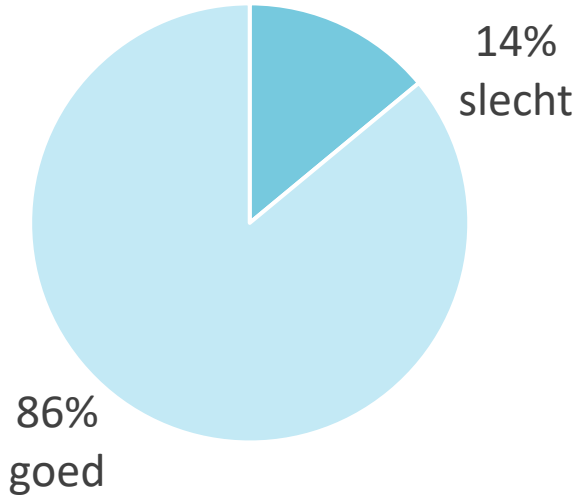
Behandeling van complicaties na een aneurysmatische subarachnoïdale bloeding

Marlien Aalbers, MD PhD

Neurovasculaire nascholing 09-01-2026

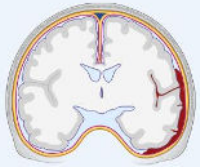
Radboudumc
university medical center

Uitkomst na 3 maanden WFNS 1-2



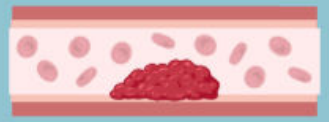
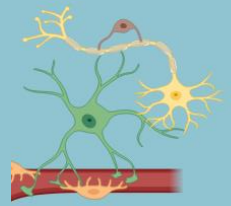
Booker, Neurosurg Open 2021

Early brain injury

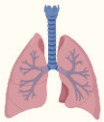
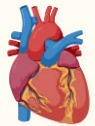


- ↑druk ↓ flow
- afbraak producten
- ischemie
- inflammatie
- hydrocephalus

Delayed cerebral ischemia

- protrombogene toestand →  microtrombi
- endotheel dysfunctie →  spasmen
- cortical spreading depolarization →  hemodynamische disbalans

Systemisch


Longoedeem Cardiomyopathie SIRS

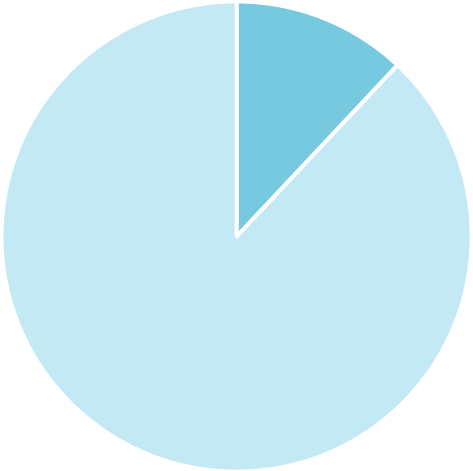
Introduction

Rebleeding

Hydrocephalus

DCI

Rebleed



11,1%

Risicofactoren

- Slechte klinische toestand
- Uitgebreide bloeding bij opname
- Karakteristieken aneurysma
- Systole >160 mmHg

Doherty Neurosurg Rev 2022

Bloeddruk regulatie

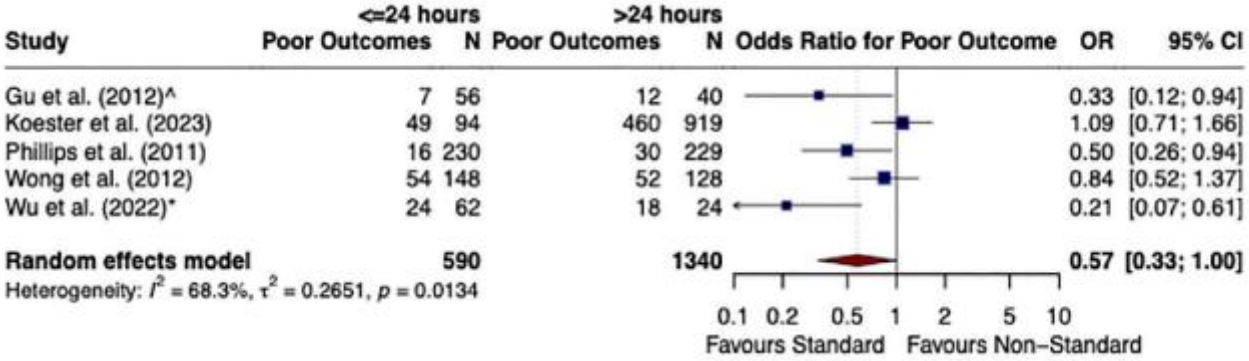
Level of evidence C

Bloeddruk controle met kortdurende medicatie

Ernstige hypertensie, hypotensie en bloeddruk schommeling moet worden vermeden

Hoh, Stroke, 2023

Vroege behandeling (<24u)



Munasinghe, J Clin Neurosci, 2025

Ultra vroege behandeling

- Post hoc studie patiënten ULTRA trial (497)

- Slechte uitkomst in
  - 57% van patiënten behandeld <6 uur
  - 37% van patiënten behandeld 6-24 uur
  - adjusted RR: 1.36 (95% CI: 1.11-1.66)

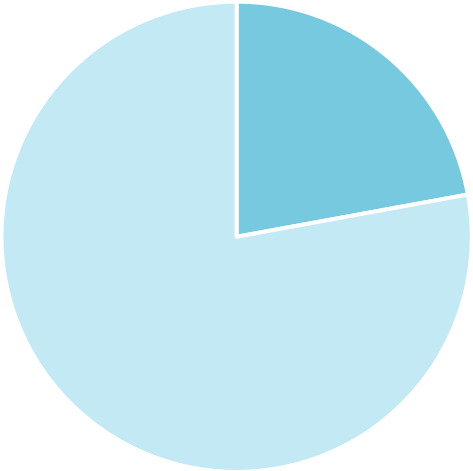
Vergouwen, Eur Stroke J, 2023

Vroege behandeling

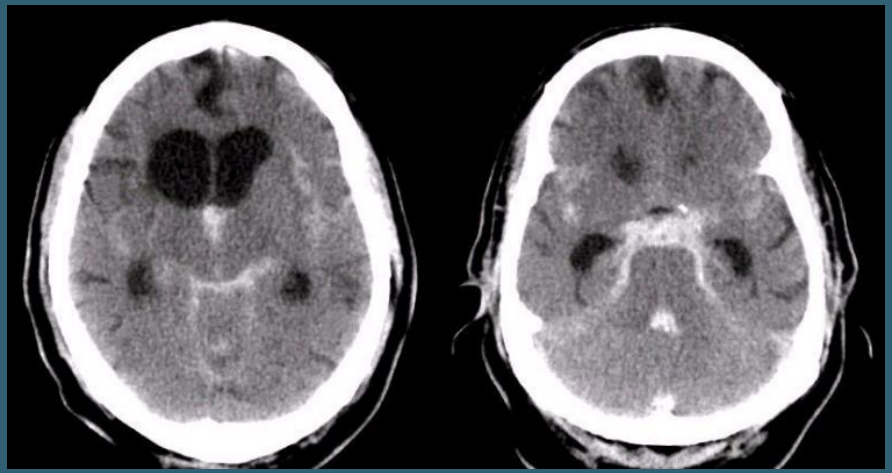
Level of evidence B

Behandeling binnen 24h

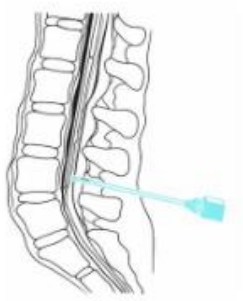
Acute hydrocephalus



20-30%



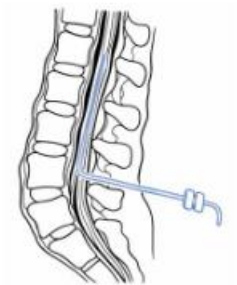
Lumbaal punctie



Level evidence C

- Minimaal invasief
- Snel

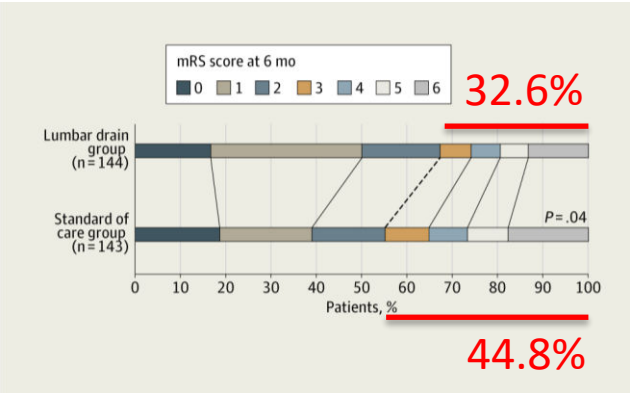
Lumbale drain



Level evidence A

- Betere lange termijn uitkomst

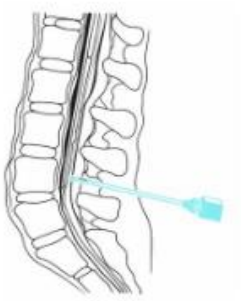
EARLY DRAIN trial



Risk ratio 0.73
(95% CI 0.52-0.98, p=0,04)

Wolf, JAMA neurol, 2023

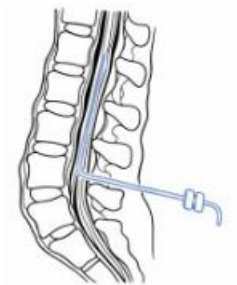
Lumbaal punctie



Level evidence C

- Minimaal invasief
- Snel

Lumbale drain



Level evidence A

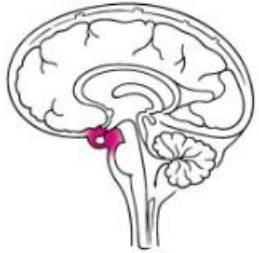
- Betere lange termijn uitkomst

Ventrikel drain

Level evidence B

- Bij obstructie
- ICP monitoring

Cisternale drain

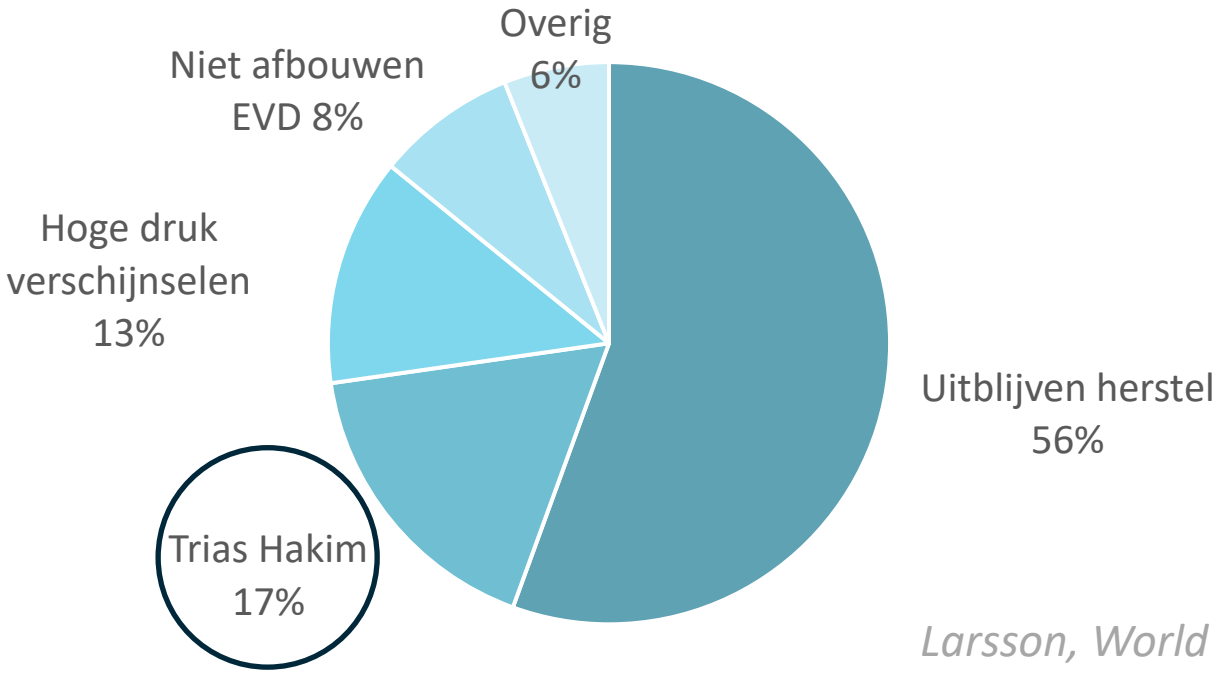


Level evidence C

- Geen standaard lamina terminalis fenestratie

Adapted Klug, Critical Care, 2025

Chronische hydrocephalus



Larsson, World Neurosurg 2025

Secundaire NPH

- Trias van Hakim
- Druk tussen 14-25 cm H2O
- Evans index >0.30
- Betere shunt response dan idiopatische NPH

Daou Neurosurg Focus 2016

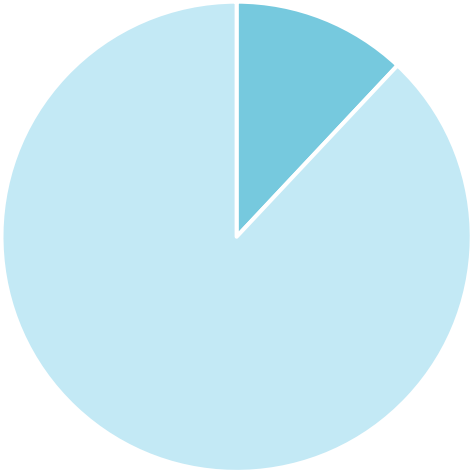
Behandeling van hydrocephalus

Level of evidence B

Permanente drainage verbetert neurologische uitkomst

Hoh, Stroke, 2023

DCI



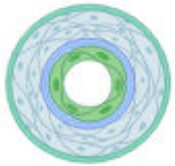
20%

Risicofactoren

- Slechte klinische toestand
- Hoeveelheid bloed
- Vrouw
- Vasospasmen
- Hydrocephalus

Xiao, World Neurosurg 2025

Geïnduceerde hypertensie



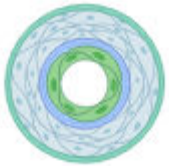
Level evidence B

1 RCT, vroegtijdig gestopt

Retrospectieve observationale studie 479 pt

Slechte uitkomst adjusted odds ratio 0.27 (95% CI, 0.14-0.55)

Geïnduceerde hypertensie



Level evidence B

Medicamenteus

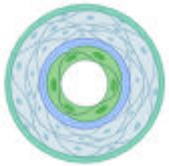
Orale nimodipine verlaagt risico op slechte uitkomst

RR 0.67 (95% CI 0.55-0.81)

Level evidence A

Cochrane Database Syst Rev. 2007

Geïnduceerde hypertensie

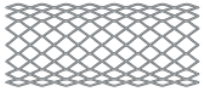


Level evidence B

Medicamenteus

Level evidence A

Endovasculair

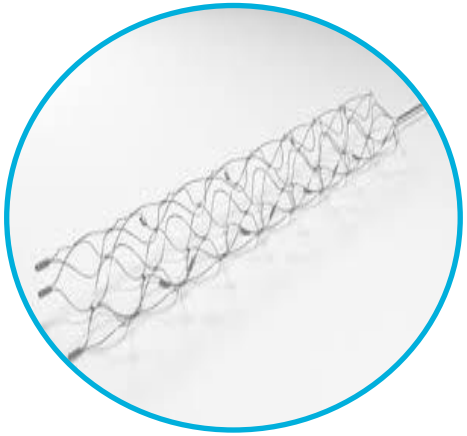


Level evidence B

Endovasculaire behandeling

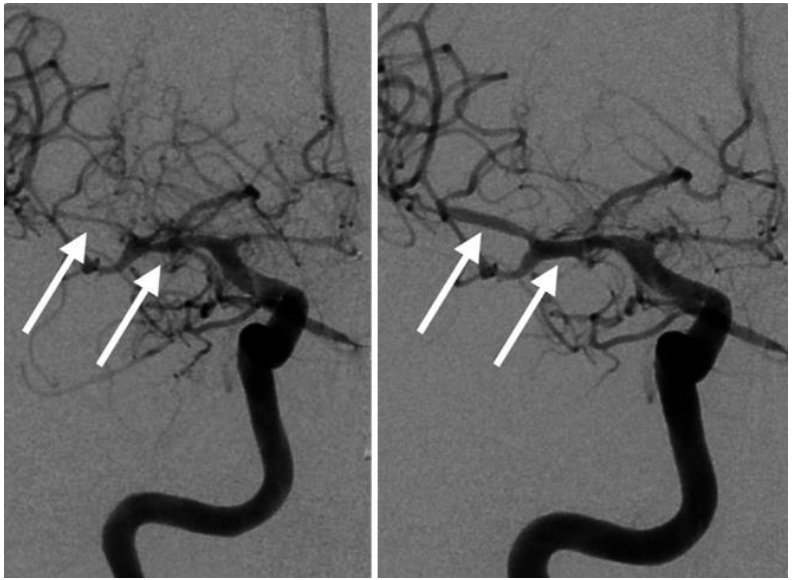
Intra-arteriële medicatie

Ballon angioplastiek



Stentretriever

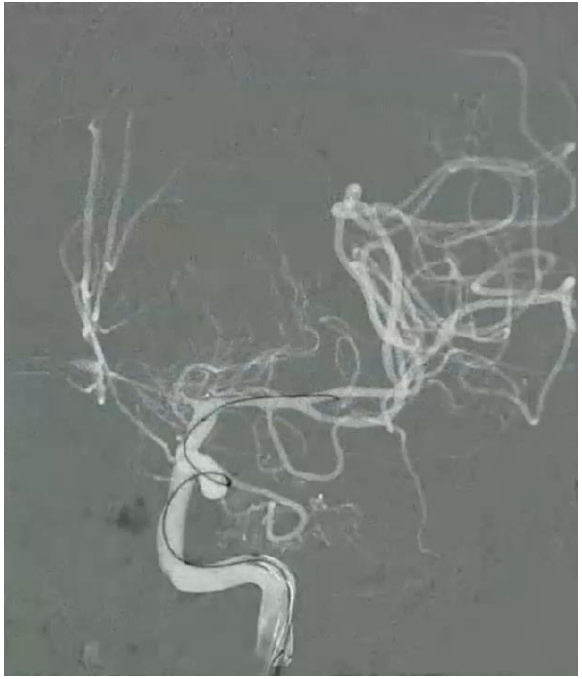
Intra-arteriële medicatie



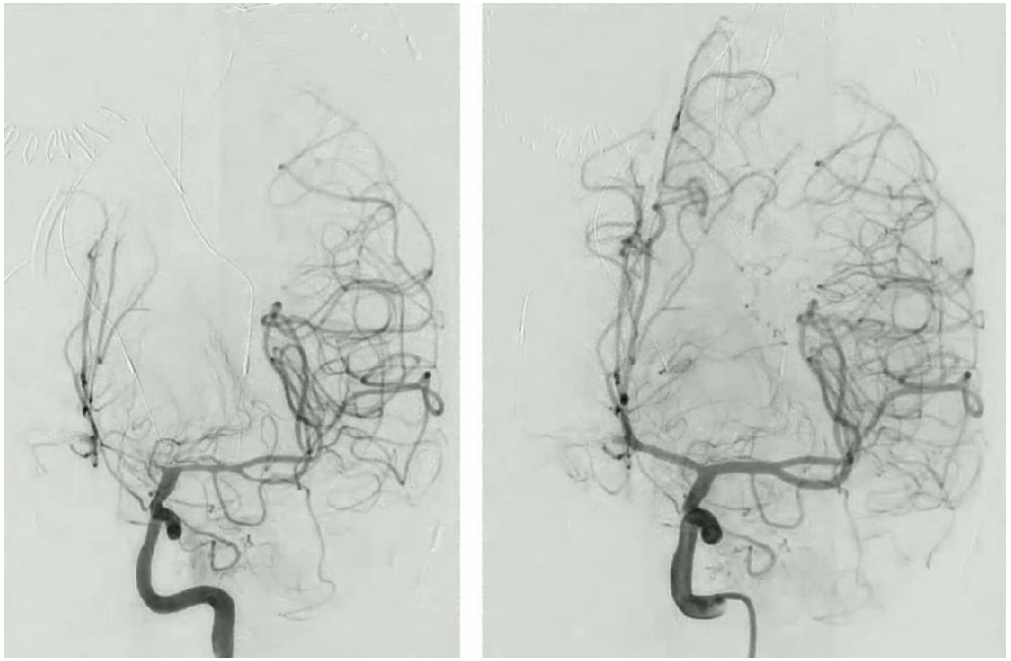
- Meta-analyse 55 studies
- Goede uitkomst
  66% (95% CI 60% to 71%)

Venkatraman, JNIS, 2018

Ballonangioplastiek

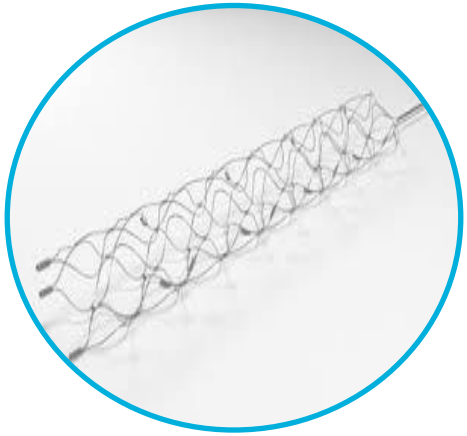


Ballonangioplastiek



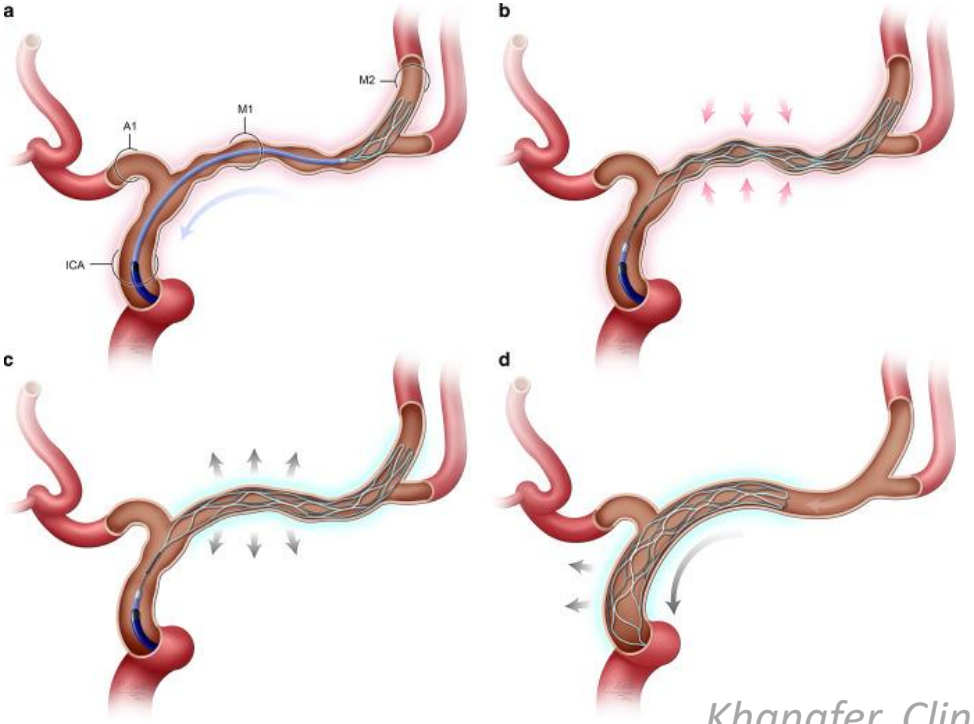
Stentangioplastiek

- Meta-analyse 156 patiënten
- Neurologische verbetering 65.9% (95% CI: 51.1–78.1)
- Complicaties 1.1% (95% CI: 0.0–3.6)

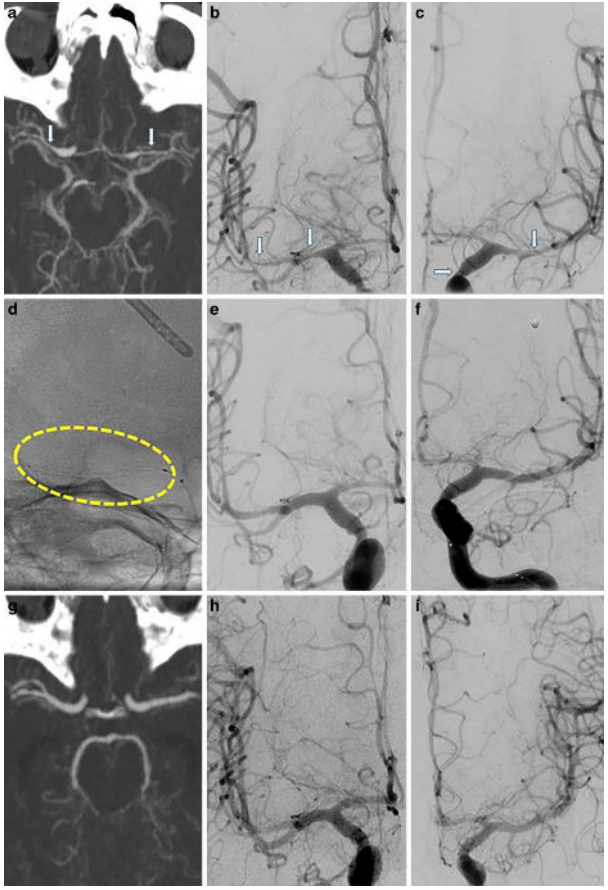


Cortese, AJNR, 2025

Stentretriever



Khanafer, Clin Neuroradiol, 2024


a
b
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d
e
f
g
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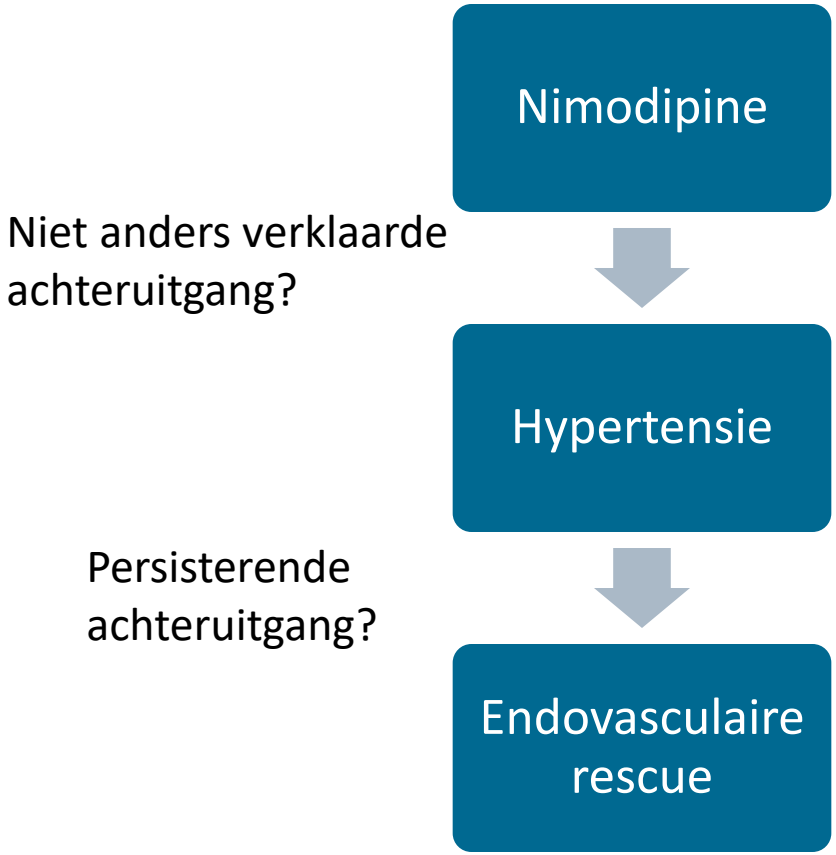
Nimodipine
Niet anders verklaarde achteruitgang?
Hypertensie
Persisterende achteruitgang?
Endovasculaire rescue

CONCLUSIE

Complicaties zijn frequent en doorslaggevend voor de klinische uitkomst

sNPH en uitblijvend herstel zijn veelvoorkomende presentatie van hydrocephalus

ELD en nimodipine verbeteren aantoonbaar de klinisch uitkomst na SAB

Dank voor uw aandacht

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