Use Of A New AVM Classification System To Treat High-Flow Vascular Malformations At The University Of Olomouc Medical Center: The Czech Experience

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High-flow malformations

Etiology – failure of differentiation of the primitive capillary plexus during the 4th and 10th weeks of embryonic life → immature vascular network

Endothelial cells retain the embryonic growth potential → responsible for recurrence after inadequate treatment

Hypoxia → adenosin receptors in endothelial and smooth muscle cells → angiogenesis

AVM treatment principle

Endothelial cells in the nidus retain the embryonic growth potential

↓

Ablation of nidus (location of shunting) is essential

Oclusion of the feeding arteries or drainage vessels alone is not sufficient and effective treatment. (it can make nidus ablation easier only) → incomplete treatment stimulates nidus to grow (angiogenesis) and clinical symptoms worsen

Treatment

Permanent (curative) treatment of AVMs can be achieved only by complete damage of endothelial cells in the nidus.

Sclerotherapy

(Surgery - nidus extirpation)

Incomplete endothelial damage after the treatment is responsible for angiogenesis, neovascularization and recanalization (palliative effect).

Surgery - ligation of feeding arteries

Coiling of feeding arteries

Fiburation

Adhesive embolic agents (nBCA - no endotelial damage)

Non-adhesive embolic agents (Onyx, Squid, Pili - no endotelial damage)

Treatment technique in responce to WY AVM classification

Depending on the morphology and localization

- transarterial
- transvenous
- direct puncture
- combined approach is required

Flow control – manual compression, balloon occlusion, tourniquet, coils → ethanol stasis within the nidus. → the time of reaction between the ethanol and the nidus is longer, lesser amount of ethanol
Case No. 1

Type of AVM?

Case No. 1

Type of AVM?

Case No. 1, WY class. type IIIb

Type of AVM?

Treatment strategy?

Case No. 1, WY class. type IIIb

Type of AVM?

Treatment strategy?

Direct puncture → coils + ethanol
Case No. 1, WY class. type IIIb

Case No. 2

Type of AVM?

Treatment strategy?

Transvenous or direct puncture → coils + ethanol (balloon was used in this case for occlusion of vein)
Case No. 2, WY class. type IIIa

Case No. 3

Type of AVM?

Case No. 3, WY class. type IV

Type of AVM?

Treatment strategy?
Case No. 3, WY class. type IV

Type of AVM?

Treatment strategy?
- direct puncture of AVFs → ethanol
- superselective transarterial approach
  → 50 % - 50% ethanol + contrast

Case No. 3, WY class. type IV

Case No. 3, WY class. type IV

Case No. 4

Type of AVM?
Case No. 4, WY class, type IIIb

Type of AVM?

Treatment strategy?

Direct puncture → coils + ethanol (small IIIa and IIIb → ethanol only, flow control)