What *not* to do in VEPTR
or
4 of my worst VEPTR mistakes

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Conflicts of Interest

• Consultant:
  – Medtronics
  – J&J, Depuy/Synthes
  – Biomet

• Royalties:
  – Synthes spine (VEPTR II)
Three things to not do with VEPTR

• Can you avoid my learning curve?

1. Upper thoracic kyphosis (esp NM pts.)
2. Reversed iliac hooks
3. Over-distraction
Upper thoracic kyphosis
Arthrogryposis, trach, vent at night
• Halo gravity traction to help correct upper thoracic kyphosis
• Bilateral rib to pelvis VEPTR
• VEPTR lengthened x 5 years
• Vastly improved pulmonary status – decannulated, no hospitalizations for respiratory distress
• Gained weight, grew
• No cervical discomfort
• Worsening cervical lordosis, upper thoracic kyphosis
Age 8
LC – arthrogryposis – age 3 to 8
LL Arthrogryposis

- Cervico thoracic junction collapsed further into kyphosis, rotating around VEPTR attachments
• Plan?
  – Halo gravity traction
  – Posterior VCR
  – Add instrumented posterior fusion from approx C5 to T5
  – Exchange of VEPTR
  – Continue lengthening VEPTR
Early Onset Deformity. – etiology as a factor:

- **Collapsing neuromuscular**
  - Kyphosis (upper thoracic) problematic for both growing rods and VEPTR
    - Pre-op halo gravity traction may facilitate device insertion by diminishing kyphosis
    - Can get them in but will they hold?
  - Growing rods can extend more cephalad
    - Better for upper thoracic kyphosis
Reversed iliac hooks
4 y.o. with Ehlers Danlos variant

- Worsening deformity
- Recurrent breakdown when attempting to sit or with a brace
- Severe osteopenia, recurrent fractures
- Increasing respiratory distress (secondary TIS)
Ehlers Danlos with reversed iliac hooks

Hooks reversed – loop on inner table of pelvis to better resist dorsal displacement
Complications of VEPTR: Anchor Point Problems:

- **Chronic, long-term:**
  - Iliac S-hook drift
    - Common over time, particularly in unilateral devices
      - Drift is generally distal, not posterior or lateral
    - Indications for revision:
      - Too close to hip joint
      - Loss of fixation
    - Revision straightforward but may require significant exposure
  - *If iliac hooks reversed, extraction much more difficult or even impossible*
Insufficient soft tissue management
Acute Brachial Plexus palsy – 5 yo with thoracogenic scoliosis – resolution with device shortening – 6 months
Deep infection with primary procedure

- 12 yo with TEF, multiple prior thoracotomies, prior chest wall infections, rib fusions.
  - Expansion thoracostomy x 2, rib to rib and rib to spine device
    - No preparation of flaps, expanders
    - Poor soft tissue coverage, no muscle coverage from prior procedures.
  - POD 14 trauma to wound over prominent device while sitting against chair. On vacation
    - Both devices removed – fusion 6 mo later

- Moral:
  - Create healthy flaps
  - No full thickness wounds over devices
**VEPTR Surgical Procedure:**

- **Incision planning**
  - Consider prior incisions
  - Consider ‘delay’ of flap or tissue expanders
  - Nutrition!
  - Access for lengthening, exchange Later device access for expansion
    - Periodic lengthening
    - Distraction lock moves superiorly with expansions
    - Tissue expanders
VEPTR – create a healthy musculo-cutaneous flap:

- Preservation of maximum soft tissue envelope
- Goal: Healthy musculo-cutaneous flap
- Full thickness elevation:
  - Skin
  - All muscles, scapula
  - *Trapezius more distal than skin*
Lengthenings:

• A 2x / year chance for a complication!
• Avoid full thickness incision over device
• Pull muscle back together with closure
  – Attending level closure
Leaves the
**Avoiding** **full thickness** **incisions** at the time of **device lengthening**:

- **Prior skin incision**
- **Superficial incisions**
- **Deep incisions**
Over-distraction
Rib fractures – acute loss of correction

• Patient #24
  – VACTERL
  – Rib fractures during initial insertion, distraction (‘just a little more’)
  – Loss of correction, fixation
  – Revision at 6 months
Pre-op
Rib fractures – acute loss of correction
Rib fractures – revision after 6 months of healing, drifted again to
Rib fractures – eventual control with growing rods.
3.5 years post op, after lengthenings:
Thanks!