# Preliminary results of preoperative diagnostics and endovascular treatment for CCSVI

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- Testing for CCSVI with color Doppler sonography
   since May 2009
- Testing for CCSVI with MRV since October 2009
- Endovascular procedures for CCSVI since October 2009

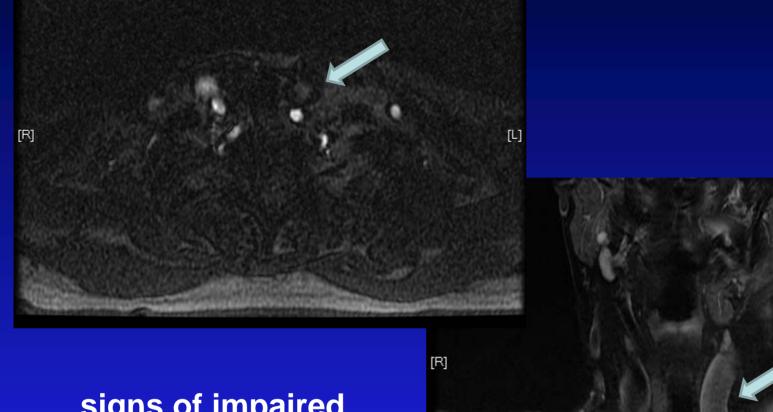


#### color Doppler sonography

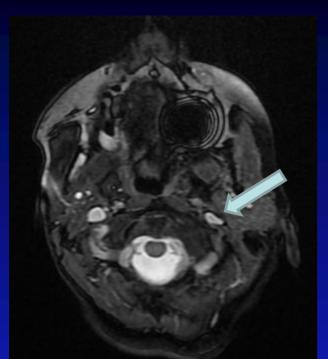
- about 250 MS patients examined
- venous abnormalities found in ~95%
- most common finding: pathologic valves or membranes in the internal jugular veins (IJV)
- majority of stenoses in the middle part of IJV seemed to be secondary to pathologic valves or to result from external compression

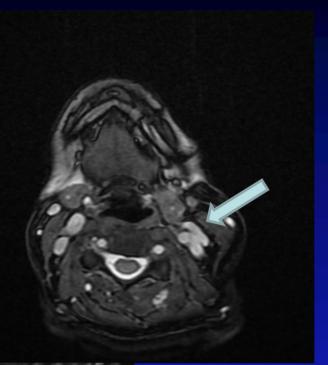
#### MR venography

- about 100 MS patients examined
- most common finding:
  - a) stenoses in middle and upper part of IJV
  - b) signs of impaired outflow on time-of-flight imaging
- pathologic valves and membranes could be visualized only in few patients



signs of impaired outflow on TOF imaging







pathologic valves and membranes not always visible (only indirect signs: a collapse of the vein)

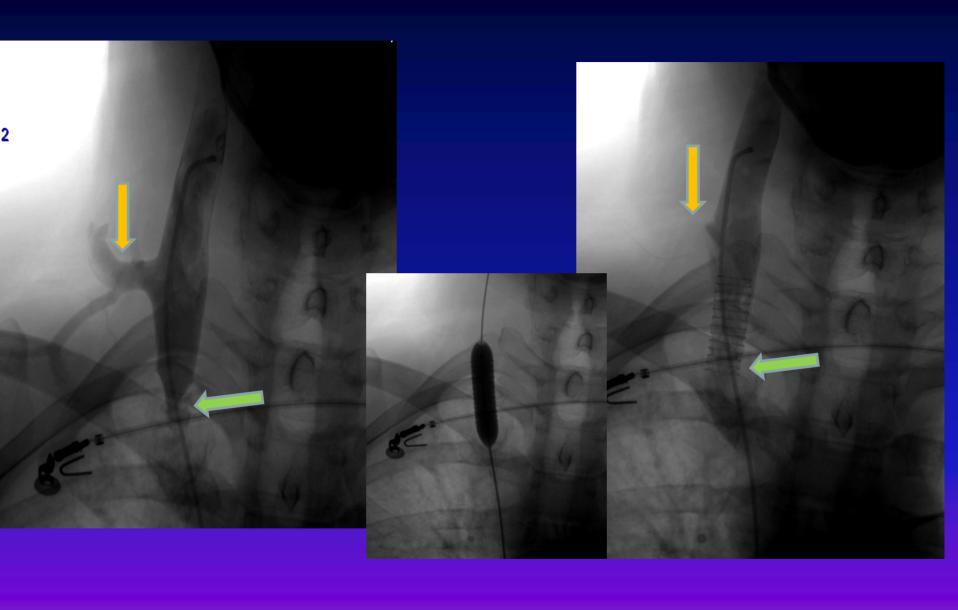
#### Endovascular treatment

- 90 patients operated on
- Intraoperative venography as the key test for decision making
- Preoperative Doppler and MRV as a help to evaluate venous anatomy and to reveal where the problem might be situated
- Stenting only if absolutely needed (ballooning unsuccessful) and if safe (not for areas with changeable diameter during Valsalva)

### Endovascular treatment – procedures for IJV

- No obvious pathology found 3 patients (3%)
- Only balloon angioplasty 57 patients (63%)
   (31 patients: one IJV; 26 patients: both IJVs)
- Only stenting 19 patients (21%) (18 patients: one IJV; 1 patient: both IJVs)
- Stenting in one IJV and balloon angioplasty of the other vein – 12 patients (13%)





### Endovascular treatment – additional procedures

- Stenting or angioplasty of azygous vein 6 patient (7%)
- Balloon angioplasty of brachiocephalic vein
  2 patients (2%)
- Redo surgeries 3 patients

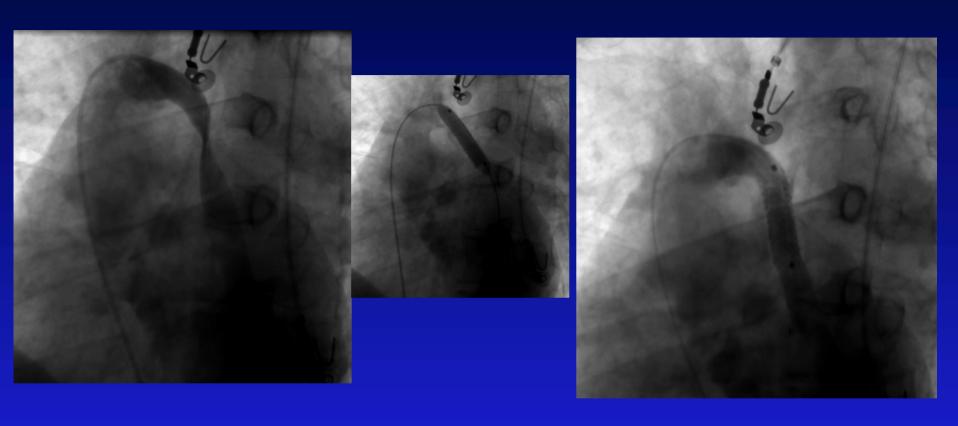








Balloon angioplasty for membrane in brachiocephalic vein



#### Stenting for stenosis of the azygous vein

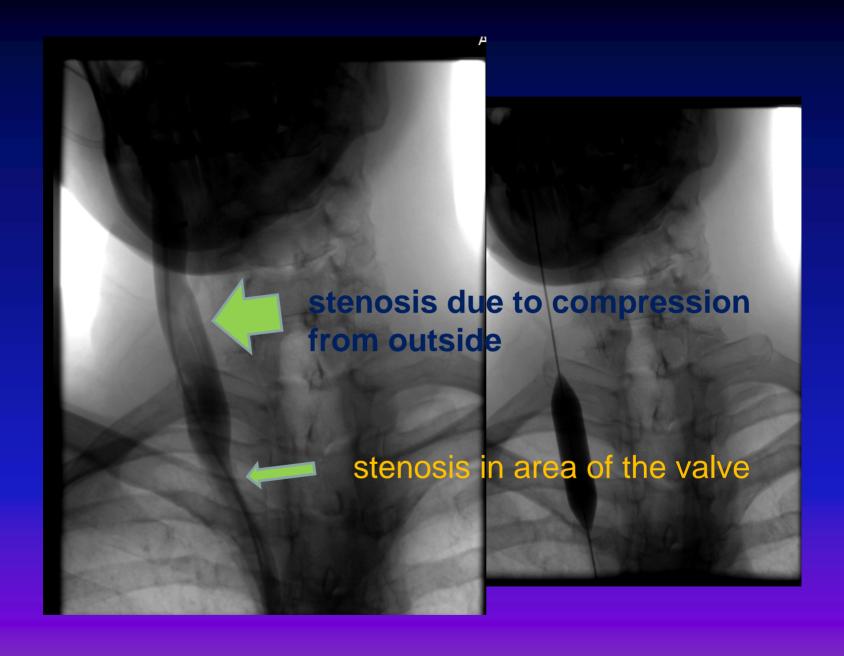
### Endovascular treatment – complications

- 1 minor bleeding from puncture in the goin,
   2 days postop
- 1 gastrointestinal bleeding a week postop (clopidogrel?)
- transient headaches following procedure in some patients
- No major pain
- No injury to the nerves
- No problems related to stents



### Endovascular treatment – failures of the treatment

- Unsuccessful stenting for hypoplastic upper IJV 1 patient
- Unsuccessful balloon angioplasty for stenosis in the middle part of IJV (probably due to external compression) – 3 patients
- Minor success of balloon angioplasty for membranes in the brachiocephalic veins - 2 patients





Stenting for stenosis in the upper IJV

## RESULTS – some preliminary impressions

- Follow-ups available only for some patients; however, most of patients reported improvements
- In general: the less disabled patients was, the bigger improvement
- No improvement or recurrence of symptoms may indicate restenosis

#### Some interesting findings

- Within one hour postop patients' hands became warm (if cold before treatment) and faces pink (if pale before)
- Bladder control improved within one day postop
- It is difficult to explain these findings in terms of improved nerve function; rather it is more likely that a blood-released neurotransmitter may play a role (angiotensin ??)