



Revision Spinal Surgery

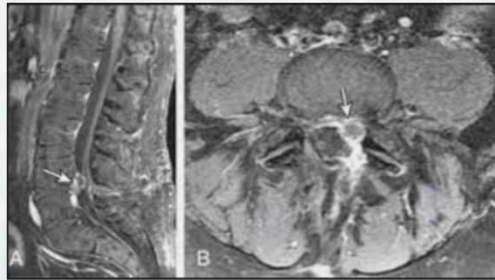
Etiology & Prevention

DR. SAEED SAEEDINIA

Neurosurgeon/Spine Fellowship

Etiology

- Residual Stenosis or Recurrent Disc Herniation
- Adjacent Segment Pathology
- Pseudarthrosis
- Implant Failure
- Flat back Syndrome
- Wound Complications (Healing Issues/Infection)



Residual Stenosis
or
Recurrent Disc Herniation

Epidemiology

- A common indication for revision surgery
- Radiographic evidence of recurrent disc herniations occurs in up to 23.1%
- Symptomatic recurrent disc herniations approximately 10.2%
- 30% of patients undergoing lumbar decompression underwent reoperation with long-term follow-up for symptomatic stenosis involving the index or adjacent levels

Risk Factors

- Obesity (BMI over 30)
- Smoking
- Diabetes
- The extent of discectomy

Indications For Fusion

- (AANS) / (CNS) Joint Guidelines statement on isolated recurrent lumbar disc herniation with radiculopathy recommends revision microdiscectomy surgery without fusion.
- The indications for fusion:
 1. Segmental instability (defined as anterolisthesis of $>3\text{mm}$ on flexion/extension films with or without focal kyphosis of 5 degrees)
 2. Chronic mechanical/axial low back pain.
- In the absence of overt lumbar instability, there is data that suggests no significant difference in treatment-related outcomes and complications between repeat microdiscectomy versus fusion for a first-time recurrent disc herniation.



Adjacent Segment Pathology

Spectrum Of Adjacent Segment Pathology

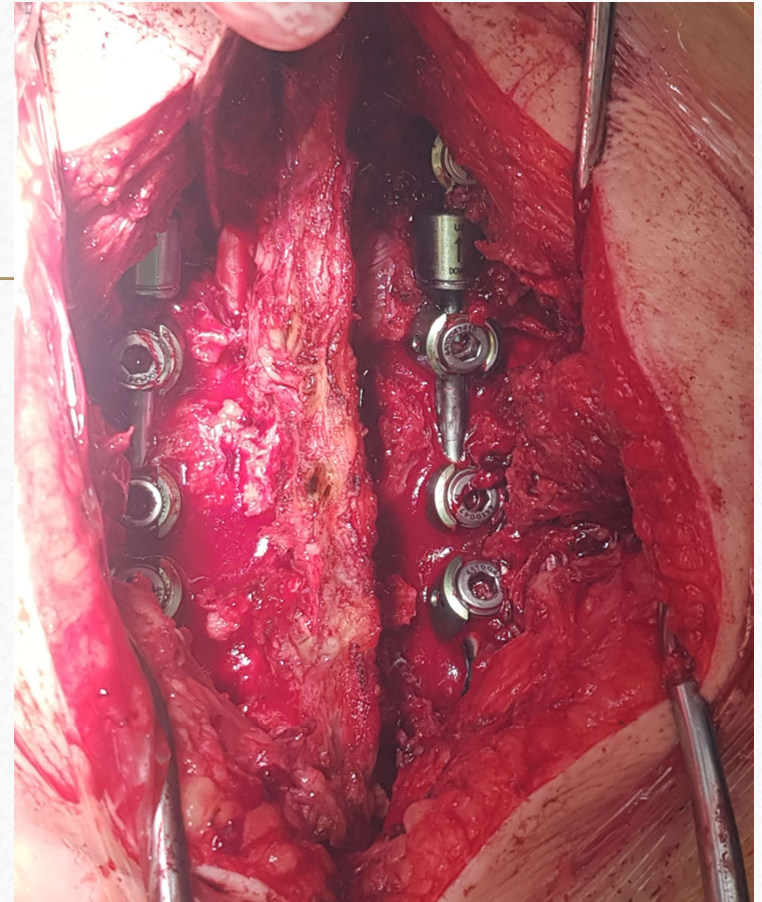
- Adjacent segment degeneration (ASDeg)
- Adjacent segment disease (ASD)
- Proximal junctional kyphosis (PJK)
- Proximal junctional failure (PJF)

Risk Factors

- Age
- Surgical approach
- Existing deformity (sagittal imbalance/PI-LL > 10 degrees)
- Decompression adjacent to a fusion construct
- Ending the fusion at the apex of a deformity
- Preexisting adjacent segment spondylosis
- Less consistent associations :obesity, bone density, length of fusion, gender, smoking status

Prevention

- Avoid of destabilizing maneuvers:
 - Disruption of the posterior tension band (i.e., the supraspinous/interspinous ligaments and ligamenta flava) during decompression
 - Disruption of the superior facet during pedicle screw placement



Prevention

- Devices to prevent ASD:
 1. Interspinous devices: Coflex (Paradigm Spine), Wallis(Zimmer), DIAM(Medtronic)
 2. Dynamic stabilization: Dynesys(Zimmer)
 3. Hybrid, or “topping-off” technique



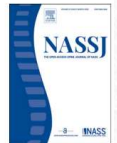
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journal homepage: www.elsevier.com/locate/xnsj



Systematic Reviews /Meta-analyses

Comparison of long-term outcomes of spinal fusion surgeries supplemented with “topping-off” implants in lumbar degenerative diseases: A systematic review and network meta-analysis

Katie Chiou^a, Yi-Chia Chiu^b, Ching-Yu Lee^{c,d}, Tsung-Jen Huang^{c,d}, Yi-Ching Lai^e, Chia-Ju Yang^f, Jason C. Hsu^{g,h,i,j,*}, Meng-Huang Wu^{c,d,k,*}





Pseudarthrosis

Pseudarthrosis

- False joint or nonunion, following arthrodesis surgery
- Radiographic diagnosis usually based on x-rays or CT imaging
- A haloing effect may be present around the screws



Etiology

- Inadequate decortication
- Poor bone remodeling at the molecular level
- A limited bony surface
- Significant motion despite instrumentation
- Smoking
- Poor nutrition

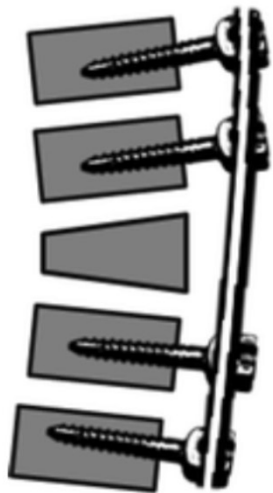
Common Levels Of Pseudoarthrosis

- At the level of:
- Three column osteotomies
- Infected spines
- Fractured rods
- L5/S1

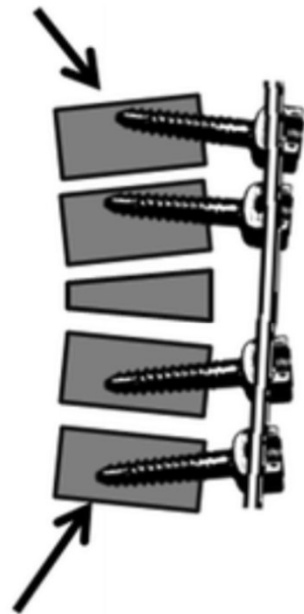


Implant Failure

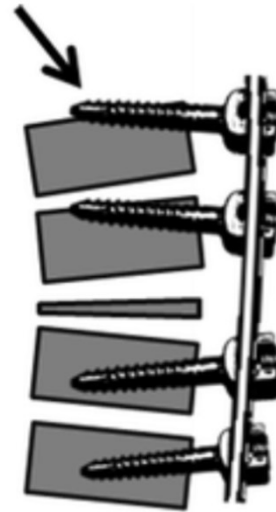
Okamoto Definition



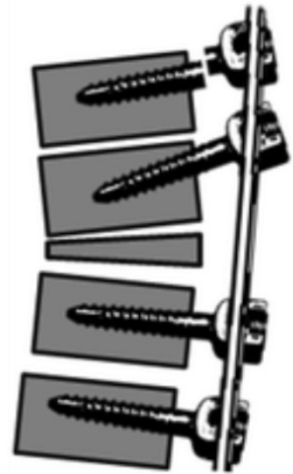
A



B



C



D

Definition

- With respect to cage or interbody device placement, subsidence, migration, collapse, or breakage are additional types of implant failures.
- Implant failure may be seen in both short- and long-term follow-up.

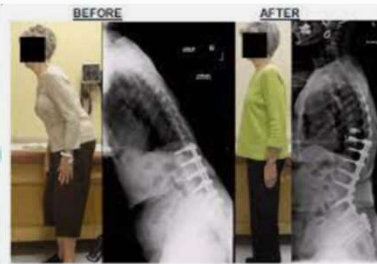
Timing

Early Implant Failure

- <3months
- Etiology:
 - Poor bone quality
 - Poor preoperative planning

Delayed Implant Failure

- Occurring within 12 months before arthrodesis was expected
 - Found with pseudarthrosis
 - Rod fracture



Flat back Syndrome

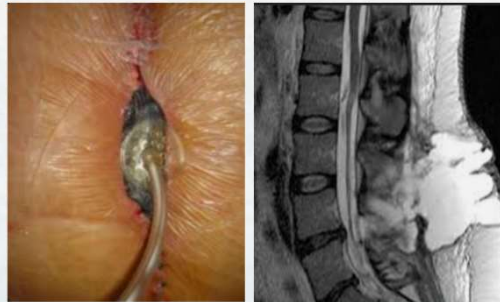
Flat Back Syndrome

- Loss of normal lumbar lordosis
- Result in a pelvic incidence and lumbar lordosis mismatch
- Iatrogenic flat back syndrome:
 - Inadequate lumbar lordosis induced into a surgical construct
 - Adjacent segment degeneration with disc space collapse and loss of lordosis at unfused lumbar segments
 - TLIF may lead to loss of segmental lordosis, resulting in flat back syndrome
 - Harrington rod placement

Management

- The most common indication for intervention is significant impairment of quality of life.
- Additional indications for surgery include symptomatic lumbar stenosis with radiculopathy or neurogenic claudication.
- Decision to operate must include an appropriate evaluation of age, comorbidity status, bone density, and the tolerance of the patient and family for the high-risk flat back deformity correction.





Wound Complications

Wound Complications

- One of the most common indications for revision lumbar spine surgery

- Wound infection

- CSF leakage

Wound Infection

[Journal List](#) > [Surg Neurol Int](#) > [v.6; 2015](#) > PMC4596055

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The incidence and risk factors for surgical site infection after clean spinal operations: A prospective cohort study and review of the literature

[Saeed Saeedinia](#), [Mohsen Nouri](#),¹ [Amir Azarhomayoun](#), [Hamed Hanif](#), [Abolghasem Mortazavi](#), [Parisa Bahramian](#),²
[Kourosh Karimi Yarandi](#), and [Abbas Amirjamshidi](#)*

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CSF leakage

- 8% to 9% overall risk of durotomy during lumbar surgery
- In revision lumbar cases 13% to 21%
- Primary repair of durotomies during the index surgery is the preferred strategy
- An augmented closure utilizing fibrin glue, collagen matrix, or muscle graft can be an effective strategy
- Lumbar subarachnoid drain trial
- Surgical exploration