Rates and Predictors of Neurologic Progression in Patients Treated Conservatively for Degenerative Cervical Myelopathy

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Natural History

"Long periods of non-progressive disability are the rule, and a progressively deteriorating course is exceptional"

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Papers and Originals

NATURAL HISTORY AND PROGNOSIS OF CERVICAL SPONDYLOSIS

BY

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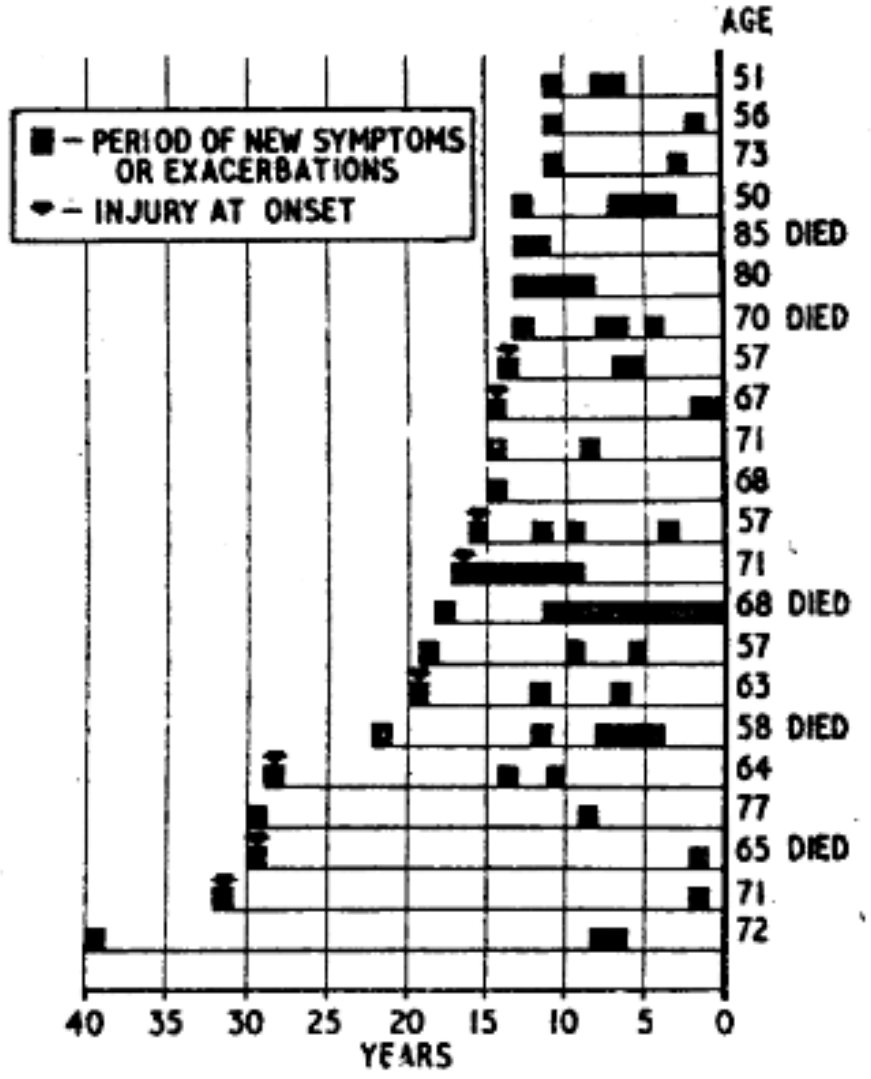
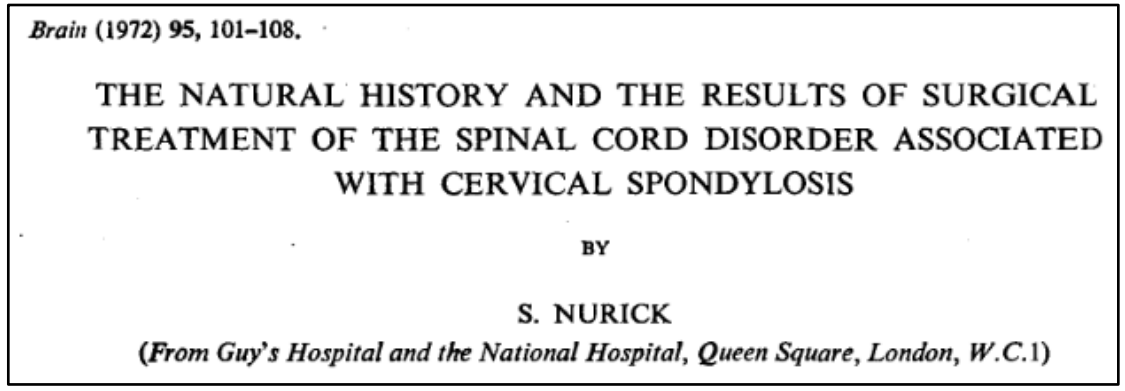


Natural History



Brain (1972) **95**, 101–108.

THE NATURAL HISTORY AND THE RESULTS OF SURGICAL TREATMENT OF THE SPINAL CORD DISORDER ASSOCIATED WITH CERVICAL SPONDYLOSIS

BY

S. NURICK

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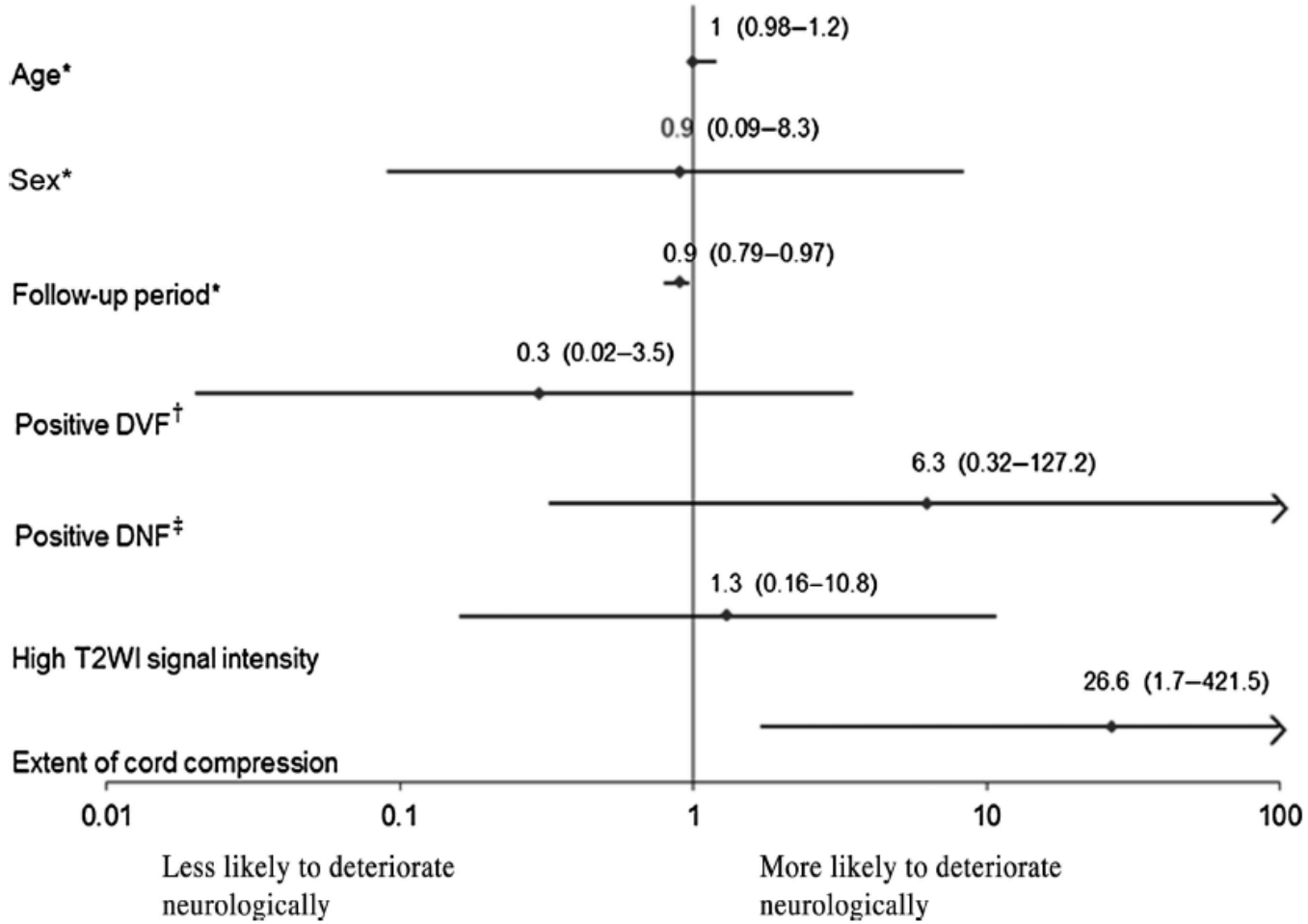
- CSM is a generally **benign disorder** caused by compression of the cord in which disability develops in an initial phase of variable duration. The disability later **remains static** except in older patients, in whom it may progress.

Rates of progression on the mJOA or JOA

Authors	Follow-up (yr)	Deteriorated (% of Patients)	Unchanged (% of Patients)	Improved (% of Patients)	Unchanged or Improved (%)
Neurological assessment by mJOA or JOA					
Kadanka *et al*[35]*	1	†15.1	…	‡84.9	84.9
	2	†34.4	…	‡65.6	65.6
	3	†26.7	…	‡73.3	73.3
Matsumoto *et al*[36,37]	3	31	…	‡69	69
	4	37	…	63	63
Shimomura *et al*[42]	3	19.6	…	…	80.4
Sumi *et al*[40]	6.5	25.5	…	…	74.5
Yoshimatsu *et al*[41]	2.5	62	15	23	38
Neurological assessment by motor JOA					
Nakamura *et al*[38]					
UE	6	0	45	55	100
LE	6	3	39	57	97
Oshima *et al*[39]	6.5	40	…	…	60
Neurological assessment by Nurick					
Barnes and Saunders[31]	8.2	13	67	20	87

Important Predictors of Deterioration



Clinical Questions

- What are the rates of progression in patients treated non-operatively for DCM?
- What are the risk factors for neurologic deterioration?

Methods

- 158 patients with symptomatic DCM were prospectively enrolled and treated either surgically or conservatively

Inclusion Criteria
• ≥1 signs of DCM: corticospinal motor deficits, hand atrophy, hyperreflexia, positive Hoffman sign, upgoing plantar responses, lower limb spasticity and/or gait ataxia
• ≥ 1 symptom of DCM: numb hands, clumsy hands, gait impairment, bilateral hand paresthesia, L'Hermitte's phenomenon, weakness
• MRI showing flattening, indentation of circumferential compression of the spinal cord

Methods

- Patients were evaluated at baseline and at 12-months follow-up using a variety of outcome assessment tools
  - mJOA
  - QuickDash
  - JAMAR
  - GRASSP
  - Berg Balance Score
- Rates of decline were computed for patients treated conservatively
- Logistic regression analysis was computed to determine important predictors of neurologic deterioration on the mJOA

Baseline Characteristics

	Conservative Treatment	Surgical Treatment
Age*	55.96±11.00	57.00±11.41
Preoperative Severity		
• mJOA*	14.92±2.03	13.14±2.60
• Quickdash*	33.81±22.77	43.88±22.98
• JAMAR (dominant hand)*	30.53±12.55	27.18±12.15
• GRASSP Motor (dominant hand)*	47.60±3.48	45.75±5.04
• GRASSP Sensory (dominant hand)	10.65±1.97	10.20±2.37
• Berg Balance Score*	49.78±11.07	48.06±9.96
Gender	48.00% M	59.74% M

*Significantly different between conservative and surgical treatment groups ($p<0.05$)

The Conservative Treatment Group

- Mild (mJOA≥15): n=55 (70.5%)
- Moderate (mJOA=12-14): n=15 (19.2%)
- Severe: (mJOA<12): n=8 (10.3%)

Deterioration, No Change or Improvement?

	Deterioration	No Change	Improvement
mJOA	42.1%	33.3%	24.6%
• Upper extremity	26.3%	56.1%	17.5%
• Lower extremity	26.3%	82.5%	17.5%
• Sensation	12.3%	73.7%	26.3%
• Sphincter	19.3%	73.7%	7.0%
QuickDash	36.4%	14.6%	49.1%
JAMAR	52.6%	-	47.4%
GRASSP			
• Motor	35.1%	26.3%	38.6%
• Sensory	24.6%	50.9%	31.6%

Can we predict who is likely to deteriorate?

Predictor	Odds Ratio	P-value
Gender	1.43 (0.57 to 3.59)	0.44
Age	0.98 (0.94 to 1.02)	0.44
Neck pain	0.58 (0.18 to 1.94)	0.38
Arm pain	1.09 (0.37 to 3.24)	0.88
Back pain	0.77 (0.26 to 2.24)	0.63
Leg pain	0.60 (0.19 to 1.88)	0.38
Smoking status	1.04 (0.50 to 2.18)	0.92
T1-signal	1.05 (0.30 to 3.65)	0.93
T2-signal	0.65 (0.34 to 1.29)	0.22

Conclusions

- Rates of progression ranged from 12.3% to 52.6%.
- No important predictors of deterioration were identified.
- Further investigation is required to explore key risk factors of neurologic decline in patients treated conservatively for DCM
  - Biomarkers
  - Advanced imaging techniques (axonal integrity, myelinating, white matter atrophy)
  - Components of the neurological examination