How to use anatomical landmarks only to precisely position left common iliac venous stents at the IVC confluence

Galway University Hospital IR
Dr. Raazi Bajwa
Dr. Gerry O’Sullivan
Chance conversation....

About 3 years ago I was doing a live case with the Leipzig team and causally remarked that we needed to land the stent

“JUST THERE”

They said how do you know?
I said ‘cos it’s always just there......

They said- prove it!!!
Football and Rugby

• Football is a game for gentlemen played by thugs
Rugby and Football

• Rugby is a game for thugs played by gentlemen
My rugby heroes were the great South Africans (many) originally of Dutch extraction
The name of the game is to land the ball between the bars—or to land the stent between the goalposts

So what are the goalposts?
PRONE view of goalposts

Land stent between spinous process and right lateral pedicle
PRONE

Point of Maximum compression usually lies JUST to the right of the spinous process

Therefore the right edge of stent MUST lie to the right of this
SUPINE
For all this to work the patient must be true Antero-Posterior

In other words the spinous process must lie-precisely-midway between the two pedicles. So the radiographer MUST rotate image intensifier until this occurs
This may be confusing for our American colleagues.

In (American) football the kick is always straight ahead.
So….

• We looked at 56 consecutive pre and post op CTVs (mean age 45; 81% female) and precisely determined the position of the following:
  • Right wall IVC; mid point IVC
  • Right wall R CIA
  • Spinous process
  • Right pedicle of appropriate transverse process and
  • Stent position in relation to each of these
White solid arrow - IVC
White broken arrow - left gonadal V
Left solid arrow - R CIA
Left broken arrow - compressed L CIV
Pre op CTV
Vertebral body measurements

- All measurements at the level of max compression

- Measurements
  - Spinous process line: From the tip of the SP → anterior apex of spinal canal → anterior abdominal wall
  - Lateral aspect right pedicle → SP line
  - Mid point right pedicle → SP line
  - Medial aspect right pedicle → SP line
IVC measurements

• Lateral aspect right pedicle → right lateral wall IVC
• Mid point right pedicle → right lateral wall IVC
• Medial aspect right pedicle → right lateral wall IVC
• SP Line → right lateral wall IVC
Right CIA measurements

- Lateral aspect right pedicle → right lateral wall R CIA
- Mid point right pedicle → right lateral wall R CIA
- Medial aspect right pedicle → right lateral wall R CIA
- SP Line → right lateral wall R CIA
Post-stenting measurements

Vertebral body, IVC and R CIA

• As pre-stenting measurements

• Slices:
  – Vertebral body, IVC and stent measurements taken at cephaloid part of stent
  – R CIA measurements taken at max level of compression
Note patient is rotated so perpendicular axis is also slightly rotated.
Stent measurements

- Slice at cephaloid part of stent
- Lateral aspect right pedicle → right lateral wall stent
- Mid point right pedicle → right lateral wall stent
- Medial aspect right pedicle → LEFT lateral wall stent
- SP Line → right lateral wall stent
- Right lateral aspect of stent → right wall IVC
Anyway who cares?

• Rate of contra-lateral common iliac vein thrombosis MAY be related to degree of coverage of contralateral CIV

• Caliste/Clark/Doyle/Cullen/Gillespie
  • J Vasc Surg Venous Lymphat Disord. 2014 Jul;2(3):253-9

• Rathore/Gloviczki/Bjarnson

• Murphy/Raju
  • J Vasc Surg Venous Lymphat Disord. 2017 Jan;5(1):8-17

• Khairy/Neves/Hartung/O’Sullivan
  • Eur J Vasc Endovasc Surg. 2017 Dec;54(6):745-751
Stunning images

Beautifully written

A “MUST” read

Rathore/Gloviczki/Bjarnson
If stent is not fully dilated it may continue to expand and shorten and fall to the left of the spinous process and cause immediate re-thrombosis- Day 1 as above.
Landing your stent accurately is important

- Older method of landing older stents well up into IVC and covering opposite CIV is defunct
- Precise deployment is now possible with new nitinol venous stents
- Landing stent so that proximal edge lies at the midpoint of the IVC- and therefore between spinous process and right pedicle is probably accurate enough
Aileen’s wave - near the Cliffs of Moher