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TIMING OF SURGERY IN CERVICAL MYELOPATHY



Disclosure

- Innovasis- consulting
- Spinewave- consulting
- Nuvasive- consulting, teaching
- Precision Spine- royalties
- 4-web- consulting



Agenda

- Natural history of cervical stenosis and cervical myelopathy
- Evaluate evidence
- Are our preconceived biases valid?



What we think

- Surgery will prevent you from getting worse, but may not make you better
- If you don't have surgery, you will get progressively worse
- You could be paralyzed if you fall or get into a minor car accident

Rationale for surgical treatment

- Prevent catastrophic paralysis or death (traumatic)
- Preserve neural function
- Prevent irreversible spinal cord damage
- Limited capability of neural regeneration/repair



Natural History
Clark and Robinson 1956



CERVICAL MYELOPATHY: A COMPLICATION OF CERVICAL
SPONDYLOSIS

BY

EDWIN CLARKE AND PETER K. ROBINSON

*The Postgraduate Medical School of London, and the
National Hospital, Queen Square*

With a Surgical Note by L. S. Walsh and Ian Mackenzie



- Retrospective observational review
- 120 patients with spinal cord compression due to cervical spondylosis (myelography)

Natural History

- 26 untreated patients
- 94 patients treated with bed rest, traction, etc. including surgery



Natural History

- 75% showed an episodic, stepwise progression
 - Between episodes:
 - 2/3^{rds} deteriorated
 - 1/3rd remained unchanged (but after each obvious relapse, new symptoms and signs remained)
- 20% showed a slow, steady progression
- 5% experienced a rapid onset of sx and signs, followed by a long period (years) of quiescence

Results of Medical Treatment (bed rest, collar, traction)

- 50% improved
 - Mostly relief of radicular sx
 - Less improvement in motor strength
- 50% unchanged
- Motor sx more persistent than sensory
- Spontaneous regression to a normal state was not reported



Results of Surgical Treatment

- 10% died
- 5/31 immediately worse
- 6/31 delayed worse
- 13/31 improved slightly



Conclusions

- “...the ultimate prognosis in most cases was poor, although progression in most cases was often extremely slow or absent and any real improvement rare.”
- “In the first place, treatment with a cervical support should be advised.”
- “However, at any time, signs of deterioration, or failure to stop a downward clinical course, should demand consideration of surgical treatment without delay, and before the patient is severely disabled.”

Natural History
Lees and Turner 1963



NATURAL HISTORY AND PROGNOSIS OF CERVICAL SPONDYLOSIS

BY

F. LEES, M.B., Ch.B., M.R.C.P., D.C.H.

J. W. ALDREN TURNER, D.M., F.R.C.P.

From the Department of Neurology, St. Bartholomew's Hospital, London



- Retrospective observational study
- Two groups:
 - Myelopathic: 34 patients followed for >5 years, up to 32 years
 - Nonmyelopathic (radicular sx, axial neck pain): 51 patients with 5 year follow-up



- No mildly disabled patient worsened
- All patients in the ‘moderately disabled’ classification remained that way
- Of 15 ‘severely disabled’ patients:
 - 1 was asymptomatic (+ Babinski’s)
 - 5 improved to ‘moderately disabled’
 - 9 remained severely affected



- Myelopathy ‘hardly ever’ developed in patients who did not show it when they first presented
- “Long periods of nonprogressive disability are the rule, and a progressively deteriorating course is exceptional.”.
- “The results suggest to us that a very conservative approach should be the rule.”



Is there any evidence that supports surgical treatment?



Cochrane Review, 2002

- Included only randomized controlled studies
- 2 trials involving a total of 130 patients

Table 1. Characteristics of Included Studies

Study	Methods	Participants	Interventions	Outcomes	Notes	Allocation Concealment
Bednarick et al ²	C: coin toss Outcome assessor blind Exclusions during trial: none Losses to follow-up: None	Czech Republic: 49 patients (38 men) Mean age: 52 years Mild and moderate myelopathy (mJOA > 12)	Rx: ACDF, laminectomy, laminoplasty Control: cervical collar, NSAIDs	Modified JOA disability scale and gait score at onset, 6, 12 and 24 months after treatment	Ex: severe myelopathy (mJOA < 12) Follow-up: 2 years	C
Persson et al ²⁸	C: sealed envelopes Outcome assessor not blind Exclusions during trial: none Losses to follow-up: 2	Sweden: 81 patients (46% women) Mean age: 47 years Clinical and radiologic evidence of cervical radiculopathy	Rx: ACDF, laminectomy Control: cervical collar physiotherapy	Pain (VAS), paraesthesia and sensory loss at onset, 3, 12, and 16 months after treatment	Ex: spinal cord compression, absence of radiologic evidence of root compression Follow-up: 16 months Cross overs: 6	A

C = concealment of allocation; Rx = treatment; ACDF = anterior cervical decompression and fusion; JOA = Japanese Orthopaedic Association; NSAID = nonsteroidal antiinflammatory drug; Ex = exclusion criteria; VAS = visual analog scale; C = inadequate; A = adequate.



Cochrane Review, 2002

- “The widespread belief that overt myelopathy will eventually develop in patients with cervical spondylosis and radicular symptoms (or in asymptomatic patients with spondylosis) is not based on good evidence.”
- “The available small randomized trials DO NOT provide reliable evidence on the effects of surgery for cervical spondylotic radiculopathy or myelopathy. It is not clear whether the short-term risks of surgery are offset by any long-term benefits.”

Bednarik et al., Eur Spine 2008



- 199 pts
 - Presented with axial pain or radiculopathy
 - No s/s attributable to myelopathy
 - MRI: spinal cord compression
 - Pain controlled with “conservative treatment”
 - Follow-up > 2 years (2-12)



- 199 patients with spinal stenosis
- 45 (23%) developed myelopathic signs/symptoms
 - Best predictors:
 - Early: developed myelopathy ≤ 12 months
 - » Radiculopathy
 - » + cord dysfunction by MEP and SSEP

- 199 patients
- 45 (23%) developed CM signs/symptoms
 - Predictors:
 - CM \leq 12 months
 - Later: Developed myelopathy > 12 months
 - MRI cord increased signal intensity



Murphy et al.,
Chiropractic and osteopathy 2009

- Systematic Review
- Risk of SC injury after minor trauma in pts with spinal stenosis
- Risk v benefit of prophylactic surgery
- Conclusion
“There is insufficient evidence of increased risk of spinal cord injury from minor trauma”



- Nonoperative versus Operative Management for the Treatment of Degenerative Cervical Myelopathy: An Updated Systematic Review
 - John Rhee et al. Global Spine Journal, 2017.



- 225 citations
- Conclusions
 - nonop treatment for mild (JOA > 13) single level DCM and intramedullary MRI signal result in similar outcomes to surgery
 - these patients should be monitored closely
 - moderate to severe JOA patients should have surgery
- nonop management have higher rates of subsequent hospitalization for spinal cord injury



Motor dysfunction score of the upper extremity
0—Inability to move hands
1—Inability to eat with a spoon, but able to move hands
2—Inability to button shirt, but able to eat with a spoon
3—Able to button shirt with great difficulty
4—Able to button shirt with slight difficulty
5—No dysfunction
Motor dysfunction score of the lower extremity
0—Complete loss of motor and sensory function
1—Sensory preservation without ability to move legs
2—Able to move legs, but unable to walk
3—Able to walk on flat floor with a walking aid
4—Able to walk up and/or down stairs with hand rail
5—Moderate-to-significant lack of stability, but able to walk up and/or down stairs without hand rail
6—Mild lack of stability but walks with smooth reciprocation unaided
7—No dysfunction
Sensory dysfunction score of the upper extremities
0—Complete loss of hand sensation
1—Severe sensory loss or pain
2—Mild sensory loss
3—No sensory loss
Sphincter dysfunction score
0—Inability to micturate voluntarily
1—Marked difficulty with micturation
2—Mild-to-moderate difficulty with micturation
3—Normal micturation



So what do we do?

Any predictors for progression?

Predictors

- Neurologic progression
- Symptoms > 6mos
- Presence of radiculopathy
- SEP, MEP, EMG evidence of cord dysfunction
- T2 MRI findings
- Compression ratio < 0.4
- Transverse area < 70mm²



- Kadanka et al. Brain and Behavior, 2017.



Is there any consensus?

- A Clinical Practice Guideline for the Management of Patients With Degenerative Cervical Myelopathy: Recommendations for Patients With Mild, Moderate, and Severe Disease and Nonmyelopathic Patients With Evidence of Cord Compression
 - Fehlings et al. Global Spine Journal, 2017



- AO Spine and CSRS
- Guideline Development Group formed
- Systematic reviews

- 5 Clinical Populations
 - severe DCM
 - mJOA 0-11
 - moderate DCM
 - mJOA 12-14
 - mild DCM
 - mJOA 15-17
 - asymptomatic no radiculopathy
 - asymptomatic with radiculopathy

Severe DCM



- Recommendation:
 - Surgery
 - Strong recommendation with moderate quality of evidence



Moderate DCM

- Recommendation:
 - Surgery
 - Strong recommendation with moderate quality of evidence



Mild DCM

- Recommendation:
 - supervised trial of structured rehabilitation
 - operative intervention if there is neurological deterioration without improvement
 - weak recommendation with very low quality evidence



Asymptomatic no radiculopathy

- Recommendation:
 - nonsurgical observation
 - counseling of patients as to potential risks/symptoms
 - weak recommendation with no identified evidence (based on clinical expert opinion)



Asymptomatic with radiculopathy

- Recommendation:
 - patients at higher risk for developing myelopathy
 - surgery vs. nonoperative with supervision
 - weak recommendation and low quality of evidence



Conclusions

- Insufficient data for TREATMENT STANDARDS
- Some data for TREATMENT GUIDELINES
- Inadequate data regarding the role of prophylactic surgery in asymptomatic patients with cervical spondylosis to prevent myelopathy
- Inadequate data regarding the role of surgery to treat mildly symptomatic myelopathic patients.



- Severe and moderate myelopathy should have surgery
- mild and asymptomatic should be at least observed closely with patient counseling
- patient counseling on risks of progression and/or spinal cord injury though data does not show high risk



Thank You