Iatrogenic Cervical Sagittal Plane Deformity Following Surgery

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Iatrogenic sagittal plane deformities

- Kyphosis: most common
- Segmental subluxation
- Hyperlordosis: rare

Common causes introducing deformity during/after index surgery

- Inappropriate patient positioning
- Improper distractor placement
- Amount or extent of decompression: multilevel laminectomy or corpectomy, excessive facet resection, muscle and ligament complex injury
- Type and extent of instrumentation
- Inadequate postoperative immobilization
- Osteoporotic bone

Possible risk factors for postlaminectomy kyphosis

- Younger age
- Extension of the resected laminae
- Removal of facet joints
- Preoperative sagittal alignment
- Malignant lesions with adjunct radiotherapy
- Laminectomy or, more rarely, laminoplasty
- Tumor associated syrinx
- C2 laminectomy
- Clinical presentation with Myelopathic symptoms
Preventive measures of postlaminectomy kyphosis

1. Early and frequent radiographic evaluation: deformities have been reported after 1 week of the surgical procedure
2. Bracing in selected cases: controversial
3. Limited decompression
4. Preservation of structural elements
5. Instrumented fusion

Symptoms associated with postoperative kyphosis

- Neck pain and neck disability
- Neurologic compromise (myelopathy and/or radiculopathy)
- Cosmesis (rare)

Basic surgical strategies for the correction of cervical kyphosis

- Lengthening of the anterior column
- Shortening of the posterior column
- Decompression and prevention of neural compression (spinal cord and/or nerve roots)

Considerations for preoperative planning

- Global and cervical sagittal balance
- Fixed vs. flexible deformity
- If a fixed deformity, ankylosed or not (anteriorly, posteriorly, or circumferentially fused)
- Pseudarthrosis
- Instability
- The levels with neural tissue compression
- Pre-implanted anterior plates/screws and posterior wires/screws/rods
- Bony structure: important for dissection, instrumentation, and more decompression

Surgical options

1. Anterior only
• ACDF or ACCF with plating
• Osteotomy for the fused anterior column

2. Posterior only
• Posterior instrumentation/fusion ± decompression for the flexible deformity
• Smith-Petersen osteotomy ± decompression for the semi-rigid deformity
• Pedicle subtraction osteotomy for ankylosed cervicothoracic junction kyphosis

3. Circumferential
• Anterior-posterior approach
• Anterior-posterior-anterior approach
• Posterior-anterior-posterior approach

Surgical tips for revisional reconstructive surgeries in the iatrogenic cervical deformity

1. Anterior
• Preoperative vocal cord exam for the decision of safer approach side
• Meticulous dissection of scar tissue
• Frequent identification of neurovascular structures and esophagus

2. Posterior
• Preservation of muscle as much as possible
• Identification of remaining bony structure: Use is as a landmark during dissection
• Minimization of injury to remaining bone to get more stable instrumentation
• Skillful resection of scar tissue from dura mater: less risky because of thick dura in the cervical spine
• “Rotation of prevent rod” technique: easier assembly and reduction
• Positional reduction using Mayfield frame: controlled translation and extension of head
• Osteotomy: Smith-Petersen or Pedicle subtraction osteotomy
• Stronger instrumentation techniques including pedicle screws are often necessary.

References


