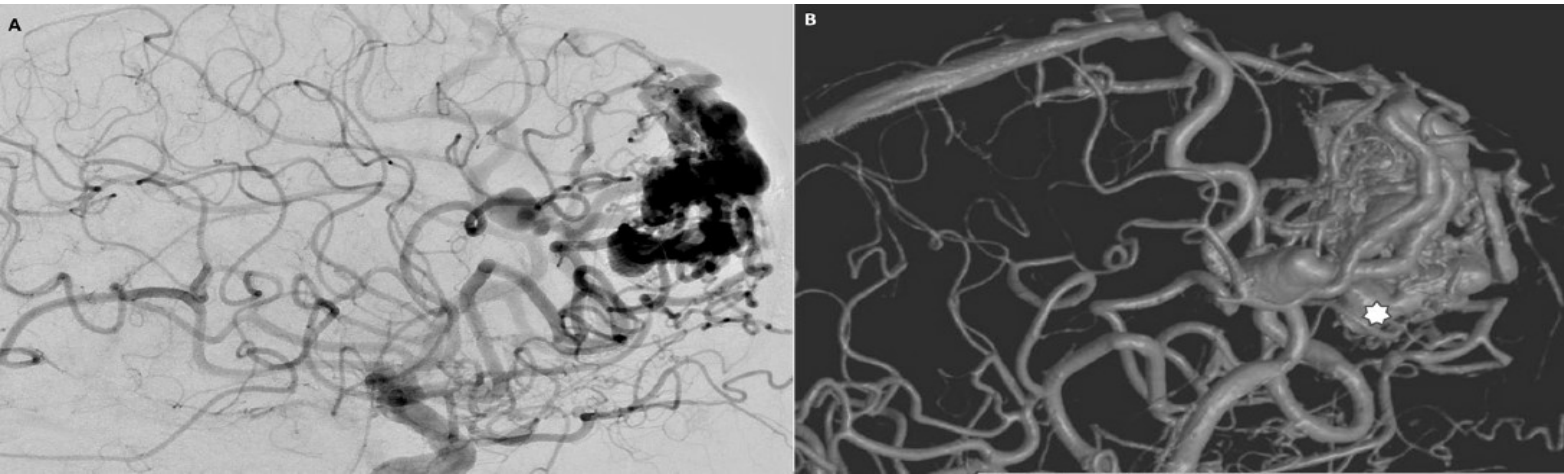
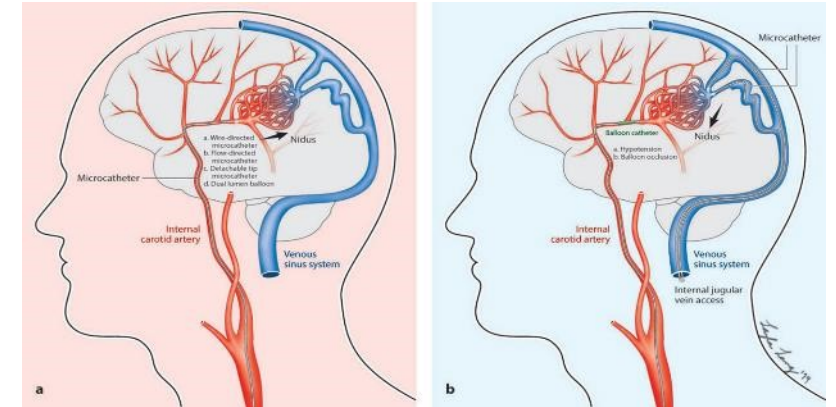
Ljubisa Borota¹, Lars Jangland², Per-Erik Åslund², Elisabeth Ronne-Engström³, Christoffer Nyberg¹, Ehab Mahmoud¹, Takuya Sakaguchi⁴ and Andreas Patz⁵

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Embolizačné techniky pri mozgových AVM

- **Transarteriálna a / alebo transvenózna embolizácia**
- **Závisí od angioarchitektúry AVM**
- **Embolizáciou vyriešili 95% AVM stupňa 1 a 2 klasifikácie Martin-Spetzler (z toho 60% krvácalo)**



22 – ročná A. L. (23. gestačný týždeň)

Náhle vzniknutá silná bolesť hlavy

Nauzea a zvracanie

Meningeálny syndróm

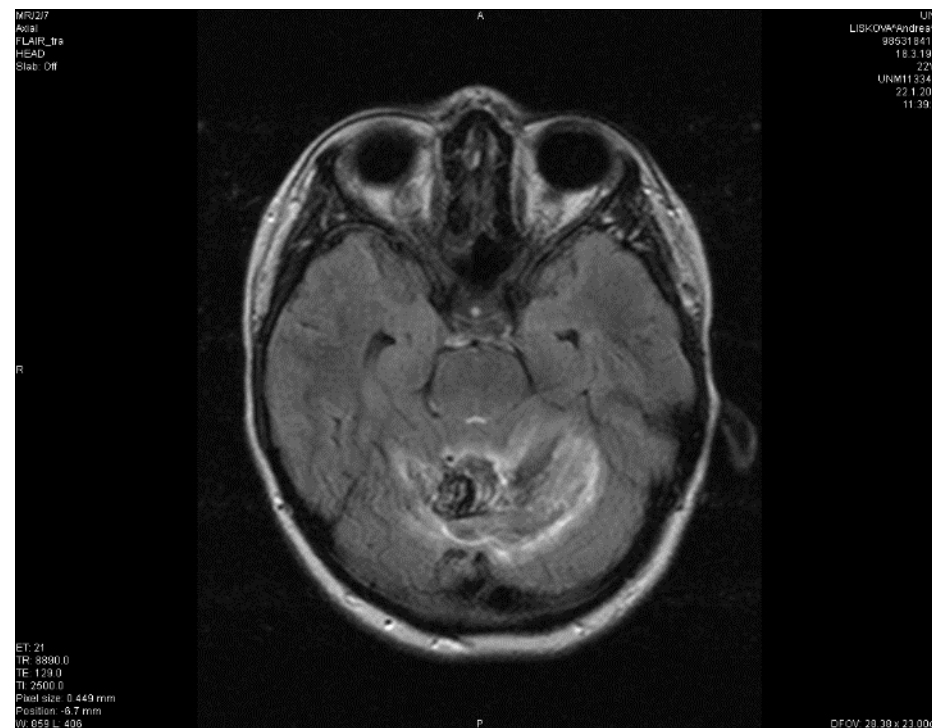
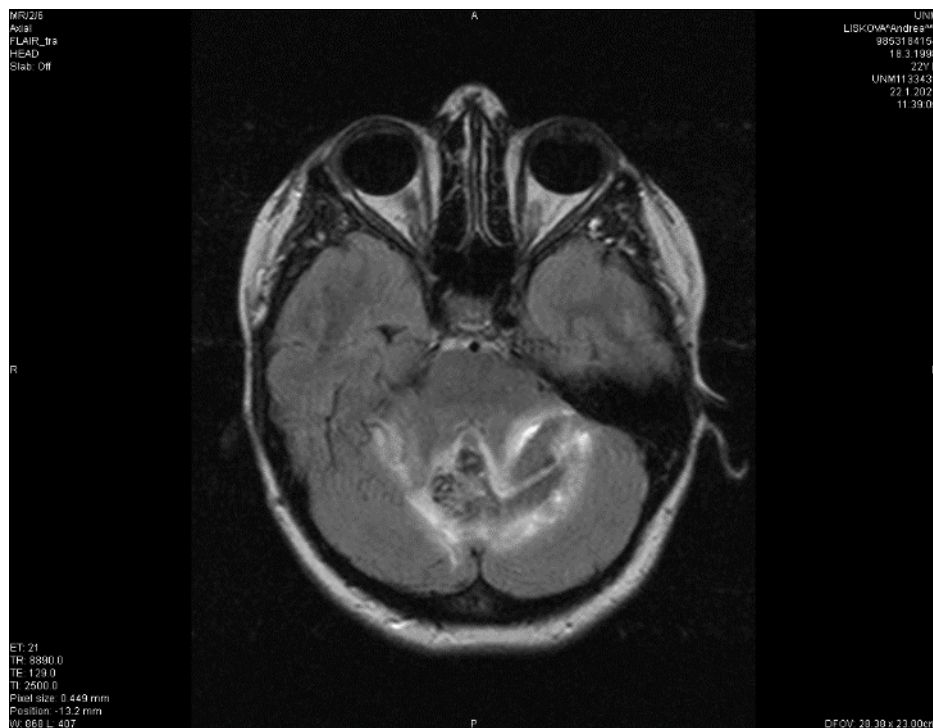
Cerebelárny syndróm



MR mozgu – sekvencia T1 sagitálne

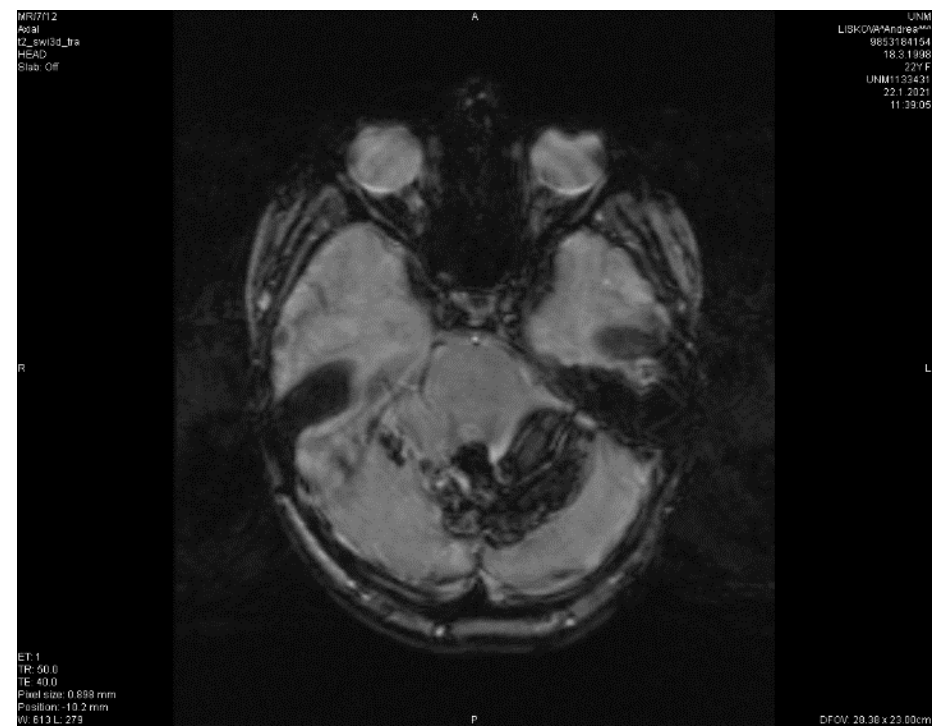
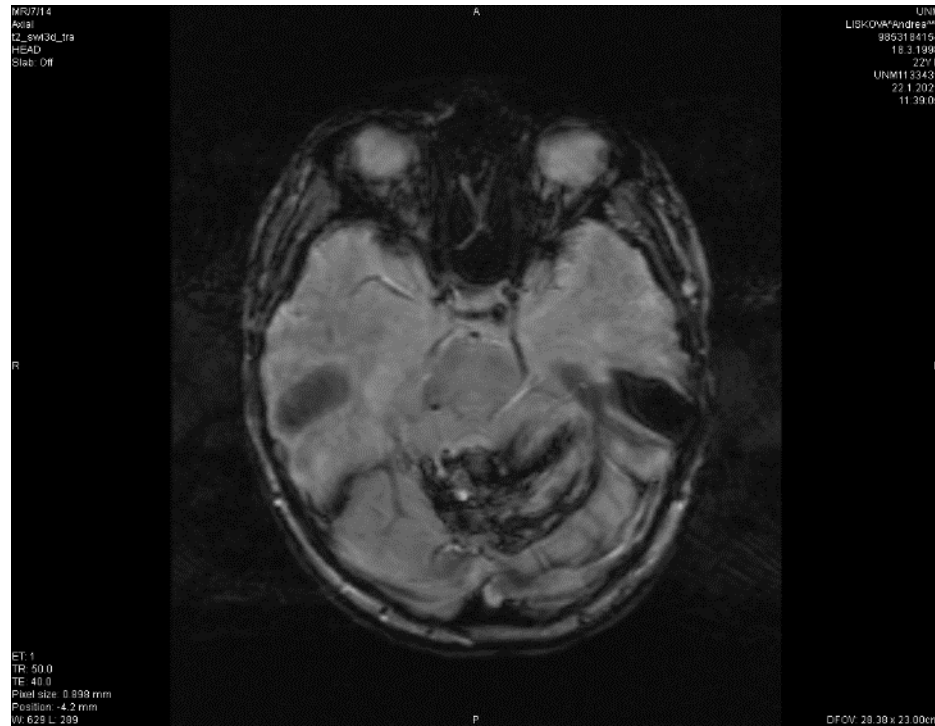
22 – ročná A. L. (23. gestačný týždeň)

MR mozgu – FLAIR transverzálne



22 – ročná A. L. (23. gestačný týždeň)

MR mozgu – SWI transverzálne



22 – ročná A. L. (23. gestačný týždeň)

Rozhodovací algoritmus

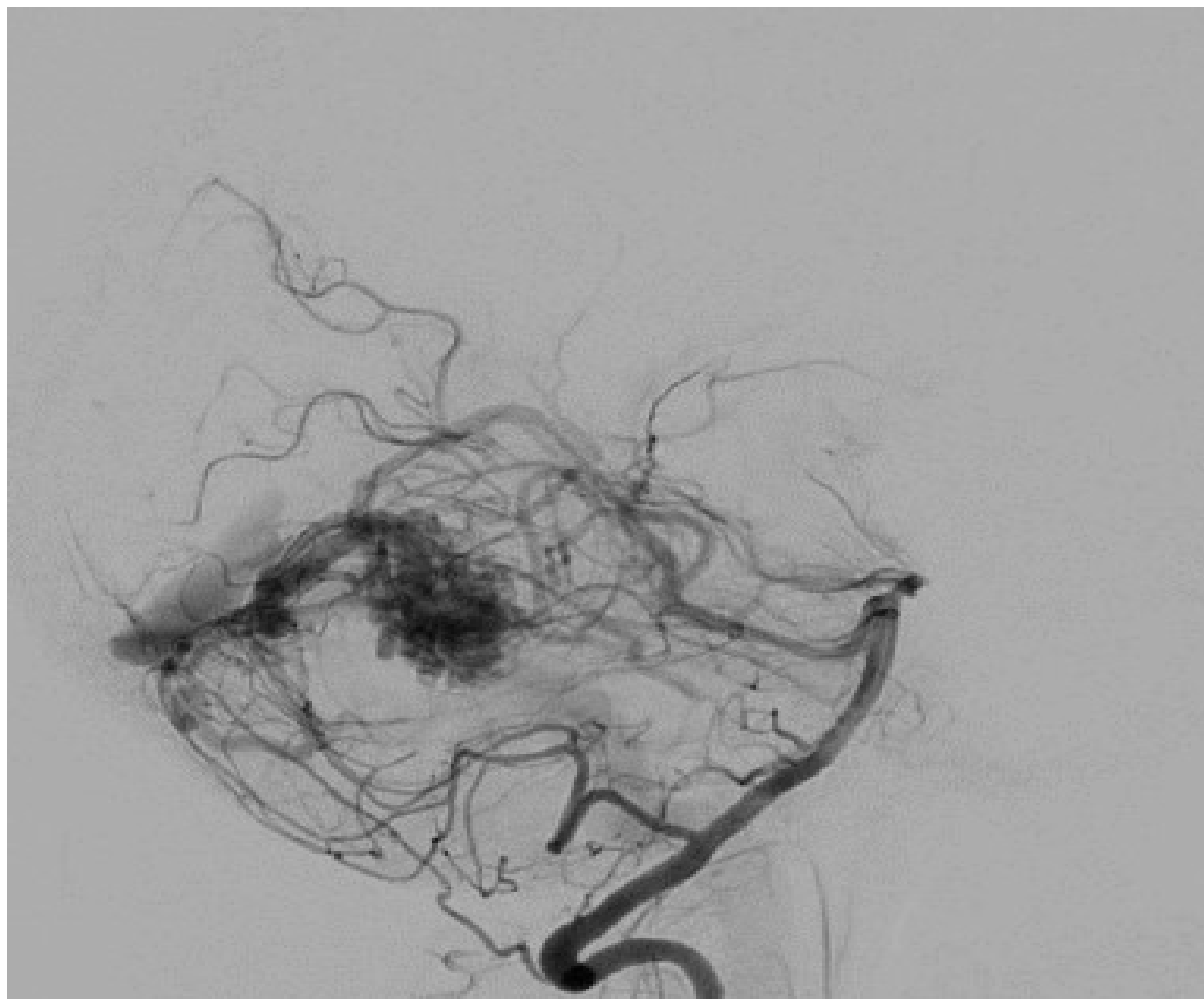


Prežívanie detí porodených	pred 24 týždňom	≈ 2 %
	medzi 24 a 27 týždňom	≈ 50%

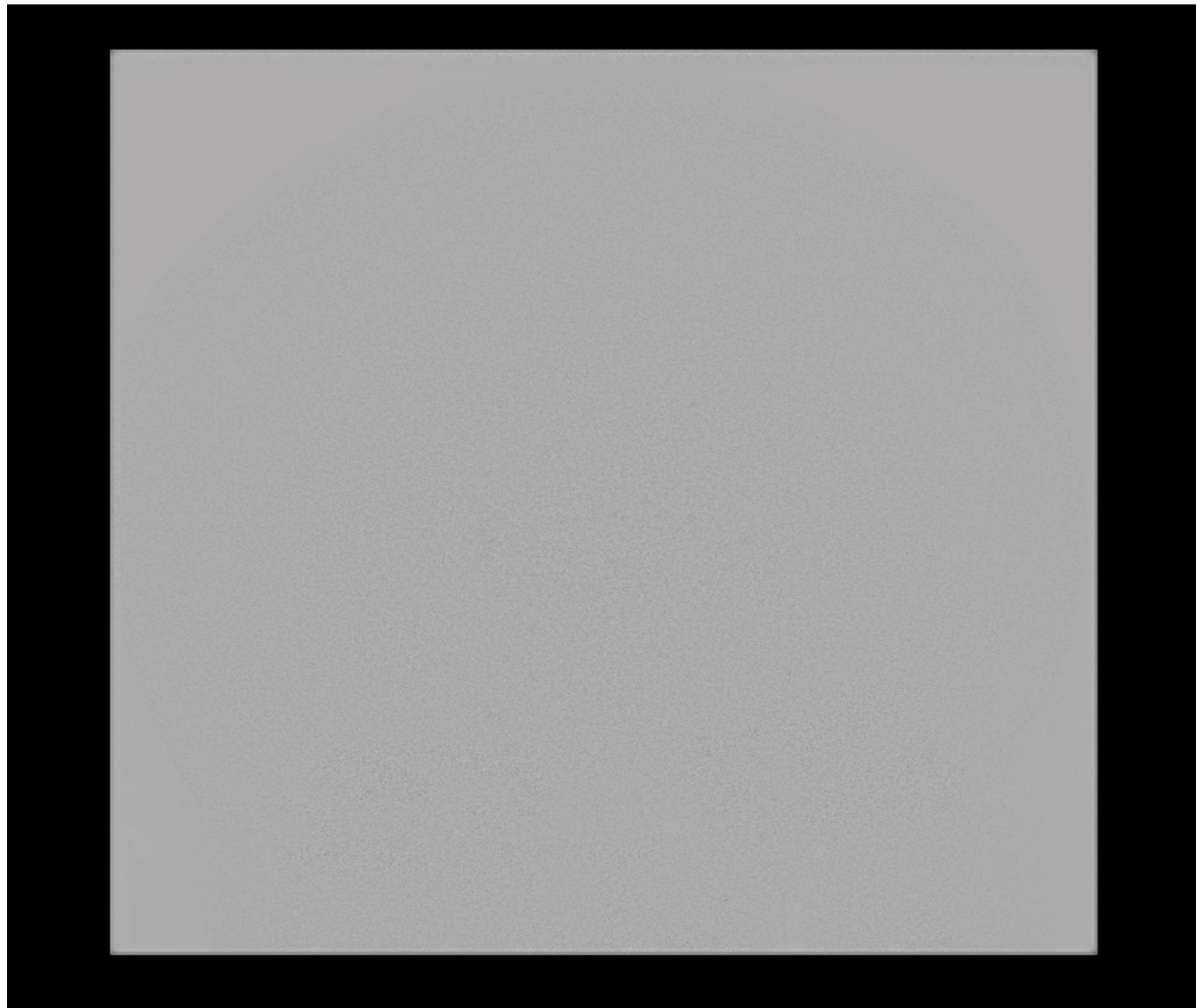
Riziko intrakraniálneho krvácania stúpa počas gravidity a puerpéria 3,27x
(v tomto prípade ide o „rebleeding“)

AVM v hornej časti pravej cerebelárnej hemisféry 1.

pred embolizáciou



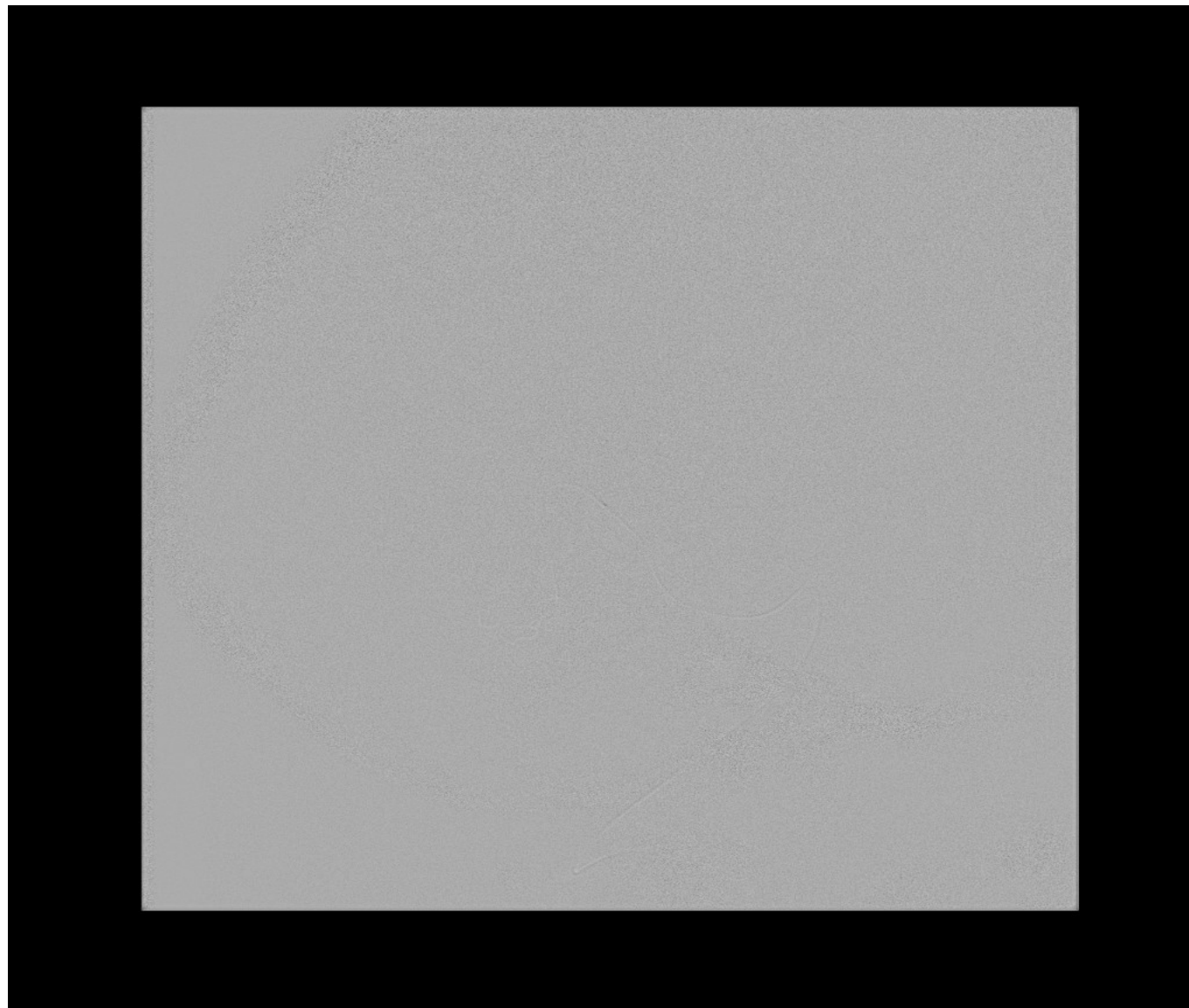
Iniciálny nástrek



Zavedenie mikrokatétra

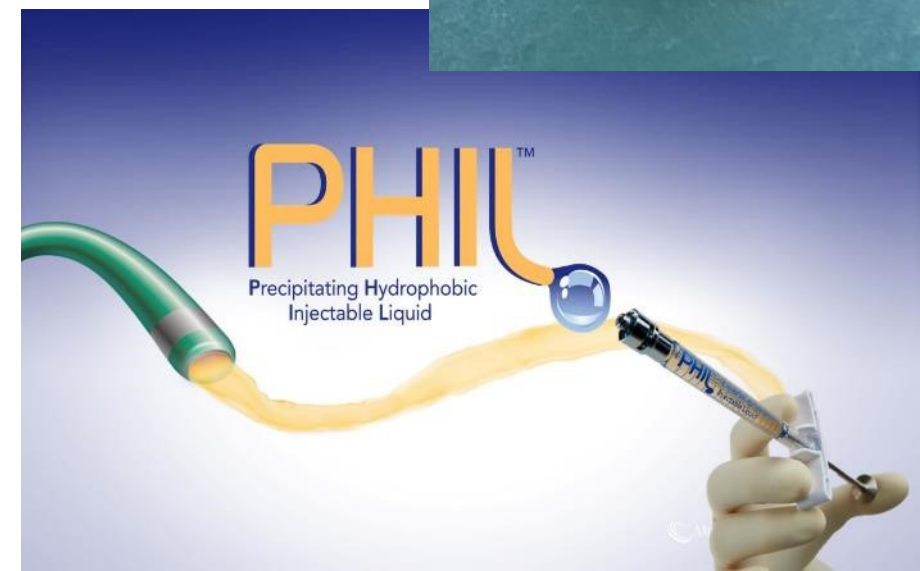
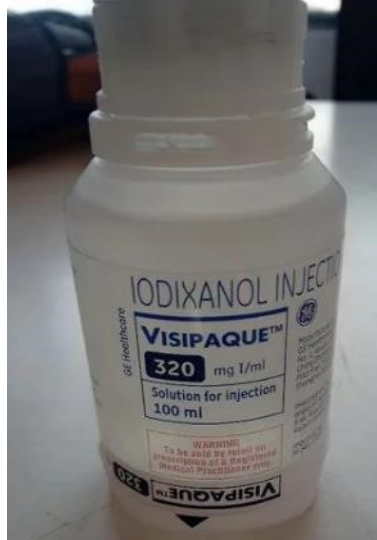


Selektívny nástrek

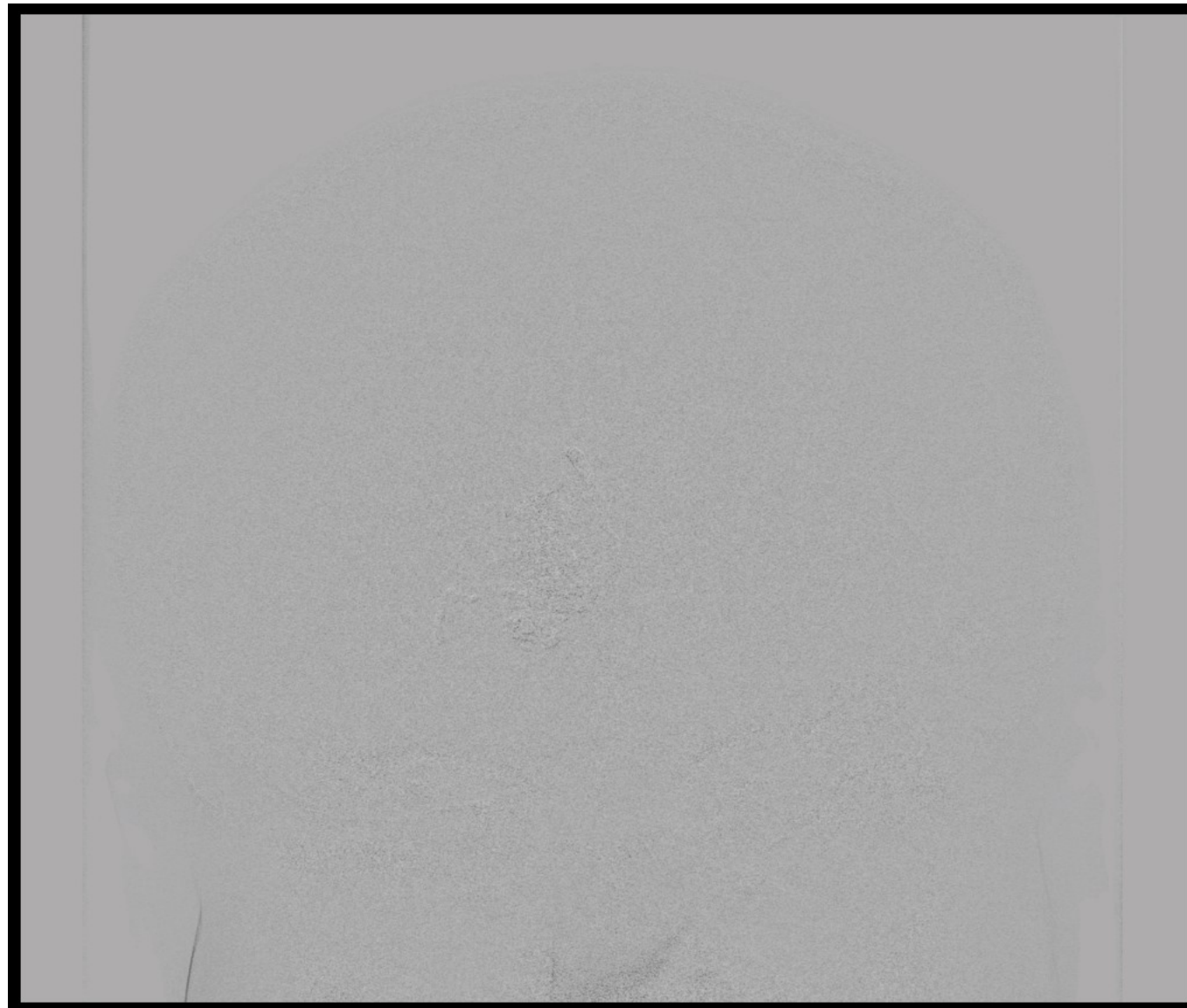


Embolizácia AVM

- Celková anestézia
 - Vstup cez a. femoralis
 - Bez heparinizácie
 - 6F hrubý vodič bol umiestnený v ľavej a. vertebralis
 - Tienenie abdomenu a podbruška Pb pokrývkou
 - Fluoroskopia (skiaskopická kontrola) použitá iba v oblasti krku a hlavy
-
- Sukcesívna embolizácia 3 tepien vyživujúcich AVM (z pravej a. cerebellaris superior)
 - Vizualizácia „Visipaque 320“ (celkovo 54,7 ml)
 - Embolizácia „25% PHIL“ (1,55 + 0,45 + 1,50 ml)

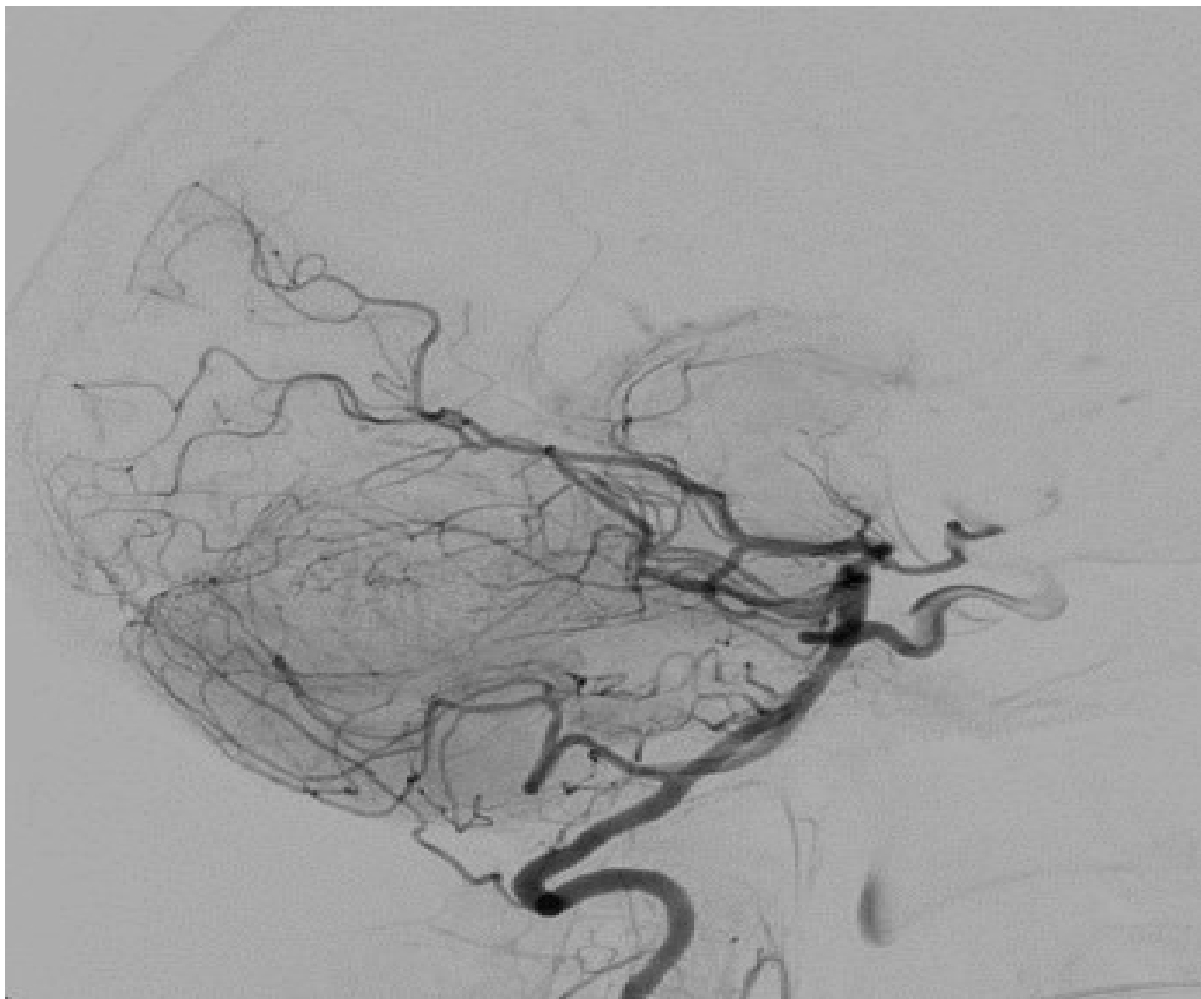


Kontrolný nástrek



AVM v hornej časti pravej cerebelárnej hemisféry 2.

po embolizácii



Diskusia 1.

- Riziká pre plod

predčasné ukončenie gravidity
poškodenie RTG žiarením

- Riziká pre matku

opakovanie krvácania
rádiochirurgické ošetrenie AVM – účinnosť má časový odklad
neurochirurgické ošetrenie – relatívne riziko výkonu
endovaskulárne ošetrenie – postup prvej voľby

- Pre túto situáciu neexistujú definitívne „guidelines“

Diskusia 2.

- **Dávka žiarenia aplikovaná do oblasti maternice < 1,0 μ Sv**
- **Maximálna dávka žiarenia (RTG) do oblasti maternice počas tehotenstva – 100,0 mSv**

- **Pacientka porodila SC v 37. týždni zdravé dieťa**
- **Žiadne známky poškodenia plodu neboli zistené v rámci štandardného skríningu**
- **V 2 rokoch veku je dieťa zdravé**

- **Pacientka je bez ložiskového neurologického nálezu (a bez ťažkostí)**
- **Kontrolné MR vyšetrenie mozgu potvrdzuje úplnú oklúziu AVM**

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Abstract A primigravida 22-year-old woman, at a gestation of 23 weeks, experienced bleeding from a pial arteriovenous malformation (AVM) located in the right cerebellum. After interdisciplinary consensus and with the informed consent of the patient and her family, AVM embolization was performed. Complete occlusion of the AVM was achieved by embolization with PHIL (precipitating hydrophobic injectable liquid). The calculated dose in the uterus was less than 1 μ Sv, which represents a negligible risk of harmful effects on the fetus. She delivered a baby at 37 weeks of gestation by caesarean section without complications. No congenital disorders were diagnosed by standard screening methods until the age of the newborn was two years. The angiography protocol must be optimized to minimize the radiation dose. Adequate shielding protection of the uterus is important. Premature termination of pregnancy is not necessary. Multidisciplinary care of neurologists, neurosurgeons, interventional radiologists, anesthesiologists, neonatologists, and obstetricians is necessary.

Keywords: arteriovenous malformation; rupture; embolization; pregnancy; radiation; dose; EVOH; PHIL; brain

1. Introduction

Brain arteriovenous malformations (bAVMs) are uncommon vascular lesions (the incidence is approximately 1 per 100,000 per year in unselected populations) composed of feeding arteries (usually enlarged), a nidus (with shunt), and draining veins. bAVMs are typically present in young adults with spontaneous intracranial hemorrhage, seizures, or headaches [1–3]. Brain arteriovenous malformations have been commonly regarded as congenital, but this suspected origin has been challenged by published reports of de novo bAVMs [4].

The prevalence rate of bAVMs is approximately 0.01–0.5%, and they generally present symptoms between 20 and 40 years of age, most commonly at 30 years of age, and equally affect men and women [5]. The location ratio of bAVMs is 85% vs. 15% for supratentorial (two-thirds superficial and one-third deep) vs. infratentorial [3].

The annual risk of bleeding from unruptured bAVMs was estimated from retrospective studies at 4%, but it has recently been reported in a range of 1–2.2% [6,7]. It was \approx 2% in the observation arm of the ARUBA study [6]. The lifetime risk of hemorrhage from non-ruptured bAVMs can be simply approximated with the following formula: lifetime risk (%) = 105—the patient's age in years [8]. The bleeding originates from the brain arteriovenous malformation itself or from the venous side [6]. The rebleeding rate is

REVIEW

Arteriovenous malformations of the cerebral circulation that rupture in pregnancy

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Department of Academic Neurosurgery, Addenbrooke's Hospital, Cambridge, UK

The Neuroradiology Journal 23: 473–478, 2010

www.centauro.it



Endovascular Treatment of Cerebral Arteriovenous Malformation Bleeding during Pregnancy A Case Report

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check for updates

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Endovascular treatment of brain arteriovenous malformations ruptured during pregnancy – A report of two cases

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