

# FAILURE OF CCSVI INTERVENTIONS

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While some patients gain considerable relief after CCSVI treatment, others have disappointing results

- No improvements
- Improvements regress within days to weeks
- Worsening symptoms, relapses
- Complications
- Result:
  - repeat treatments discouraged
  - concept of venous related symptoms negated

# CHALLENGE: Restenosis

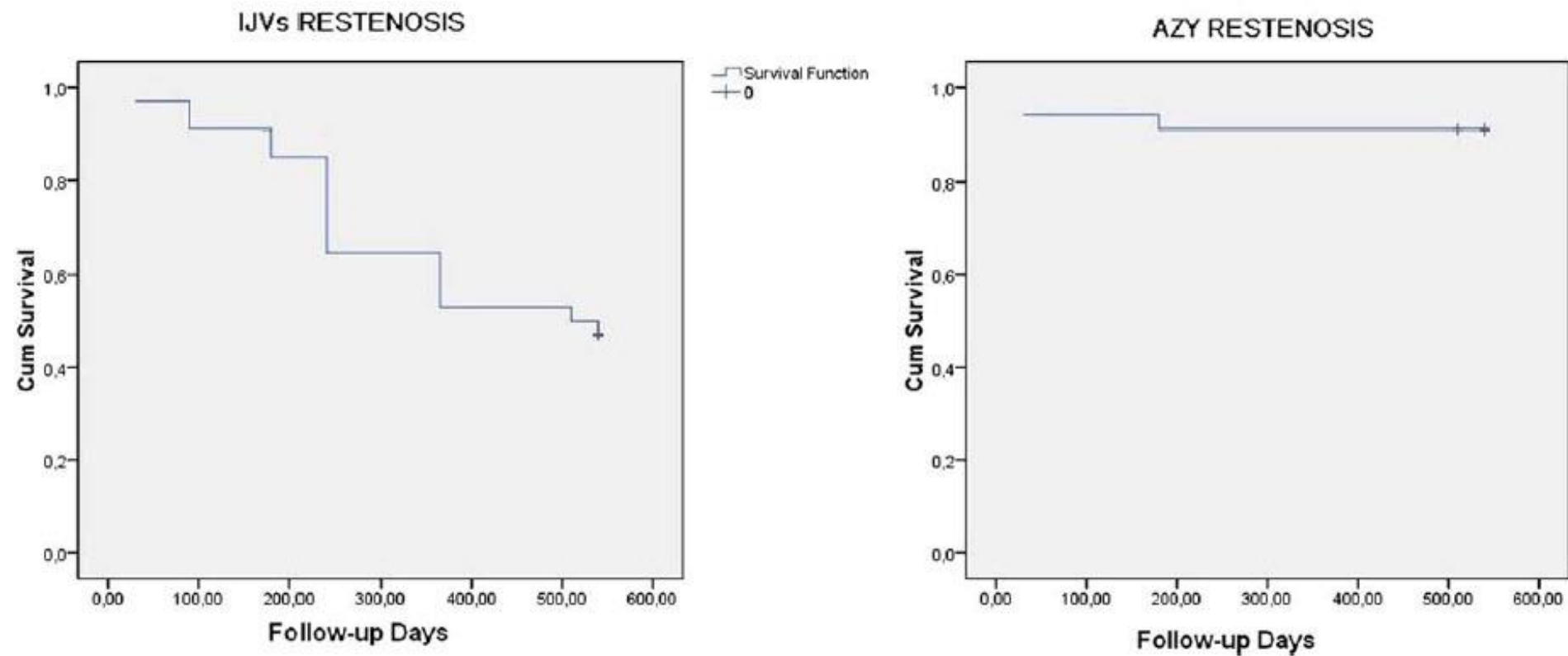


Fig 7. Kaplan-Meier estimates show the (Left) cumulative patency rate detected in the internal jugular veins (*IJVs*) and (Right) at the azygous (*AZY*) vein at 18 months of follow-up.

How to explain  
great success in some patients  
and  
poor outcome in others?

# Failures 2009-13 were reviewed looking for technical causes

- Reviews of unsuccessful Rx by others
  - Assessment after repeat Dx & Rx
- Personal technical errors (trial & error)
  - Assessment of my second procedures

# Failures are either disease or procedure

1. Loss of placebo effect
2. Advancing neuronal death and gliosis
3. MS Exacerbations
4. Failed diagnostic evaluations
5. Suboptimal treatment
6. Restenosis or occlusion
7. Failures of follow-up

# Failures 2009-13 were reviewed looking for technical causes

- after treatment of others
  - reviews of unsuccessful Rx
  - Follow-up Dx & Rx of these patients
- Personal technical errors (trial & error)



# Failed Diagnostic Evaluations

Deficient imaging techniques

Undetected intraluminal pathology

Incomplete imaging

- A. primary veins (IJV, BCV, AzV)

- B. Less accepted veins (ALV, LRV)

- A. Misinterpretations



# Unsatisfactory treatment

Failure to traverse stenosis

Under & over dilation

- Mis-estimate stenosis & vein size

- Inadequate and excessive pressure

Hypoplasia & Septum

Venoplasty complications

- Thrombosis, dissection, perforation

Stent complications

# Failure of Follow-up

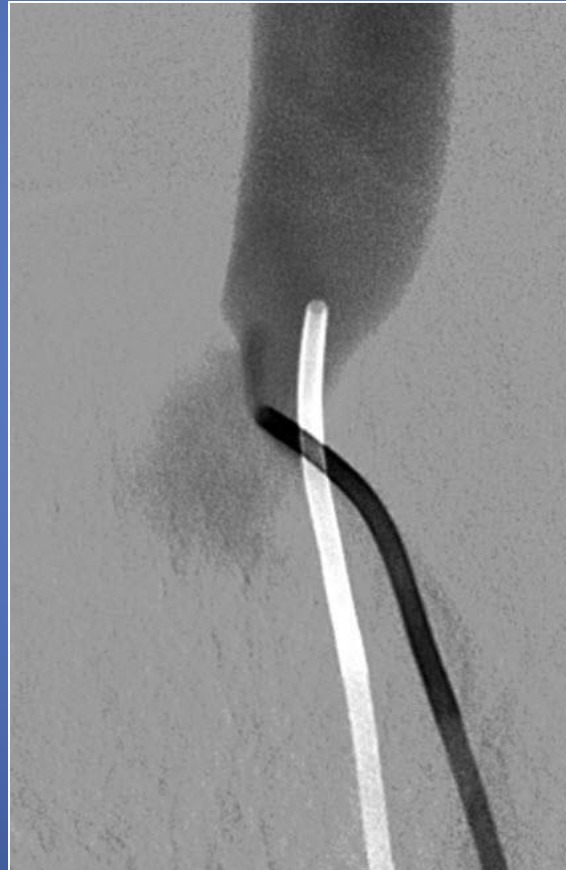
- No recognition of MS relapses
- Inadequate surveillance
  - No attempts to screen for early restenosis
  - No early screening for thrombosis
- Inadequate prevention of thrombosis
- Timely planning for re-intervention

# Conclusions

- Not all early loss is regressed placebo
- Diagnostic and therapeutic inadequacies are not uncommon. SO LOOK FOR IT
- Some restenosis is not failure
  - Just need for more treatment
- Must detect thrombosis early
- Re-treatment can salvage many “failed” procedures

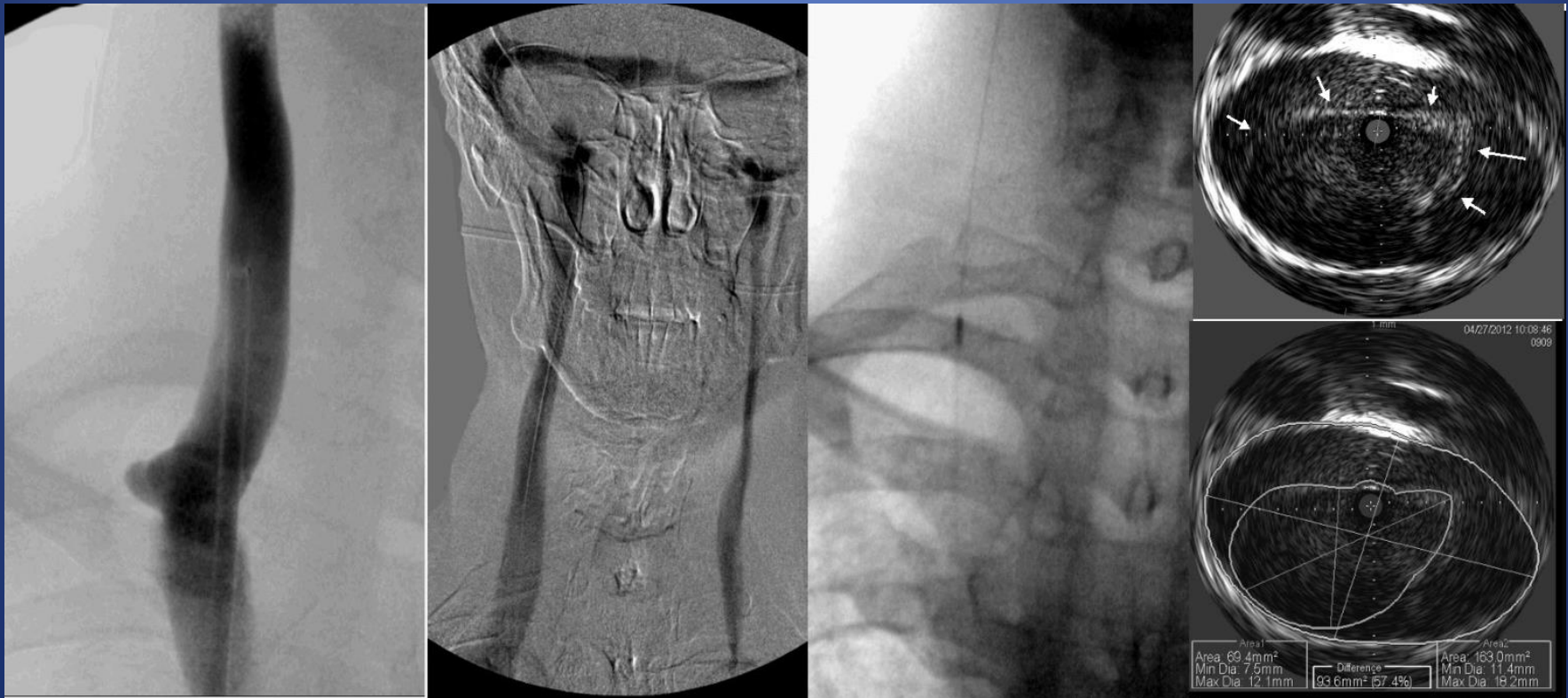
EXAMPLES

Contrast too dense filming too slow  
Slower injection more dilute contrast

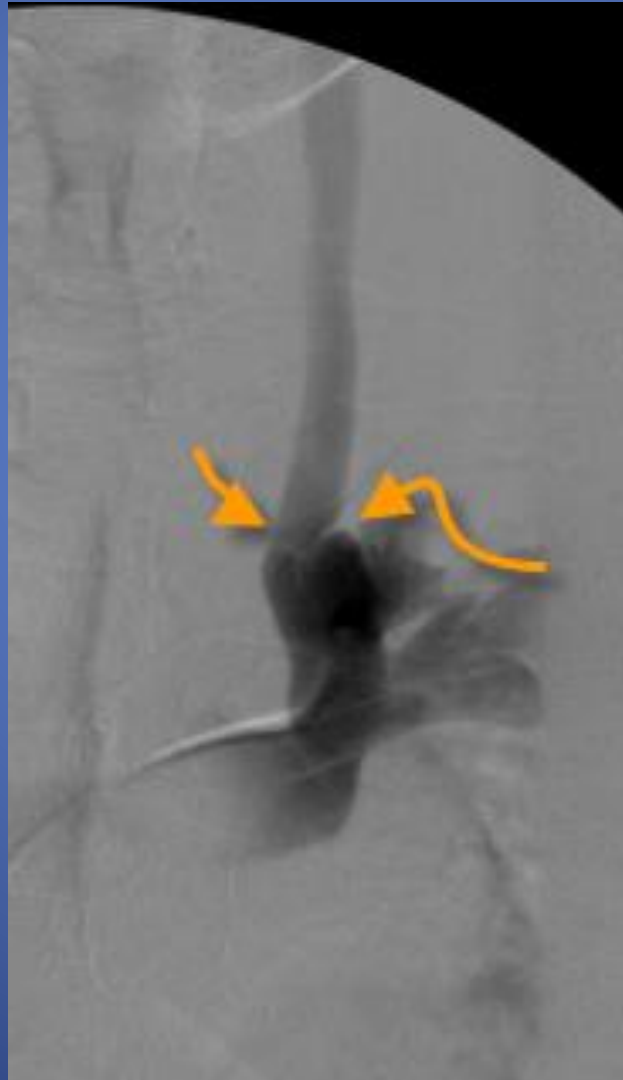




# Unrecognized RIJV valve stenosis detected by IVUS



Failure to traverse:  
Could not cannulate through LIJV valve



And  
stopped



# LIJV valve stenosis: Rendezvous

Rendezvous  
via neck access

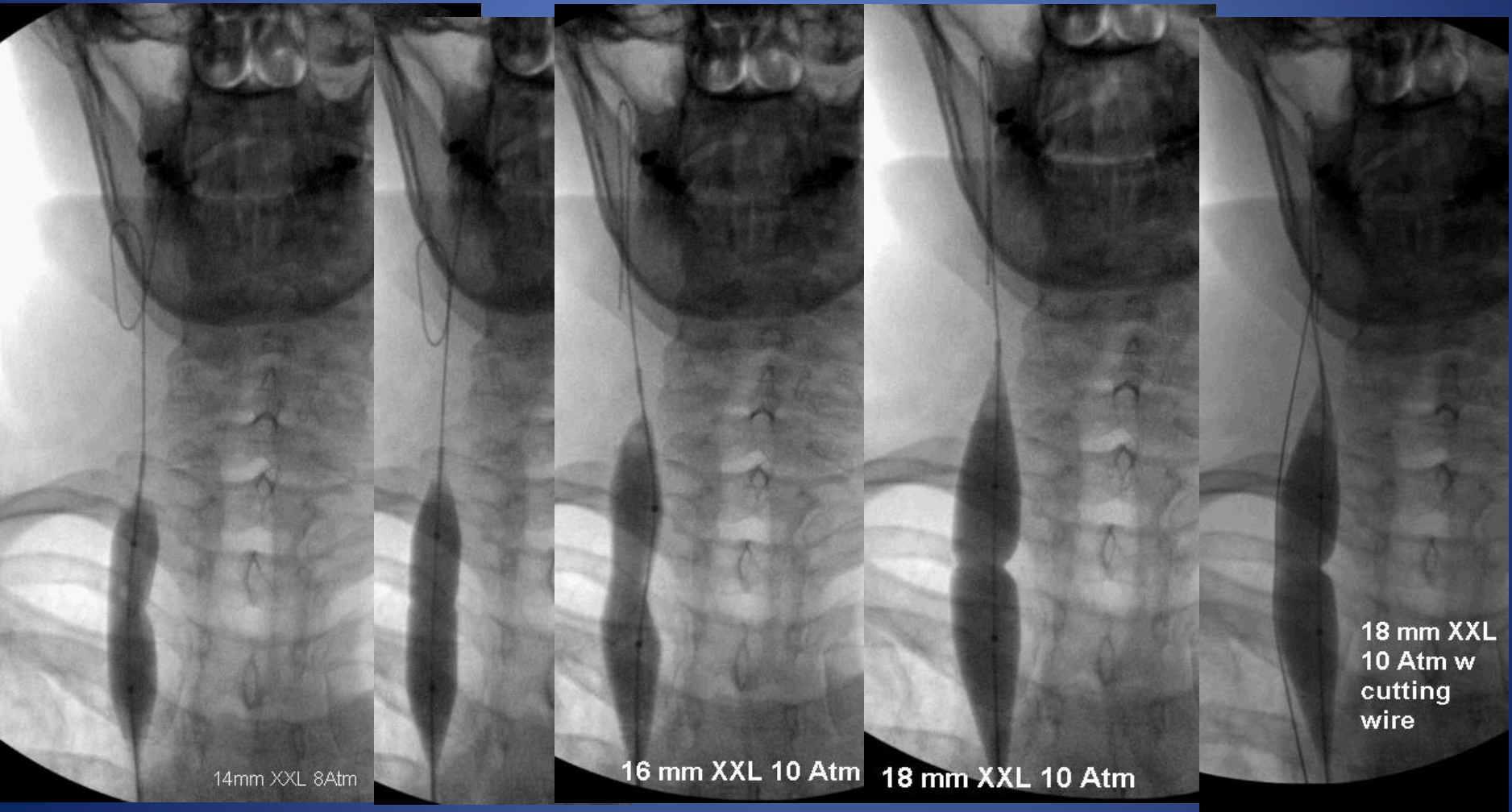
Reflux into  
contralateral  
dural sinus

High  
pressure  
angioplasty



# Suboptimal Angioplasty

## Under-dilation, under-pressured



# IJV needs large balloons & high pressure



# How is balloon size selected?

- Principles derived from arterial 'plasty
  - Artery is muscular and round
  - Intentional dissection of wall
  - 20% greater than diameter
- How to measure diameter?
  - Gestalt, venographic estimation, empiric
- Problem: venogram is magnified



# But veins are not arteries

not atherosclerotic disease

valvular stenoses

more compliant

compressed into non-circular shapes

# IVUS precise measurement of CSA

Select balloon w CSA  $\sim 50\%$  > vein

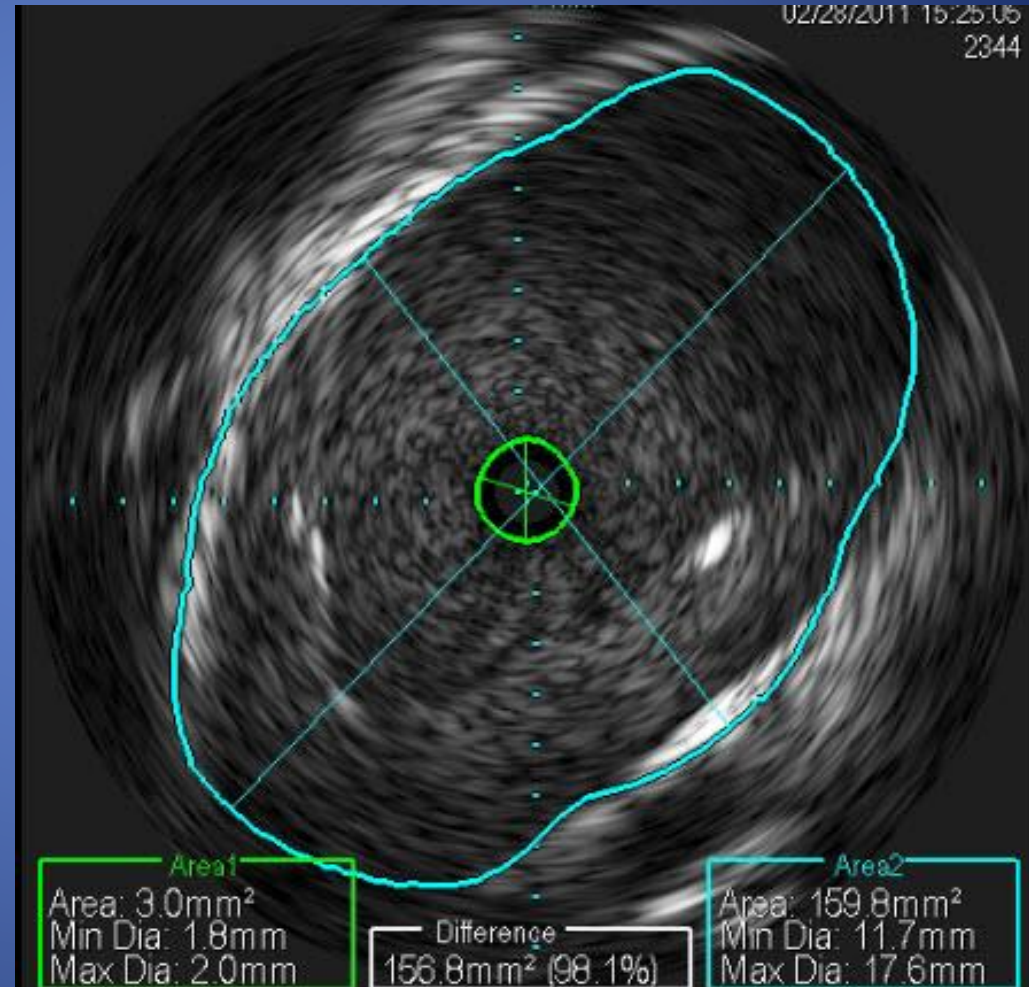
CSA =  $159.8\text{mm}^2$   
 $11.7\text{mm} \times 17.6\text{mm}$

options:

$16\text{mm} = 201\text{mm}^2$

$18\text{mm} = 254\text{mm}^2$

$20\text{mm} = 314\text{mm}^2$



# Acta Scandinavia:1976; 347:415-7

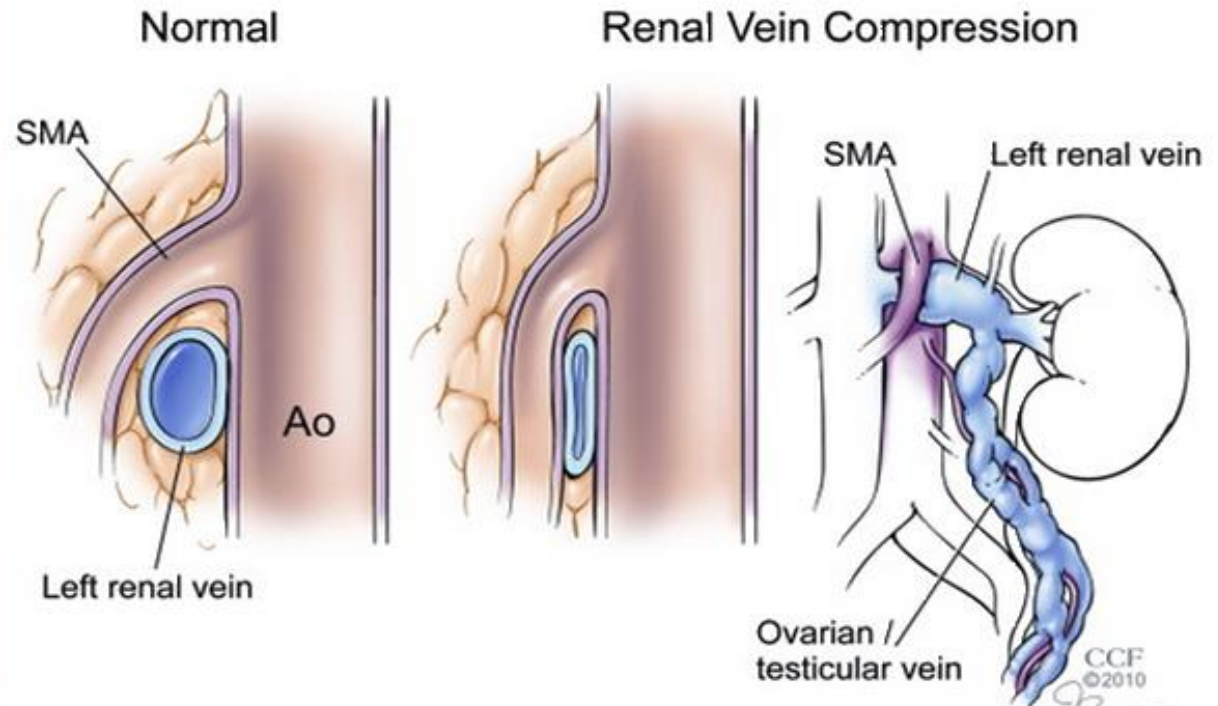
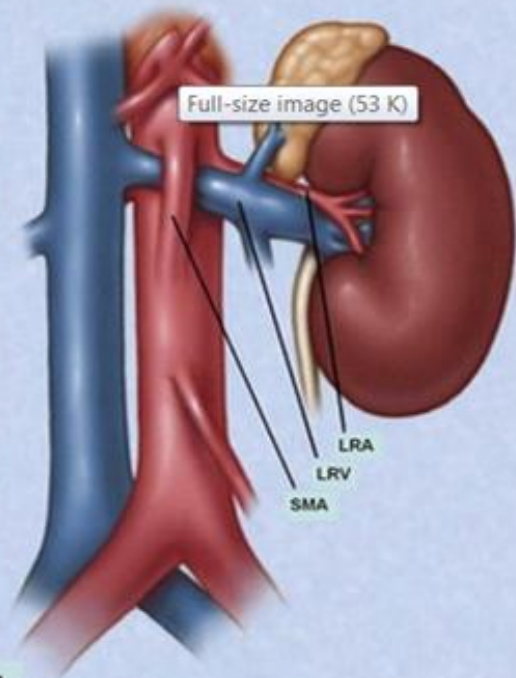
## Aboulker and Leriche

- “Increased intraspinal venous pressure, resulting ... in numerous spastic paraplegias and quadriplegias is due to multiple venous abnormalities”
- “stenoses of the internal jugular veins, the left renal, the left iliac veins, the azygos veins”
- “permanent stasis in the intraspinal plexuses through excessive supply or insufficient drainage”
- Some treated by surgical decompression with relief

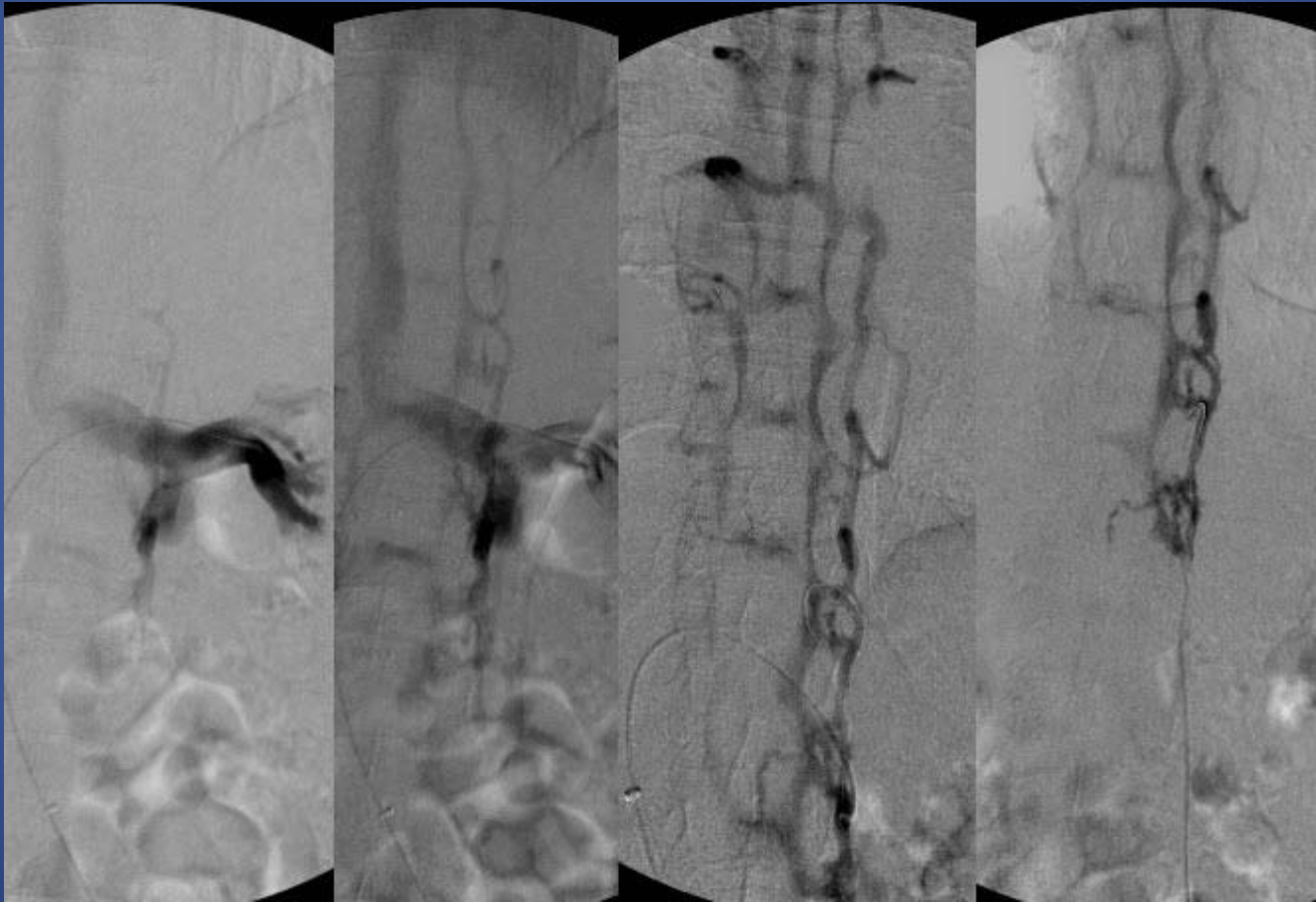


# Secondary cerebrospinal venous congestion due to L Renal Vein Entrapment (Nutcracker)

## An inflow overload



2/3 of renal collaterals enter spine



# PwMS have more frequent and higher degree of Nutcracker than HC

| Patients             | Number | Testing             | Stenosis (%) | >70 Stenosis (%) |
|----------------------|--------|---------------------|--------------|------------------|
| Acute Trauma Victims | 100    | CT w contrast       | 11           | 1 (1)            |
| PwMS                 | 200    | Venography and IVUS | 104 (52)     | 46 (23)          |

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