Interventional Management of Back Pain

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AXIS SPINE CENTER

A DIVISION OF NORTHWEST SPECIALTY HOSPITAL
PROUDLY OWNED AND OPERATED BY PHYSICIANS

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Disclosures

- **Globus – Education**

- **I do spine surgery.**

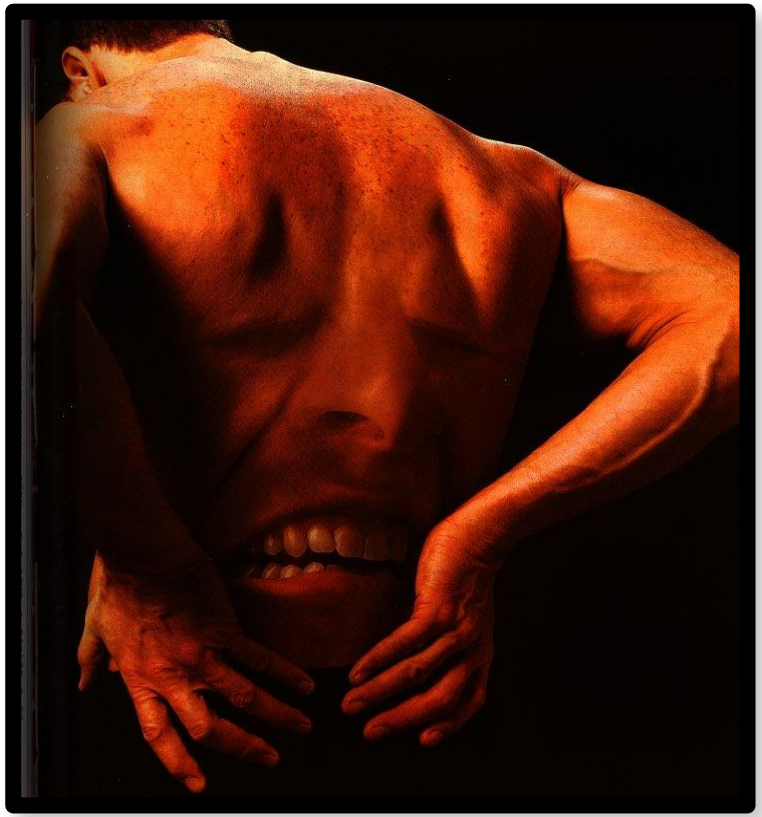
Goals

- Review the process of ESI's, SCS, and spinal fusion
- Patient criteria and expected outcomes
- Evidence based management of patients



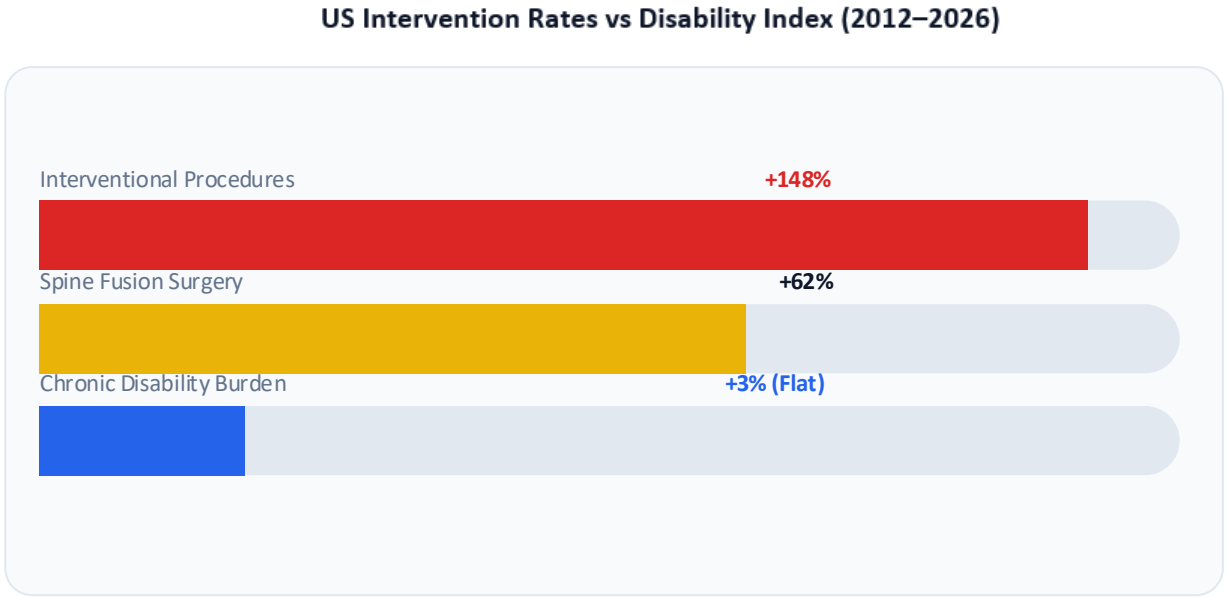
LBP Epidemiology

- **85% of adults < 50 (Annual Prevalence of 50%)**
- **3rd most expensive disorder (cancer, cardiac)**
- **Most expensive work-related disorder**
- **Most common disability in persons < 45**
- **Only 10-20% have precise diagnosis**



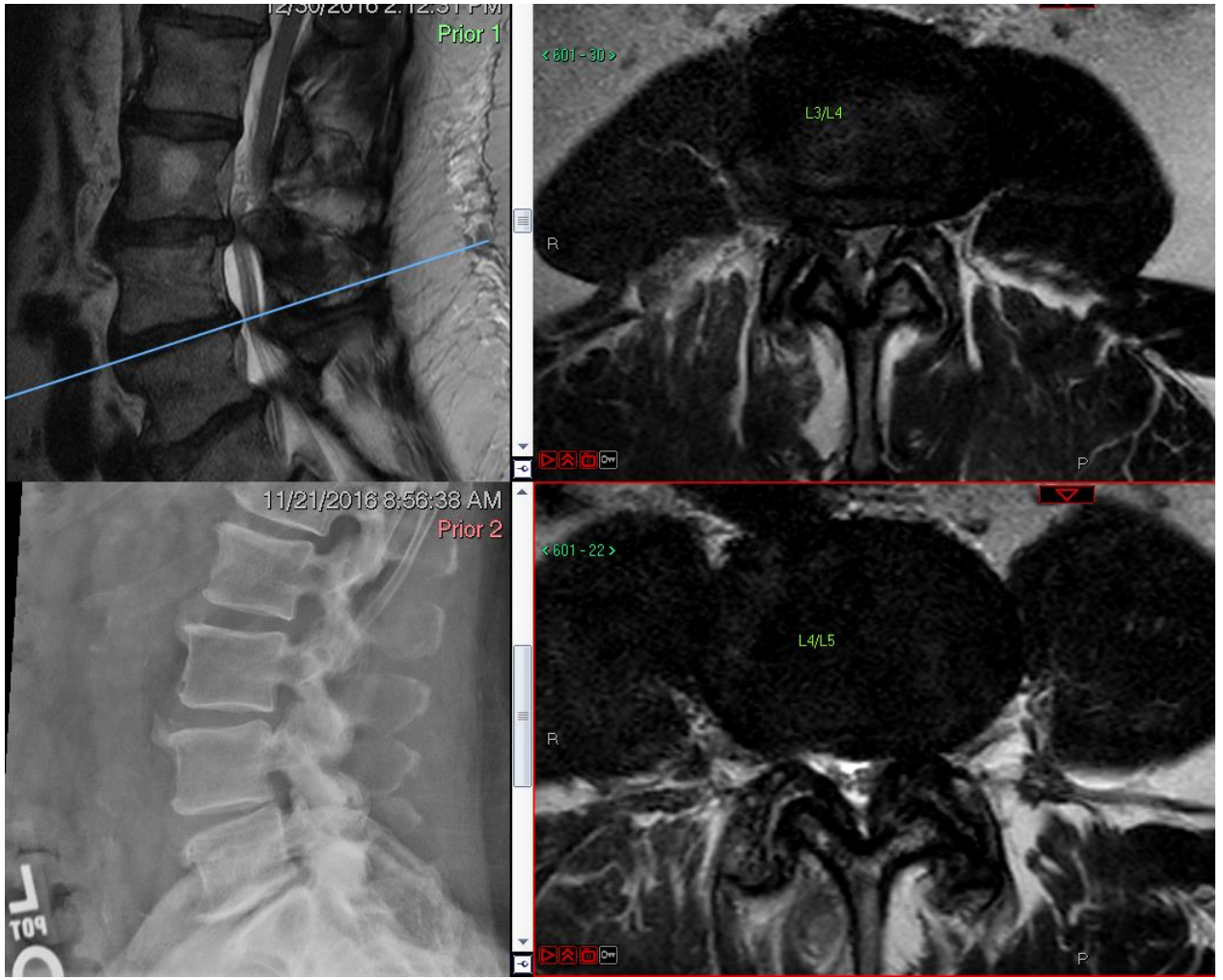
Why Back Pain Matters

- 90% of LBP is non-specific
- Acute LBP: 72% recover at 12m
- Chronic LBP: 42% recover at 12m
- Interventions require identified pain source
- Interventions follow failed conservative care
- US leads injection and fusion rates
- High utilization without reduced disability



Degenerative Spine Disease

- Intervertebral disc derangement
  - spondylosis, stenosis, spondylolisthesis
- Genetic
- Age related to increasing lumbar disk degen
- Past history related to back pain
- Smoking related to lumbar disk degen
- Obesity related to lower back pain



Imaging of Lumbar Degeneration

- 98 asymptomatic vs 27 symptomatic volunteers aged 20-80 underwent MRI

	Bulge	Protrusion	Extrusion
	no. of subjects (%)		
Evaluator 1			
Asymptomatic subjects	52 (53)	30 (31)	2 (2)
Symptomatic subjects	23 (85)	14 (52)	8 (30)
Evaluator 2			
Asymptomatic subjects	50 (51)	23 (23)	0
Symptomatic subjects	18 (67)	15 (56)	6 (22)
Average of the two evaluators			
Asymptomatic subjects	51 (52)	26.5 (27)	1 (1)
Symptomatic subjects	20.5 (76)	14.5 (54)	7 (26)

*Bulge, protrusion, and extrusion are defined in the Methods section.

- 7-year follow-up with 67 asymptomatic volunteers
- Imaging not predictive of LBP
- (Jensen et al. NEJM. 1994, Borenstein et al. JBJS. 2001)

Age (yr)	Location of Bulge					Bulge at Least at One Level
	L1–2	L2–3	L3–4	L4–5	L5–S1	
	no. of subjects					*no. of subjects (%)*
20–29 (n = 20)	0/0	0/0	4/0	5/2	4/2	7/4 (35/20)
30–39 (n = 28)	2/1	1/1	4/1	6/8	4/3	11/9 (39/32)
40–49 (n = 23)	1/0	1/2	3/8	7/10	5/8	13/15 (57/65)
50–59 (n = 17)	3/3	5/4	10/8	9/6	12/9	13/14 (76/82)
≥60 (n = 10)	0/1	1/4	4/5	5/6	4/5	8/8 (80/80)
Total (n = 98)	6/5	8/11	25/22	32/32	29/27	52/50 (53/51)

*For each pair of data, the first number refers to the first evaluator's result, and the second number to the second evaluator's result.

Interventional Management of Back Pain

- Process, patient selection, outcomes, evidence
- ESI, spinal cord stimulation, fusion
- Build one shared mental care model
- Align GP, PT, DC, IPM, surgery
- Focus on appropriate referral timing
- Selection drives outcomes across disciplines



The Care Continuum

- Foundation: active rehab and education
- First-line: exercise, CBT, multimodal therapy
- Adjuncts: spinal manipulation, acupuncture
- Second-line: short-term judicious pharmacology
- Interventional: ESI, RFA, neuromodulation
- Surgical: decompression and structural fusion
- Interventions augment active rehabilitation

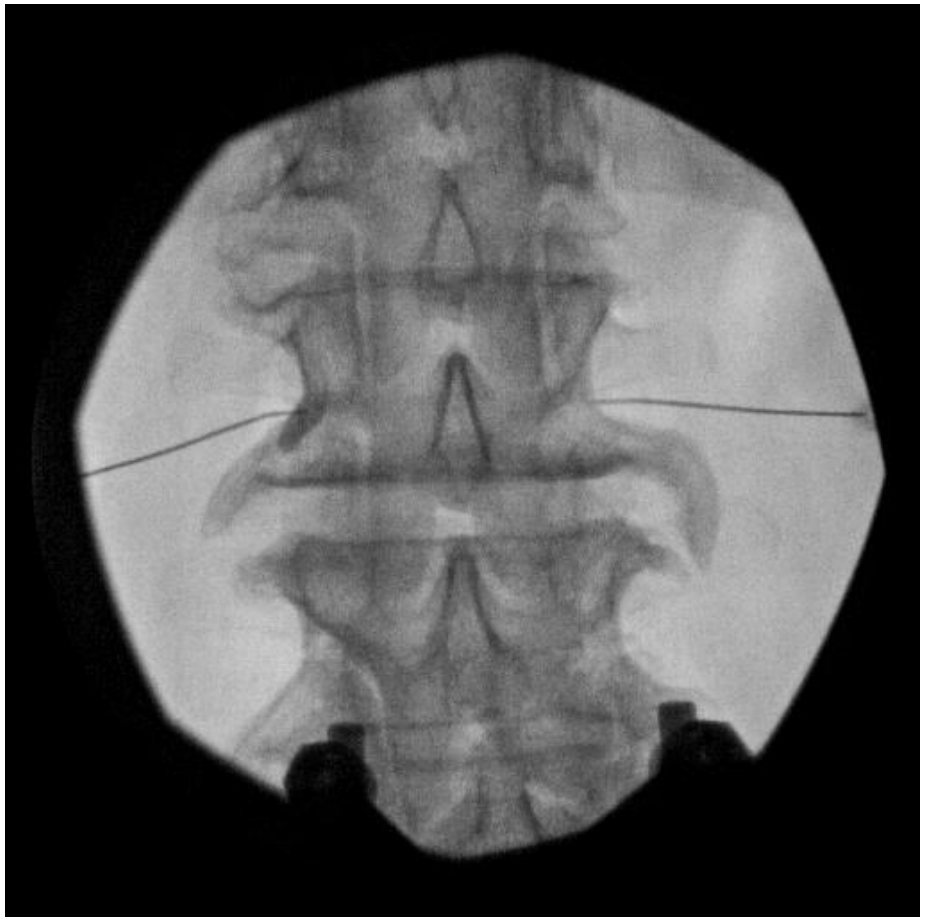
TABLE 1. DIFFERENTIAL DIAGNOSIS OF LOW BACK PAIN.*

MECHANICAL LOW BACK OR LEG PAIN (97%)†	NONMECHANICAL SPINAL CONDITIONS (ABOUT 1%)‡	VISCERAL DISEASE (2%)
Lumbar strain, sprain (70%)§	Neoplasia (0.7%)	Disease of pelvic organs
Degenerative processes of disks and facets, usually age-related (10%)	Multiple myeloma	Prostatitis
Herniated disk (4%)	Metastatic carcinoma	Endometriosis
Spinal stenosis (3%)	Lymphoma and leukemia	Chronic pelvic inflammatory disease
Osteoporotic compression fracture (4%)	Spinal cord tumors	Renal disease
Spondylolisthesis (2%)	Retroperitoneal tumors	Nephrolithiasis
Traumatic fracture (<1%)	Primary vertebral tumors	Pyelonephritis
Congenital disease (<1%)	Infection (0.01%)	Perinephric abscess
Severe kyphosis	Osteomyelitis	Aortic aneurysm
Severe scoliosis	Septic diskitis	Gastrointestinal disease
Transitional vertebrae	Paraspinous abscess	Pancreatitis
Spondylolysis¶	Epidural abscess	Cholecystitis
Internal disk disruption or diskogenic low back pain‖	*Shingles*	Penetrating ulcer
Presumed instability**	Inflammatory arthritis (often associated with HLA-B27) (0.3%)	
	Ankylosing spondylitis	
	Psoriatic spondylitis	
	Reiter's syndrome	
	Inflammatory bowel disease	
	Scheuermann's disease (osteochondrosis)	
	Paget's disease of bone	

Deyo NEJM 2001

ESI: The Process

- Therapeutic and diagnostic pain assessment
- Routes: transforaminal, interlaminar, caudal
- Image guidance with contrast mandatory
- Non-particulate steroid first for TFESI
- Particulates linked to rare neurovascular events
- Targets nerve root inflammation directly
- Temporary window for functional recovery



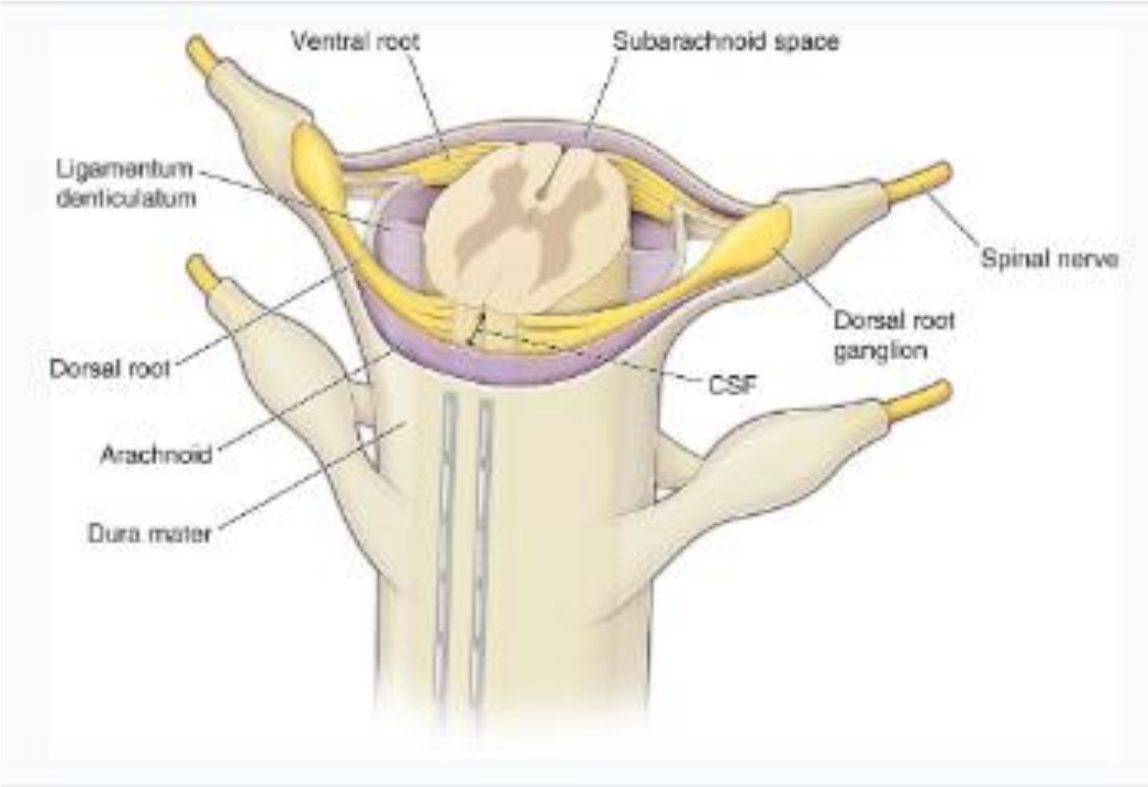
ESI: Safety and Protocol

- FDA warning: rare severe neurological risks
- Use strictly within multidisciplinary pathways
- Trained, credentialed proceduralists required
- Screen for infection and coagulopathies
- Contrast verification prevents intravascular injection
- Never stand-alone therapy for back pain
- Set realistic pre-procedure patient expectations



SCS: The Process

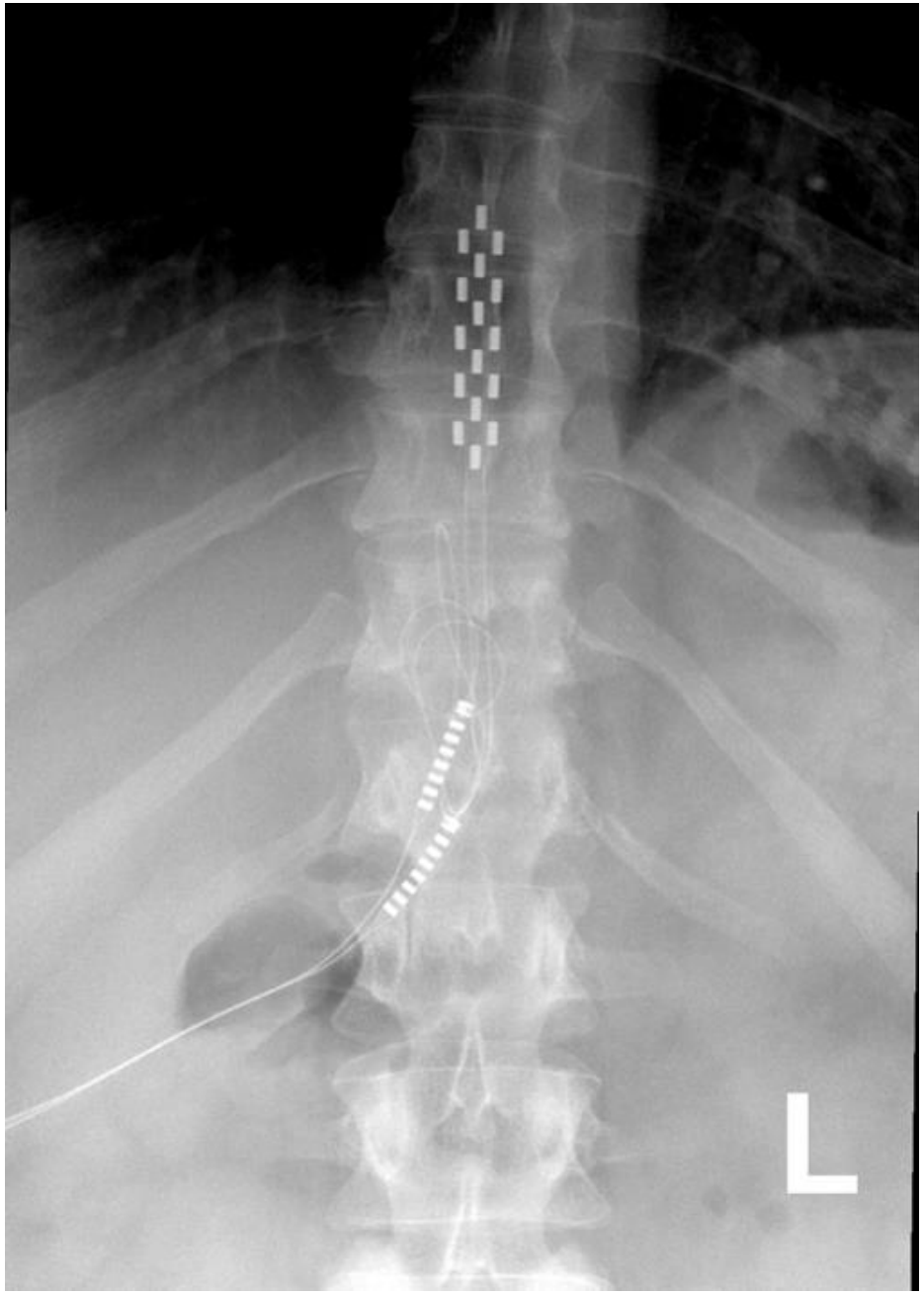
- Neuromodulation of dorsal column pathways
- Temporary trial lead precedes permanent implant
- Classic indication: post-surgical neuropathic pain
- Expanding indication: nonsurgical refractory back pain
- Platforms: 10kHz, burst, closed-loop ECAP
- DRG stimulation available for focal areas
- Reversible and adjustable therapy platform



Percutaneous Epidural Lead Placement over Dorsal Columns

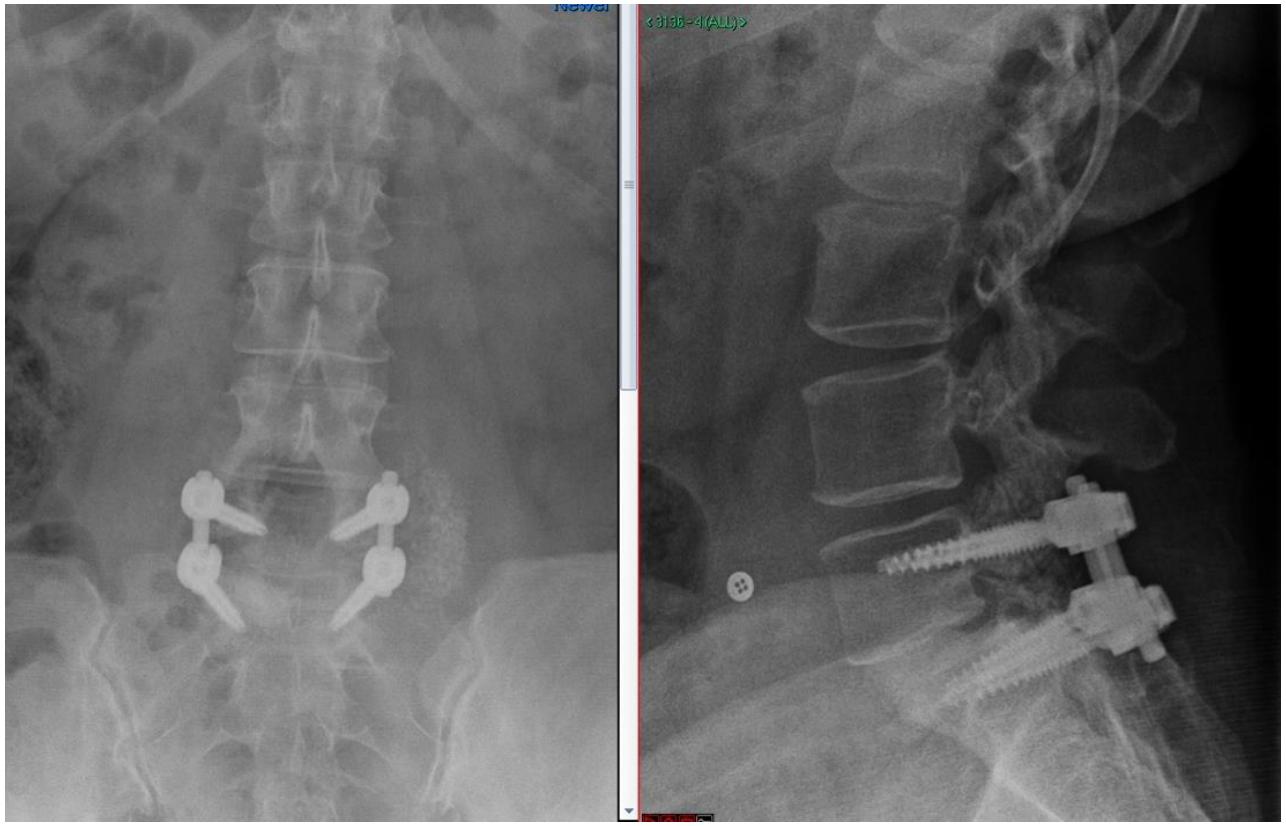
SCS: Safety and Evidence

- Infection risk may require system explant
- Lead migration and rare nerve injury
- SOLIS trial: 3.6% explant rate
- Adverse events in 8-29% overall
- Trials limited by industry sponsorship
- Blinding challenges exist in neuromodulation
- Careful trial evaluation ensures success



Fusion: The Process

- Arthrodesis stabilizes unstable motion segments
- Approaches: ALIF, PLIF, TLIF, instrumentation
- Technique complexity adds cost and risk
- Fusion differs fundamentally from decompression
- Stenosis alone: decompression usually sufficient
- Requires structural instability or deformity
- Demands rigorous preoperative optimization



Matching Procedure-to-Problem

- ESI: radicular pain, disc herniation
- SCS: neuropathic or refractory back pain
- Decompression: radiculopathy and spinal stenosis
- Fusion: mechanical instability and spondylolisthesis
- Misdiagnosis leads to procedure failure
- Match specific pathology to intervention
- Multidisciplinary consensus improves accuracy



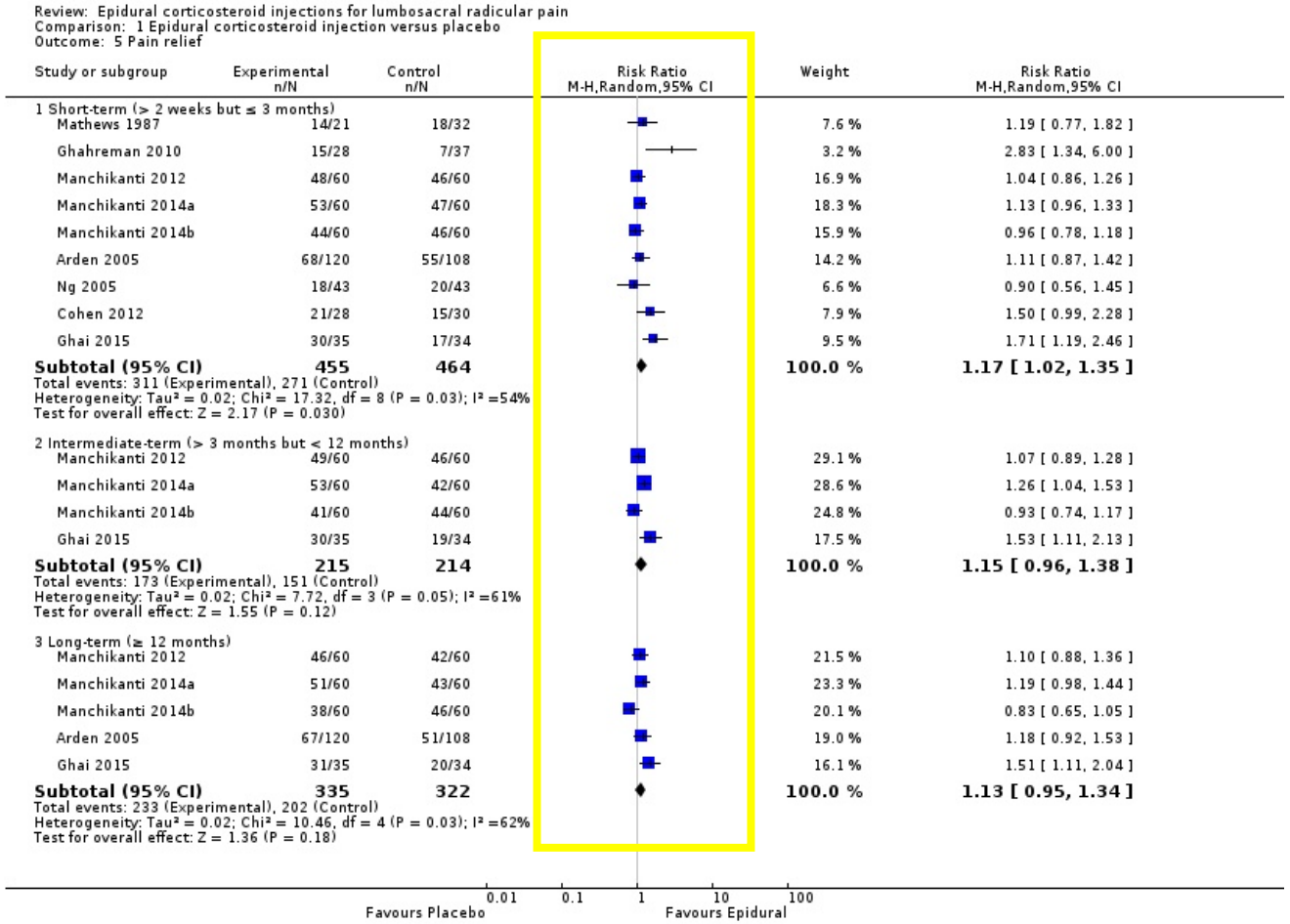
The Ideal Candidate

- Pain matches neuroanatomy and imaging
- Exhausted appropriate conservative care options
- Minimal psychosocial confounders or secondary gain
- Low baseline chronic opioid consumption
- Absence of dominant central sensitization
- Realistic expectations regarding treatment goals
- Selection drives outcomes across all modalities



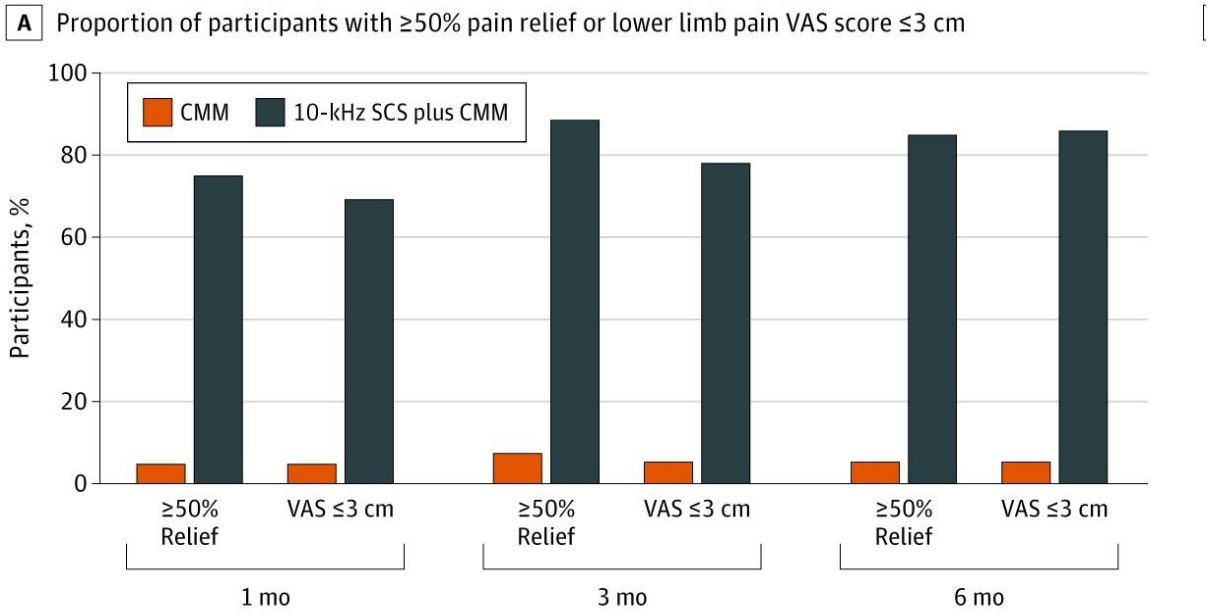
ESI: Criteria and Outcomes

- Best results: acute lumbar radicular pain
- Moderate efficacy: spinal canal stenosis
- Weakest efficacy: non-specific axial pain
- Benefit magnitude is small to moderate
- Duration typically temporary (weeks to months)
- Serial injections provide temporary rehabilitation window
- Does not reliably prevent future surgery



SCS: Criteria and Outcomes

- Indicated: refractory neuropathic pain after trial
- SOLIS trial: 89.5% success vs CMM
- Oswestry Disability Index improved significantly (27 vs 7)
- Closed-loop SCS: 79% achieved >=50% relief
- Opioid reduction achieved in 50% patients
- Limited independent sham-controlled trial data
- Selection determines long-term success



Kapural et al, JAMA Neurol. June 1, 2021

SCS: Longitudinal Outcomes

- Sustained pain reduction over two years
- Functional disability improvements maintained
- Quality of life scales show durability
- Requires ongoing device programming maintenance
- Patient education on battery management critical
- Real-world cohort data supports long-term benefit
- Multidisciplinary follow-up optimizes outcomes



Adapted from Thomson et al., Pain Ther 2021

Patel et al. 73% VAS and 82% Response, plateau at 6m

Lumbar Fusion – NASS

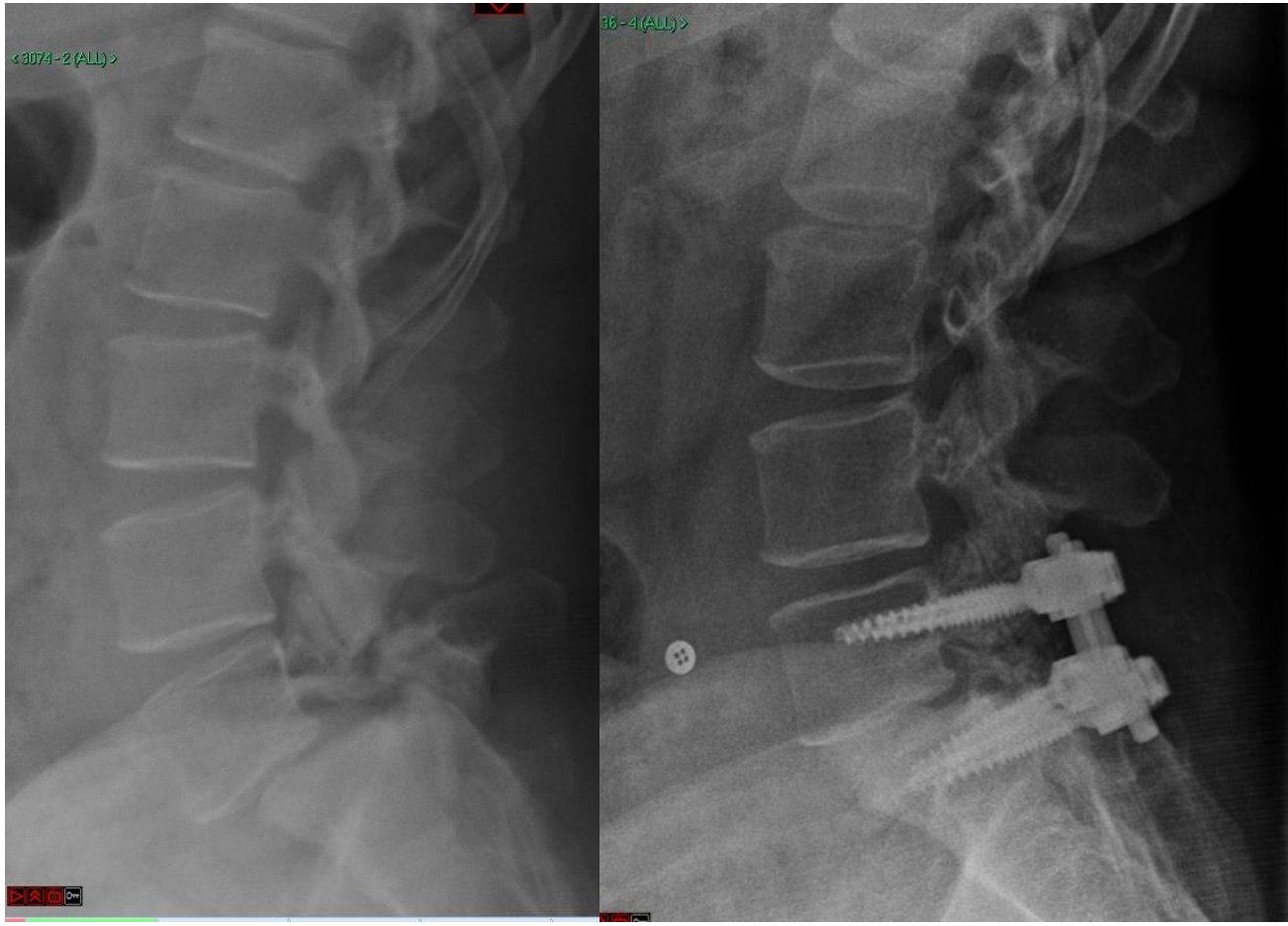
- Stenosis, central/foraminal
  - 2mm dynamic instab
  - Isthmic/degen spondy
  - Recurrent stenosis
  - Stenosis adj to fusion
- Herniation
  - Far lateral at L5/S1
  - Foraminal
  - Recurrent
  - Primary at cord level
- Synovial Facet Cyst

- Discogenic LBP
  - Adv single level disease, pri c/o LBP +/- leg pain
    - Modic changes
    - Other levels nl XR and nl/min MR
  - 6 months treatment
    - PT/exer, IPM, DC/DO
  - Psych conditions managed
- Deformity
  - 5cm sagittal/coronal imbalance
  - 10deg curve progression
  - 30deg coronal curve

Also, tumor, trauma, infection resulting in instability

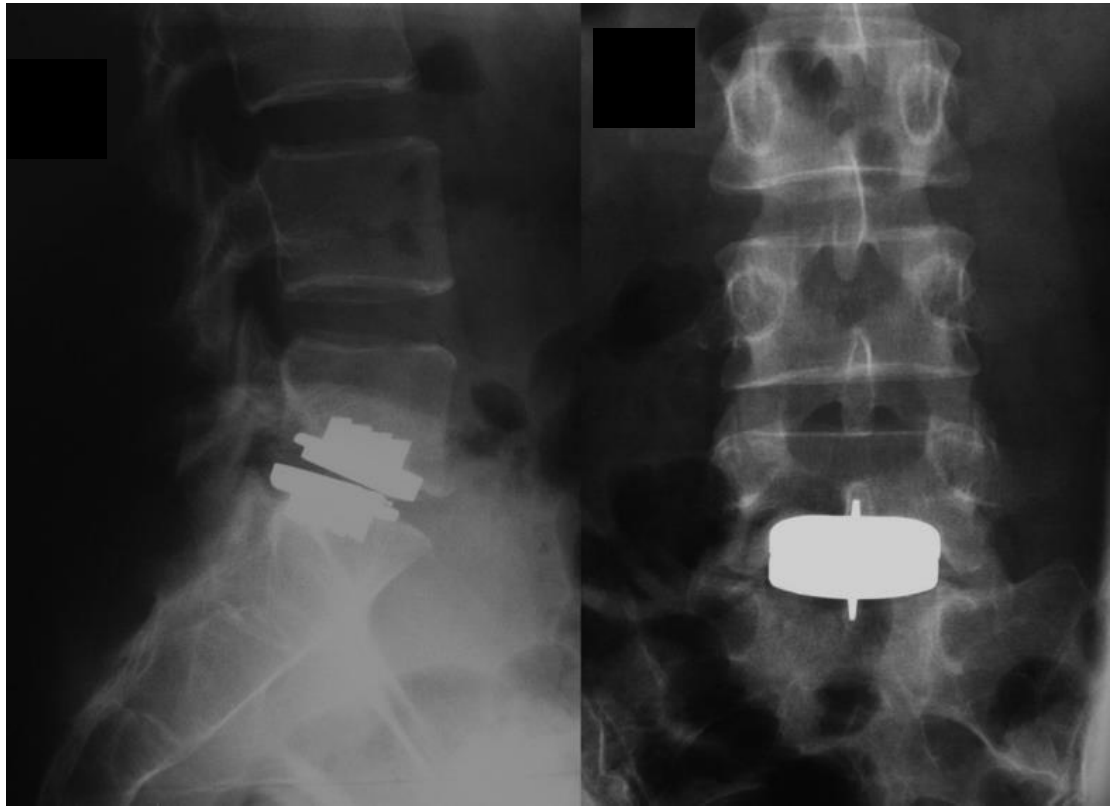
Fusion: Criteria and Outcomes

- Clearest indication: mechanical instability, spondylolisthesis
- Instability definition: >=5mm translation, >=20 deg angulation
- Non-specific axial LBP: fusion not recommended
- Outcomes for axial pain match intensive rehab
- Higher complication rates than non-operative care
- Worse outcomes in workers compensation population
- Failed back surgery syndrome: 10-40% prevalence



Lumbar Artificial Disk Replacement

- Adv 1-2 level disease, L3-S1
  - Primary c/o LBP +/- leg pain
  - Modic changes
  - Other levels nl XR and nl/min MR
- 6 months treatment
  - PT/exercise, IPM, DC/DO
- Psych conditions managed
- 18-60y/o w/o sig facet degen



42F c/o LBP to bilat post thighs, 85/15







What “Success” Looks Like

- ESI: temporary relief enabling active rehabilitation
- SCS: durable pain reduction, improved function
- Fusion: structural stability and deformity correction
- Axial LBP fusion matches intensive rehab
- Shared decision-making prior to referral
- Unified message across all provider disciplines
- Clear goals prevent patient dissatisfaction



What the Evidence Shows

- BMJ Review: 81 trials, 7,977 patients
- Procedures vs sham: variable long-term difference
- Epidural for axial pain: no sham benefit
- RFA: limited benefit without diagnostic blocks
- Societal guidelines and systematic reviews differ
- Transparent discussion of evidence with patients
- Evidence favors targeted, concordant intervention

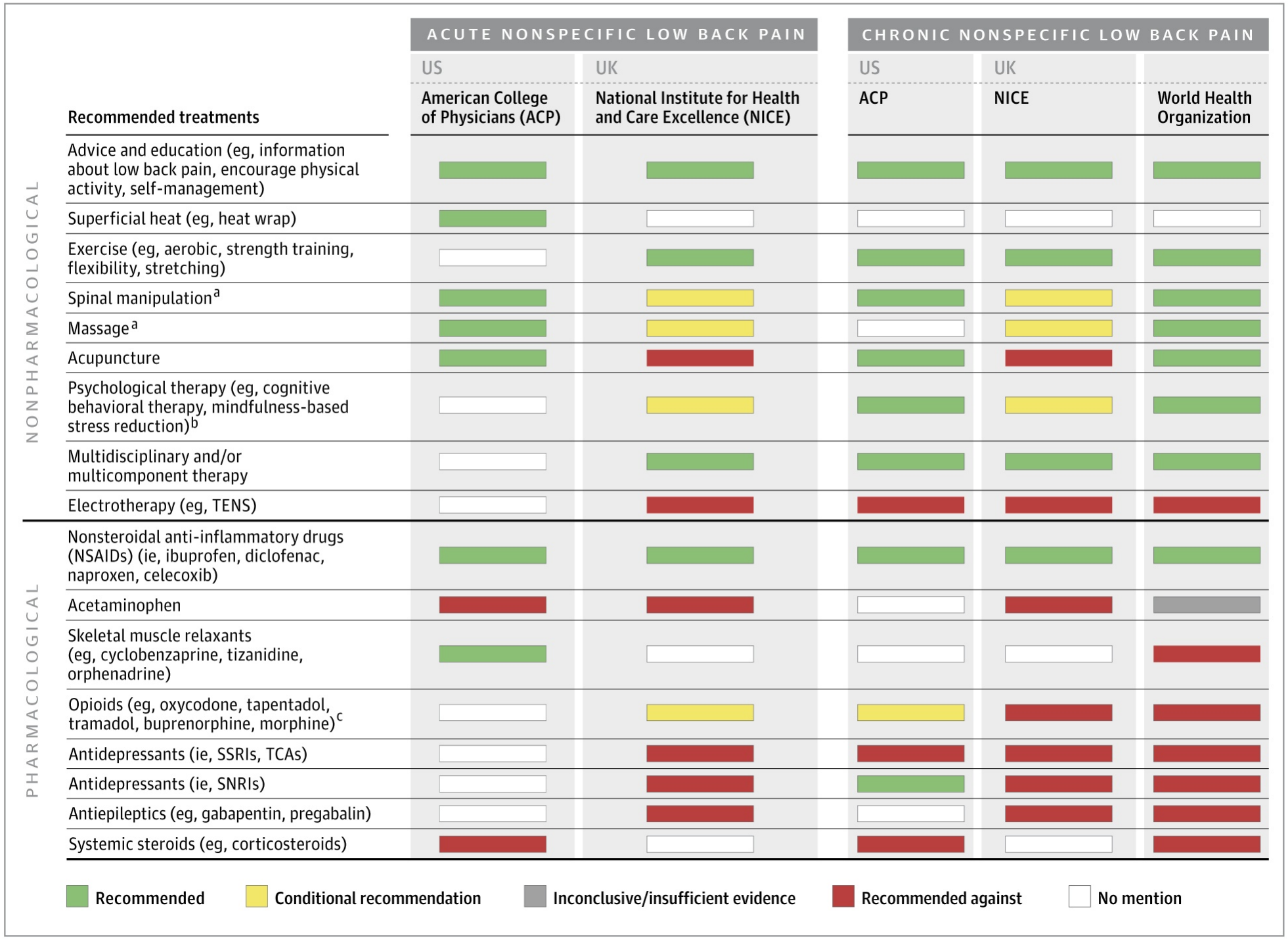
Procedure	WMD vs sham (10 cm VAS)	95% CI	Certainty
Epidural local anaesthetic	+0.28	−1.18 to 1.75	Moderate
Epidural local anaesthetic + steroid	+0.2	−1.11 to 1.51	Moderate
Joint-targeted steroid injection	+0.83	−0.26 to 1.93	Moderate
Epidural steroid injection	+0.39	−0.94 to 1.71	Low
Joint-targeted local anaesthetic	+0.63	−0.57 to 1.83	Low
Joint-targeted LA + steroid	+0.22	−0.42 to 0.87	Low
Intramuscular LA	−0.53	−1.97 to 0.92	Low
Intramuscular LA + steroid	+1.82 (↑ pain)	−0.29 to 3.93	Low

Positive numbers favor sham

First-Line Care is Evidence Based

- Exercise therapy: moderate-certainty long-term benefit
- Psychological support: CBT, pain education, mindfulness
- Multidisciplinary rehab beats single-modality care
- Short-term relief: spinal manipulation, acupuncture
- Insufficient evidence: TENS, traction, ultrasound
- Active therapies outperform passive treatments
- Rehabilitation forms backbone of spine care

Intervention	Evidence Strength	Clinical Durability
Exercise	🟢 Moderate	🟡 Short–intermediate
Psychological therapy	🟢 Moderate	🟢 Up to ≥12 mo (select)
Multidisciplinary (biopsychosocial)	🟢 Moderate	🟢 ≥12 mo
Cognitive sensorimotor retraining	🟢 Moderate	🟢 Up to 12 mo
Spinal manipulation	🟡 Low–moderate	🟡 Short-term
Acupuncture	🟡 Low–moderate	🟡 Short-term
Massage	🟡 Low	🟡 Short-term
Yoga	🟡 Low–moderate	🟡 Short–intermediate
Tai chi	🟡 Low	🟡 Short-term
Mindfulness stress reduction	🟡 Low–moderate	🟡 Short-term
Superficial heat	🟡 Low	🔴 Acute only
TENS / ultrasound / traction	🔴 No benefit	🔴 None


ACUTE NONSPECIFIC LOW BACK PAIN
CHRONIC NONSPECIFIC LOW BACK PAIN
US
UK
US
UK
Recommended treatments
American College of Physicians (ACP)
National Institute for Health and Care Excellence (NICE)
ACP
NICE
World Health Organization
NONPHARMACOLOGICAL
Advice and education (eg, information about low back pain, encourage physical activity, self-management)
Superficial heat (eg, heat wrap)
Exercise (eg, aerobic, strength training, flexibility, stretching)
Spinal manipulation[a]
Massage[a]
Acupuncture
Psychological therapy (eg, cognitive behavioral therapy, mindfulness-based stress reduction)[b]
Multidisciplinary and/or multicomponent therapy
Electrotherapy (eg, TENS)
PHARMACOLOGICAL
Nonsteroidal anti-inflammatory drugs (NSAIDs) (ie, ibuprofen, diclofenac, naproxen, celecoxib)
Acetaminophen
Skeletal muscle relaxants (eg, cyclobenzaprine, tizanidine, orphenadrine)
Opioids (eg, oxycodone, tapentadol, tramadol, buprenorphine, morphine)[c]
Antidepressants (ie, SSRIs, TCAs)
Antidepressants (ie, SNRIs)
Antiepileptics (eg, gabapentin, pregabalin)
Systemic steroids (eg, corticosteroids)
Recommended
Conditional recommendation
Inconclusive/insufficient evidence
Recommended against
No mention

JAMA 2026

Shared Decision Algorithm

- Stepwise care: conservative to advanced therapies
- Keyed directly to pain mechanism and anatomy
- Defined roles for every care discipline
- PCP, PT, DC lead primary rehabilitation
- Interventional pain manages targeted injections and SCS
- Surgery addresses structural instability and compression
- Continuous reassessment ensures timely referral

- **Urgent structural/neurologic emergencies**
  - → jump straight to surgery
- **Radicular pain with a concordant lesion**
  - → main elective surgical population
- **Axial nonspecific pain**
  - → stays in the conservative/rehabilitative lane almost indefinitely

Red Flags - Urgent Referral

- Immediate surgical triage: cauda equina syndrome
- Progressive motor deficit requires urgent evaluation
- Red flags: malignancy, fracture, infection
- Avoid delay surgical triage for injections

- Decompression indicated for persistent radiculopathy
- Early surgery for herniation speeds recovery
- 1-2 year outcomes converge with conservative

- **CES**
  - Acute urinary issues, saddle anesthesia, acute BLE weakness, decreased rectal tone
- **Tumor**
  - h/o cancer, ? wt loss, pain x 1 m, >50 y/o
- **Trauma**
  - Event, osteoporosis, chronic steroids
- **Infection**
  - Fever, IVDA, immunosuppression, recent surgery
- **AAA**

Each Discipline's Role

- PCP: initial triage, diagnosis, conservative care
- PT/DC: functional restoration, exercise, manipulation
- Interventional Pain: targeted diagnostic blocks, ESI, SCS
- Spine Surgery: decompression, stabilization, fusion
- Clear communication between disciplines essential
- Establish unified treatment goals with patient
- Collaborative spine teams yield superior outcomes



Bottom Line – Yes Surgery

- **Surgery first line:**
  - **Cauda Equina Syndrome**
  - **Myelopathy**

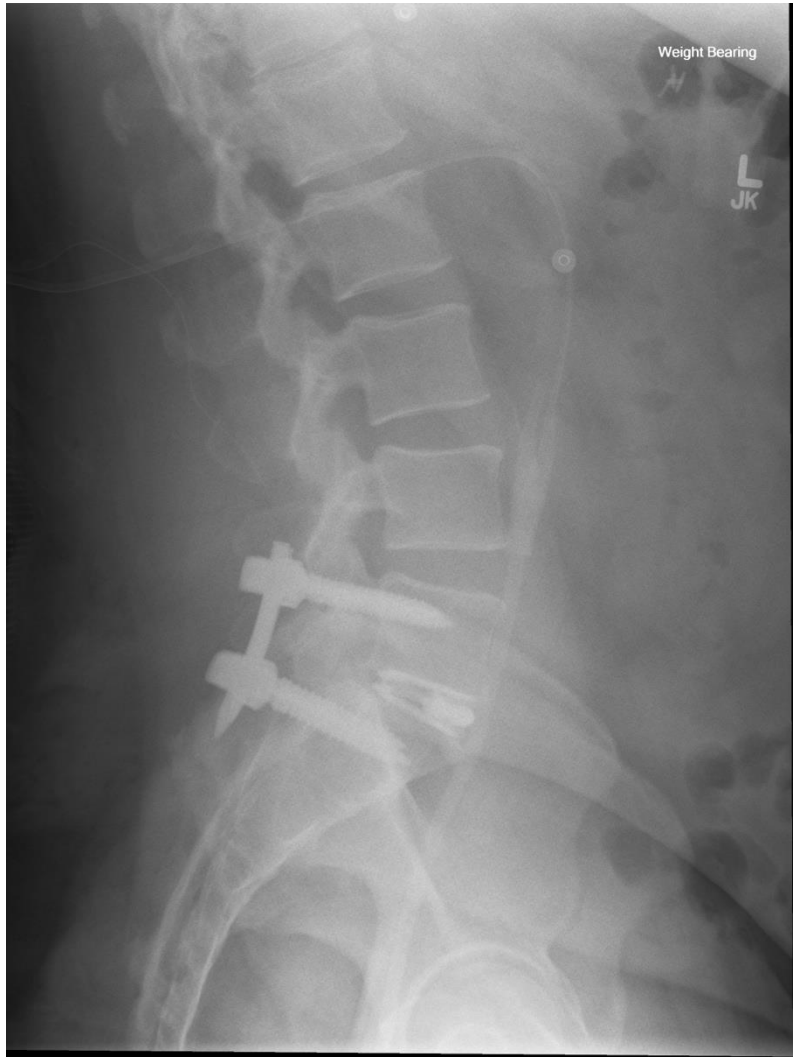
- **Surgery ok early:**
  - **Dynamic Spondy**
  - **Neurogenic Claudication**
  - **Lumbar HNP**



Bottom Line – Possible Surgery

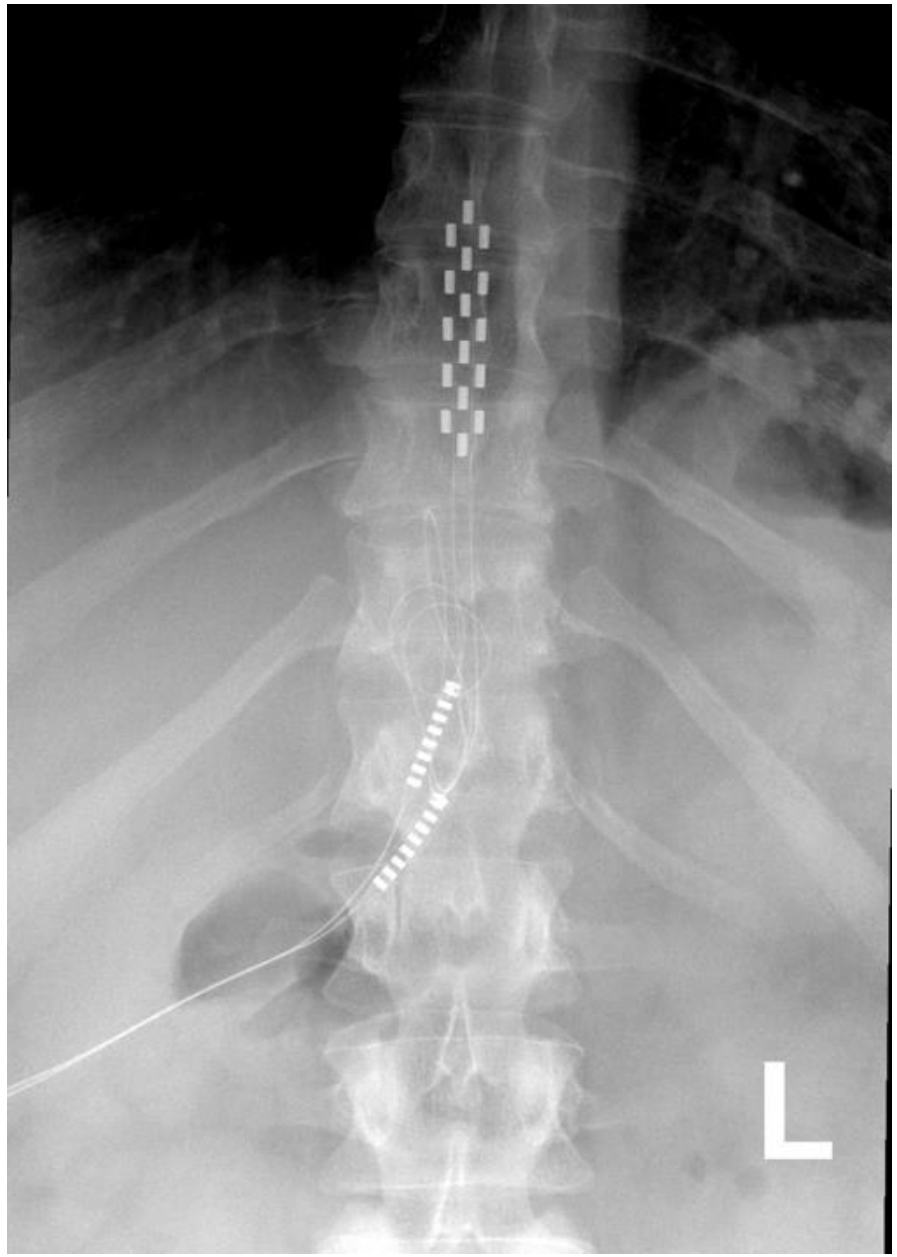
- **Surgery beneficial w corresponding imaging after fail nonop:**
  - **Cervical Radiculopathy**
  - **Stable Spondy**
  - **Deformity**
  - **Facet Cyst**

- **Surgery beneficial after extensive fail nonop:**
  - **Single Level Discogenic Back Pain**
  - **Sacroiliac Joint Dysfunction**



Bottom Line – Avoid Surgery

- **Axial pain without neural compression, instability, or deformity**
- **Lumbar HNP w/ axial pain only or no symptoms/normal PE**
- **Spinal Stenosis w/ mechanical/nonspecific LBP**
- **Disc Degen +/- annular tear w/o HNP and primary c/o LBP**



Key Takeaways

- Interventions augment active rehab, never replace
- Selection drives outcomes, not technical procedure
- Match pathology precisely to procedure choice
- ESI: radicular pain, short-term functional bridge
- SCS: durable relief for selected neuropathic pain
- Fusion: structural instability, not axial back pain
- **T**eam-based multidisciplinary care yields best outcomes



Key References

- Cashin AG et al. Low Back Pain. JAMA. 2026
- Knezevic NN et al. Low Back Pain. Lancet. 2021
- Wang X et al. Spine Interventions NMA. BMJ. 2025
- North J et al. SOLIS SCS Trial. RAPM. 2025
- Deer TR et al. Neuromodulation Consensus. J Pain Res. 2025
- Abdu WA et al. SPORT Fusion Trial. Spine. 2018
- NASS Clinical Practice Guidelines

- Chiarotto A, Koes BW. Nonspecific Low Back Pain. N Engl J Med. 2022.
- Chou R, Deyo R, Friedly J, et al. Nonpharmacologic Therapies for Low Back Pain: A Systematic Review for an American College of Physicians Clinical Practice Guideline. Ann Intern Med. 2017.
- Qaseem A, Wilt TJ, McLean RM, et al. Noninvasive Treatments for Acute, Subacute, and Chronic Low Back Pain: A Clinical Practice Guideline From the American College of Physicians. Ann Intern Med. 2017.
- Ho EK, Chen L, Simic M, et al. Psychological Interventions for Chronic, Non-Specific Low Back Pain: Systematic Review With Network Meta-Analysis. BMJ. 2022.
- Maharty DC, Hines SC, Brown RB. Chronic Low Back Pain in Adults: Evaluation and Management. Am Fam Physician. 2024.
- Rizzo RN, Cashin AG, Wand BM, et al. Non-pharmacological and non-surgical treatments for low back pain in adults: an overview of Cochrane reviews. Cochrane Database Syst Rev. 2025.
- Walter KL. What Is Low Back Pain? JAMA. 2026.

Questions?

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