Masters’ Tips & Tricks

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Masters’ Tips & Tricks
MASTER’S TECHNIQUES: VCR & GROWING RODS

I. INTRODUCTION/TERMINOLOGY
   a. SCHWAB – OSTEOTOMY TYPES
      ANATOMICAL CONSIDERATIONS
      
      Neurosurgery 2014;74(1):112–20
      
   b. Fox VCR Study Group Definition:
      “3-column circumferential vertebral osteotomy creating a segmental defect with
      sufficient instability to require provisional instrumentation
   c. Indications
      i. Pathology dependent
         1. Type of deformity (scoliosis, kyphosis, lordosis)
         2. Coronal/sagittal/combined imbalance
         3. Curve magnitude
         4. Stiffness (preop & intraop)
         5. Bone density (proxy for PS purchase)
      ii. Surgeon dependent
         1. Operative goals
         2. Surgeon experience/comfort level (PSOs, post. HV exc.,
            costotransversectomy approach)
      iii. Risk dependent
         1. Minimization
         2. Avoid complications
         3. Able to obtain enough correction w/o resorting to VCR
   d. Contraindications
      i. VCR → “stuck dura” dorsally and/or ventrally from prior
         decompression/post. interbody fusion
      ii. Unfamiliar w/technique
      iii. Lack of SCM (?) during procedure (↑ risk!)
   e. Preoperative planning
      i. Complete radiographic evaluation
      ii. Total spine MRI
      iii. 3D CT scan ± actual model
      iv. Pulmonary/nutrition analyses
      v. Cardiac/anesthesia clearance

Notes:
II. SPECIFIC INDICATIONS/TECHNIQUES

a. Posterior VCR
   i. Procedure of “last resort”
   ii. Severe & stiff deformities/autofused spinal columns
   iii. For primary IS → “spine-on-chest wall” x-rays
   iv. Marked kyphoscoliosis/lordoscoliosis
   v. Performed primarily in thoracic/TL region
   vi. Resection of all post. elements, facet joints ↑/↓, pedicles, nearly all vertebral body & discs ↑/↓
   vii. Tremendous correction ability as spine is disarticulated at apex & proximal/distal limbs slowly brought together
   viii. Performed via staged ant./post. approaches or post.-only (in single or staged fashion)

b. Surgical technique
   i. Exposure, costotransversectomy, pedicle screw placement
   ii. Laminectomy, temporary rod placement, vertebral body exposure
   iii. Lateral vertebral body access and removal, discectomies

Notes:
iv. Posterior vertebral body impaction, compression closure

v. Anterior cage insertion, final correction, placement of rib pieces over laminar defect

III. OUTCOMES
   i. Complications
      1. 86/147 (59%) total complications
      2. 68/147 (46%) intraop
         a. 39/147(26.5%) SCM loss or actual neuro deficit
         b. 33/147(22.4%) EBL >2L
      3. 43/147 = 29% postop
         a. 21/147(14.3%) respiratory
         b. 7/147 (4.8%) infections
   ii. No intraop/postop deaths
   iii. No permanent paraplegias: 1 pt. w/persistent neuro dysfunction
   i. Postop neuro status
      1. 138 pts./8yrs
      2. 112 with intraop SCM same as preop
      3. 4/26 without intraop SCM – (15%) transient paraplegia
   ii. Characteristics
      1. 3 KS & 1 AK – +116.3°

Notes:
2. Apex proximal to mid-thoracic – T2-7
3. 3 prior ASF w/segmental vessel ligation
4. All preop neuro status acute, progressive myelopathy

iii. F/U neuro status

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<tr>
<th>Age</th>
<th>VCR (mmHg)</th>
<th>Ds</th>
<th>Secondary Ds</th>
<th>Preop</th>
<th>Postop</th>
<th>F/U</th>
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<td>T7A</td>
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All 4 pts. Regained LE motor function and 4/4 ambulatory

c. Benefit of SCM – multicenter pediatric VCR “Fox” Consortium
   i. Prompt response to SCM changes
      1. 147 pts./7 surgeons
      2. 39/147 (27%) critical change/SCM loss or failed WUT
      3. 19 pts. (13%) worsening neuro status immediate postop
      4. 1 permanent neuro decline

   i. Loss of SCM data
      1. 15/90 pts. either lost (n=13) or had degraded data meeting warning criteria (n=2)
      2. All 15 SCM data returned following prompt intervention
      3. All woke w/intact LE function! (“SCM SAVES”)

IV. COMBINE VCR WITH GROWING INSTRUMENTATION” IN EOS PATIENTS
   a. Unique situation – more angular deformity w/growth potential ↑/↓ resected area
   b. Use of preop HGTx – very beneficial & may often obviate actually performing VCR procedure
   c. Growing instr. can consist of growing rod or Shilla-type construct
   d. Risk/benefits ratio of VCR with definitive fusion vs. VCR & long fusion w/growth instr.
   e. Need to question viability of spine growth w/3 fusion areas
      i. Proximal anchors
      ii. Apical VCR fusion
      iii. Distal anchors
   f. Goal is either GR construct alone w/apical correction from HG Tx or apical VCR w/short segmental fusion
      i. HGTx highly beneficial in both scenarios
      ii. Need for additional surg. w/growth in most short – segment apical fusion in EOS a patient population

Notes:
Bibliography


