Rehabilitation Status Post Spinal Fusion

The Numbers
- The likelihood of having spinal surgery in the United States is 5 times higher than that of the United Kingdom, and 2 times that of Australia, Canada and Scandinavian countries. (Linde Spine 2003)

- Although overall lumbar surgical rates in the USA reduced from 2002 to 2007, fusion rates increased 15 fold. (Deyo JAMA 2010)

- In the USA lumbar fusion surgery rates have increased 220% from 1990 to 2001. (Deyo Spine 2005, Gray Spine 2006)

- This led to a 500% increase in spending for lumbar fusion from 1992 to 2003. (Wenstein Spine 2006)

Fusion Outcomes from Swedish National Spine Register
- 25% of patients reported no change or worsened pain following lumbar fusion (back and/or leg pain)

- At 1 year 40% of patients reported dissatisfaction regarding the outcome of the surgery.

(Sormqvist 2007)
Fusion Outcomes
- 70% of patients report significant long-term functional improvement
- Solid fusion as determined from radiographs ranged from 52% to 92% depending on the choice of surgical procedure. (Christensen 2004)
- Re-operation rates reported 14% within 4 years (Martin 2007)
  - 62.5% of reoperations associated with device complications or pseudarthrosis

Take Home Message
- Fusion can provide functional improvements in the appropriate patient.
- Fusion doesn’t really “fix” the patient, it addresses a specific anatomical problem.
- Outcomes can vary greatly depending on surgical technique, patient selection and criteria for success.

Take Home Message
- Increasing rate of lumbar spine fusion
- High costs associated with lumbar fusion
- High re-operation rate
- Lack of consistent outcomes

“Effective rehabilitation of patients following lumbar spinal fusion surgery is an important issue.” (Rushton)

Challenging Patient
- Pain
- Functional limitations/disability
- ROM
- Psychosocial issues
- High utilization of medical services
- Disc injury above/below the surgical level

Physical Therapies Role in Rehabilitation
- Pre-op
- Post-op
  - Inpatient
  - Out-patient
- Has PT been shown to be beneficial?
Physiotherapy rehabilitation following lumbar spinal fusion: a systematic review and meta-analysis of randomised controlled trials

BMJ Open 2013; Aimee Rushworth, Gillian Evestleigh, Emma-Jane Fetherston, Nicola Harwood, Rosalie Bennett, Gill James, Chris Wright

Conclusions: Inconclusive, very low-quality evidence exists for the effectiveness of physiotherapy management following lumbar spinal fusion. Best practice remains unclear. Limited comparability of outcomes and retrieval of only two trials reflect a lack of research in this area that requires urgent consideration.

Evidence-Based Practice?

- Due to complexity of these patients the medical team must utilize their clinical experience and a patient's values to maximize outcomes.

- It appears that behavioral intervention may be beneficial. How do I incorporate this?
Cognitive Behavioral Therapy
- Activity pacing
- Attention diversion
- Cognitive restructuring
- Goal setting
- Graded exposure
- Maintenance strategies
- Problem-solving strategies

Therapeutic Neuroscience Education
- Altering patients' beliefs to alter their pain experiences.
- Patient's want answers
  - What is wrong with me?
  - How long will it take?
  - What can I do for it?
  - What can you do for it?

What do patients want to know?
- Patients in pain want to know more about pain, not anatomy.

Does TNE work?
- For chronic MSK disorders there is compelling evidence that an educational strategy addressing the neurophysiology and neurobiology of pain can have a positive effect on pain, disability, catastrophizing, and physical performance.

How does TNE work?

Key Contents of TNE
- Neurophysiology of pain
- Nociception and nociceptive pathways
- Neurons
- Synapses
- Action potential
- Spinal inhibition and facilitation
- Peripheral sensitization
- Central sensitization
- Plasticity of the nervous system
Spinal-Fusion Surgery — Advances and Concerns

Stephen J. Lipson, M.D.

Panel A, article screws have been placed through a metal plate and into L5 and the sacrum. As shown in Panel A, the intervertebral disk has lost height and bulges out. In Figure 1.

In 1 out of 4 patients the nervous system will turn down gradually over time. Typically alarm system will turn down gradually over time. Flare ups are expected not due to harm but sensitivity.

How to Calm Nerves Down

- Knowledge
- Movement
- Medication
- Safe but sore
- typically alarm system will turn down gradually over time
- recovery will have ups and downs
- Flare ups are expected not due to harm but sensitivity

How to Provide TNE

- One-on-one sessions
- Provide homework
- Answer questions and progress
- Assess patients understanding
  - The Pain Neurophysiology Questionnaire (PNQ)
- This educational approach should include physical movement especially aerobic exercise.

Educational Tools

- Prepared pictures
- Metaphors
- Hand drawings
- Workbook with reading/Q&A
- YouTube videos
- Pain neurophysiology questionnaire

Nerves

- Like an alarm system
- Alerts brain of possible danger
- Once danger is removed normally alarm system will calm back down
- In 1 out of 4 patients the alarm system stays extra sensitive

Nerves and your back

- Once nerves become sensitive it takes less activity to cause nerves to fire off danger messages to brain.
- Key for you to understand is that pain may not be only due to original surgery/back pain, but the increased sensitivity of the nerves in the region.
The Pain Neurophysiology Questionnaire (PNQ) (Moseley 2003)

- 19 questions
- Test patient
- Use questions to guide education

### Tissues only send DANGER messages

- Eyes: Contain light receptors; not vision
- Ears: Contain vibration receptors; not hearing
- Tissues: Contain nociceptive receptors; not pain
- Tissues: Contain danger receptors; not pain

### 1.) WHEN PART OF YOUR BODY IS INJURED, SPECIAL PAIN RECEPOTORS CONVEY THE PAIN MESSAGE TO YOUR BRAIN.

- True
- False

### 11.) THE BRAIN DECIDES WHEN YOU WILL EXPERIENCE PAIN.

- True
- False

### Example

- Ankle vs. Bus

### How to include TNE in Tx

- Perform along with or during other treatments
- Neuromuscular re-education
- Use images, books, drawings, internet.
- Not all patients need TNE
  - Central sensitization
  - Failed other treatments
- Use outcome measures to assess progress
Knowledge is Power

- TNE
- Post Operative precautions
- Safe exercise program
- Re-assure patient to decrease FEARS

When does PT start?

- Typically immediately in hospital
  - Teach Post Operative Precautions
    - B - Bending
    - L - Lifting often 5-10 lbs first 6 weeks
    - T - Twisting
  - Gait/Transfer training
  - Educate to reduce patient fear

Key Concerns with Rehabilitation

- What are risks and benefits associated with physical therapy?
- Patient and therapist’s fear of exercise causing harm
  - Communication with surgeon
  - Understanding surgery
  - Understanding stress on spine with exercise

How much stress do common physical therapy exercises place on hardware?

Loads on an Internal Spinal Fixation Device During Physical Therapy
Antonius Rohlmann, Friedmar Graichen and Georg Bergmann
PHYS THER. 2002; 82:44-52.
None of the movements studied caused bending moments in the implants higher than those observed during walking 128%.

What about the discs?

- Good agreement between intradiskal pressure and bending moments in the fixation devices for most activities

(Rohlmann Ergonomics 2001)

When does outpatient PT begin?

- Safe to start immediately (Albert 2010)
  - Especially education
- Typically 4-6 weeks
- No difference in outcomes at 1 year post if started 6 or 12 weeks after surgery (Dhertagaard 2013)

What should PT consist of?

- Education
- Cardiovascular exercise
- Stabilization
- Range of motion/stretching exercise

Cardiovascular Exercise

- Typically surgeons will ask patients to walk daily
- Gradually increasing
- Use a pedometer
  - 2,100 steps = 1 mile
Stabilization

- Co-contraction of multifidus and transverses abdominus to provide segmental stabilization
- Improved function of stabilizing muscles decrease unwanted stress on spine
- No evidence on what is best exercise routine currently

ROM/Stretching

- Minimal research
- Maximize ROM of adjacent joints to decrease stress on surgical site
  - Hip
  - Thoracic

Conclusions

- Educate
  - Decrease fear
  - Improve understanding of pain
  - Improve understanding of benefits of exercise

- Exercise
  - Stress placed on spine and hardware during common exercises
  - Limited evidence on best exercises
  - Key is knowledge of safe exercises

- Communicate

QUESTIONS?

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References


