Sacral Neuromodulation
Technical aspects

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Overview

- Technique for the office – PNE

- Technique for the operating room
  - 1 stage
  - 2 stage

- Technique for removal
Sacral Neuromodulation
Urological Indications

- Refractory Urinary Urgency
- Refractory Urge Urinary Incontinence
- Non-obstructive Urinary Retention
- Pelvic Pain syndromes ???
- Neurogenic OAB ???
Percutaneous nerve evaluation (PNE)

- Performed in the office
- Procedure takes 30-60 minutes
- 1-2% lidocaine
- Bilateral leads placed
- Typically left in place for 7-10 days
  - Leads typically migrate
  - Infection rates higher after 10 days
PNE

Who is not a candidate?

- Unable to tolerate prone position without sedation or monitoring for up to 60 minutes.

- Indication – non obstructive urinary retention
  - Often requires more than 1 week to assess response

- Lower back/upper buttock cellulitis
PNE

Other relative contraindications

- Elderly patients
  - Difficult/brittle sacrum

- Multiple back surgeries
  - Challenging to place lead
  - Use fluoroscopy
Tips for placement

- If no fluoroscopy, position of S3 is approximately:
  - 9-10 cm above tip of coccyx, or at sciatic notch
  - At level where needle/stylet balance on prominence at center of lower back – 2-3 cm out from midline

- Be prepared to use longer introducer needle in more robust patients

- 1% lidocaine to bony shelf – need to walk down posterior sacrum until foramen reached, 60 degree angle
PNE

Posterior Sacrum

Lateral Sacrum
Important Fact

- SACRUM is not vertically oriented
- “UPPER” Sacrum (S1 & S2) approaches horizontal plane
- “LOWER” Sacrum (S3, S4, S5) approaches frontal plane
Sciatic notch

S1
S2
S3
S4

2 cm = 1 finger

Most prominent

Superior-medial side of foramen

9 cm = four fingers
Tips for assessing stimulation

- Motor response often difficult to interpret
  - Often altered due to discomfort

- Sensation may be most important parameter to assess during a PNE
  - Women: vagina, rectum
  - Men: scrotum, penis, rectum
  - NOT buttock, thigh
Tips

- Lead is unipolar – proper location is imperative to testing response
- Test response at several times during placement
  - Test needle (to locate S3)
  - Test lead through introducer needle
  - Test lead after needle removed
- Firmly secure the leads in place
PNE

The lead will never work any better than the minute you put it in.
Stage 1,2 Placement

- Intraoperative flouroscopy to identify S3

- “Cross Hairs” – start with AP view
  - Identify sciatic notch (SI joint) – mark on skin
  - Identify vertical midline - mark
  - At point where lines meet mark out about 2 cm laterally – this is position of S3
  - Go up 1-2 cm in skin for needle entry, 60 degrees trajectory
C-arm

Correct position of the C-arm for AP and LL x-ray
AP x-ray
Find out S3 in two steps

1) Look for pelvis-sacrum junction ⇒ sciatic notch (S3 level)

2) Look for and count the foramina arcs

Tips:
- usually you don’t see S4 arcs
- you see the arc not the foramen
  (The foramen, in sacrum posterior face, is just over the arc)

AP

LL

2) Look for and count all the foramina

Tips:
- hump in internal border of the sacrum
- same size of the sacral vertebrae
- start to count from S1 (don’t from S4)
Technique

- Stimulate after foramen located – on insulated part of finder needle

- Look for S3 response – flexion of great toe, bellows response, sensory in vagina/scrotum, rectum

- Past stylet to correct depth through finder needle using lateral view, depth markers
The foramen beginning at this level
Stage 1

- Enlarge skin incision and pass trocar with sheath under fluoroscopic guidance using radiolucent guide on trocar – located between upper and lower edge of sacrum – ie in the foramen.
... keep the depth marker in the foramen
Stage 1

- Once at proper location, withdraw trocar, leaving sheath in place and advance tined lead to pre-marked position on the lead – test lead at this point.

- Under fluoroscopic guidance, remove sheath while maintaining lead in proper position.

- Typically, lead “1” (the longest) or “2” should be bridging the lower edge of the sacrum. Lead “0” below, and lead “3” in the foramen, but move based on response.
Proper lead location
If placing external stimulator

- Tunnel device to dominant side, upper buttock.

- Make 3-4 cm incision at this point and connect tined lead to lead extension.

- Make separate stab incision at least 4-5 cm away from upper buttock incision for exit site of lead extension.
If placing IPG

- Tunnel tined lead as previously, but make pocket large enough to accommodate IPG

- Pocket should be deep enough to allow sufficient fat between IPG and skin (otherwise may pt may be bothered by it), but not into fascia of gluteal muscle.

- IPG must lie flat. Test impedance after closing subcutaneous space.
Removing tined lead

- Incisions at IPG and introducer site

- Identify lead at S3 introducer site and firmly grasp with clamp

- Slow, progressive removal, repeatedly replacing clamp at lowest level. Watch for lead fracturing.