MANAGEMENT OF POSTOPERATIVE INSTABILITY

Rudolf Morgenstern MD, PhD, OSS, MISS
Centro Médico Teknon
Barcelona, Spain
Rudolf Morgenstern, MD, PhD, MISS
Orthopaedic Spine Surgeon

Centro Médico Teknon
Barcelona, Spain
POSTOPERATIVE INSTABILITY

“Failed Back Surgery Syndrome”

• Instability after posterior decompression surgery
  - Postoperative lumbar spinal instability occurring or progressing secondary to laminectomy. Iida Y et al.; National Kobe Hospital, Japan; Spine, 1990 Nov;15(11).

• Adjacent segment syndrome
  - The Impact of Adjacent Segment Degeneration on the Clinical Outcome After Lumbar Spinal Fusion. Jun Young Tang et al., Spine; 2008 Volume 33, Number 5,
  - Effects of Lumbar Arthrodesis on Adjacent Segments. Tae Yup Kim et al. Guro Teun Teun Hospital, Seoul, SPINE Volume 37, Number 17, 2012

• Broken posterolateral bonegraft arthrodesis
  - Symptoms of post-traumatic stress following elective lumbar spinal arthrodesis. Deisseroth K, Hart RA; Malcom Grow Medical Clinic, Andrews Air Force Base, MD, USA; Spine; 2012 Aug 15;37(18)

• Posterior transpedicular screw loosening
  - A comparative study on screw loosening in osteoporotic lumbar spine fusion between expandable and conventional pedicle screws. Wu ZX et al.; Arch Orthop Trauma Surg. 2012 Apr;132(4)
Goals

• Avoid scar tissue dissection.
• Stabilize the affected segment.
• Restore sagittal balance.
• Minimize muscle dissection and tissue damage.
• Prevent further unstability.
Revision Surgery Tools

- Percutaneous transpedicular screw fixation
- Percutaneous transfacet compression screws
- Transforaminal expandable interbody Ti cages
- Transforaminal interbody PEEK cages
- Fenestrated screws with PMMA bone cement
- Balloon Kyphoplasty
- DBM bone graft + HA + bone marrow
Revision Surgery Strategies

• Prone position with hip flexion for lumbar lordosis reduction “as flat as possible”.
• Posterior lumbar distraction with transpedicular screws and rods “as much as possible” for posterior impingement reduction.
• Rods curved in lordotic shape in the lumbar spine for sagittal balance preservation.
• Anterior expandable cage expansion “until feeling strong resistance” for further construct stabilization.
Posterior Impingement

360º Stabilized Segment with an expandable cage + screws and rods distraction
Prone position surgical technique under fluoroscopic control
PRONE POSITION
POSITIONAL LUMBAR DISTRACTION
TRANSPEDICULAR LUMBAR DISTRACTION
EXPANDABLE CAGE INSERTION
EXPANDABLE CAGE EXPANSION AND FIXATION
Transforaminal Interbody fusion cage

Percutaneous transpedicular screws

scar tissue

DBM+HA

Revision Surgery Strategies
Kyphoplasty

Fenestrated transpedicular screws

Revision Surgery Strategies
POSTOPERATIVE INSTABILITY

• Instability after posterior decompression surgery
• Broken posterolateral bonegraft arthrodesis
• Transpedicular screw loosening
• Adjacent segment syndrome
Case I

• Male
• 40 years old
• Previous L3-L4-L5 laminotomy due to central stenosis 3 years ago
• Severe leg pain
• VAS = 9; ODI = 40
- Male, 40 years old
- Severe central stenosis L3-L4 and L4-L5
- Previous decompression surgery 3 years ago
Severe LBP; VAS = 9 ; ODI = 35

Left leg irradiated pain

CSF stop image in mielography
PEEK cage filled with BMP-2 and β TCP
L4-L5  PEEK cage markers
L4-L5  PEEK cage markers
Left rod

Right rod
Dynabolt
Dynamic fixation
Rigid fixation
TLIF

Dynamic
Dynamic
PEEK cage
Pre-op pain evaluation:
VAS leg = 9 ; ODI = 40/50

After 2 years follow-up:
VAS leg = 0; ODI = 6/50
Case II

• Female
• 60 years old
• Three times previously operated one year ago with L3-S1 posterior decompression and unilateral screws and rod fixation, withdrawn because implant intolerance.
• L4-L5 grade II spondylolisthesis
• Longitude with cemented fenestrated screws L3-L4-L5-S1 + PMMA bone cement
Spondylolisthesis L4-L5 grade II in standing
Spondylolisthesis L4-L5 reduced in supine position

Pre-op
Percutaneous transpedicular multilevel screw fixation system by Medtronic
Fenestrated screws with PMMA
Case III

- Male
- 70 years old
- Flat Back syndrom.
- DDD L5-S1 with LBP and bilateral irradiated leg and buttock pain.
- Prior posterior decompression L4-L5-S1 done 1 year before.
Opticage by Interventional Spine

Percutaneous transforaminal expandable titanium cage
Percutaneous transpedicular multilevel screw fixation system by Medtronic
Percutaneous Posterior fixation with Longitude by Medtronic
Percutaneous Posterior fixation with Longitude by Medtronic
Opticage in L5-S1
Posterior fixation with Longitude system by Medtronic
POSTOPERATIVE INSTABILITY

- Instability after posterior decompression surgery
- Broken posterolateral bonegraft arthrodesis
- Transpedicular screw loosening
- Adjacent segment syndrome
Case IV

- Female
- 76 years old
- Prior decompression 4 years ago and reintervention with bone graft posterior fusion 2 years ago.
- Right leg paresia
- Arthrodesis broken at L3-L4
- Spondylolisthesis L3-L4
- EMG = L5 and S1 right side old neural injury
Spondylolisthesis L3-L4
Broken arthrodesis at L3-L4
izquierda
POSTOPERATIVE INSTABILITY

• Instability after posterior decompression surgery
• Broken posterolateral bonegraft arthrodesis
• Transpedicular screw loosening
• Adjacent segment syndrome
Case V

- Female
- 63 years old
- Spondylolisthesis L4-L5 grade II
- Previous posterior decompression surgery 2 years ago with posterior fixation.
- Screw loosening
Central stenosis at L4-L5 level with left foraminal stenosis and spondylolisthesis grade I.
After decompression surgery:
Lumbar AP radiograph showing bone removal and in the lateral Xray a grade II spondylolisthesis.
CT scan with grade II spondylolisthesis
Bilateral spondylolysis due to excess removal of lamina at L4-L5 level.
Pre-op: screw halo sign
PEEK cage in L4-L5

Post-op
Nov. 2012

Follow-up = 3 years
Case VI

- Female
- 33 years old
- Left leg irradiated pain with S1 numbness
- Severe low back pain (\(\text{VAS}_{\text{back}} = 9\), ODI = 33)
- Posterior fixation at L4-L5-S1 done 3 years before
- Evidence of bone fusion only at L4-L5
- Residual instability at L5-S1 (at the non-fused segment)
Bone resorption halo sign at S1 left screw
Old posterior fixation screw system + new expandable cage in L5-S1
Post-op CT-Scan control
Pre-op disc height of 8 mm

Post-op disc height of 12 mm.
Follow-up = 1.5 years
POSTOPERATIVE INSTABILITY

- Instability after posterior decompression surgery
- Broken posterolateral bonegraft arthrodesis
- Transpedicular screw loosening
- Adjacent segment syndrome
Case VII

- Male
- 62 years old
- Arthrodesis at L3-L4-L5 with bone graft and laminectomy 22 years ago.
- DDD L2-L3 with unstable adjacent segment syndrome.
- Pre-op: $\text{VAS}_{\text{back}} = 7$, $\text{VAS}_{\text{leg}} = 10$; ODI = 37/50
Unstable DDD segment at L2-L3
Percutaneous transfacet compression screws + expandable cage for 360° interbody fusion

Opticage + Perpos screws by Interventional Spine
Peri-op Fluoro X-ray final control

Expandable cage with transfacet screws to avoid vertebral rotation

© Dr. Rudolf Morgenstern, CM Teknon, 2011
Opticage in a perfect central position.
Opticage placed at L2-L3
Case VIII

- Female
- 71 years old
- PLIF with posterior fixation L3-L4, L4-L5, L5-S1 with posterior decompression due to a central stenosis in 2008.
- Adjacent segment syndrome D12-L1, L1-L2, L2-L3.
- LBP with right radiated pain.
Percutaneous posterior fixation connected to the old system.
Opticage at L2-L3 with lumbar lordosis restoration.
Case IX

- Female
- Severe osteoporosis
- Burst fracture L4
- Hiperlordotic lumbar collapse
- Kiphoplasty + posterior percutaneous fixation with fenestrated screws + PMMA bone cement
L4 burst fracture
L4 kyphoplasty with hyperlordosis
new L1 fracture 3 months later

BUT !!!
Longitude T11-T12 with connecting rods
T10 kyphoplasty

L1 kyphoplasty
THANK YOU FOR YOUR ATTENTION