University of BRISTOL

MSc Orthopaedic Research Methods & Evidence-Based Medicine

Clinical Module 1 – Spine

Operative vs non-operative management of mild cervical spondylotic myelopathy (CSM)

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Search strategy

References

1. Individual Learning Objective

To understand if patients with mild CSM have better outcomes with operative or non-operative management in terms of clinical parameters and patient reported satisfaction

2. PICOS

P – Mild CSM (modified Japanese Orthopaedic Association (mJOA) Score 15-17) confirmed on MRI
I – Operative management including anterior, posterior and combined approaches
C – Non-operative management: analgesics, soft collar immobilization, isometric exercises and gait training
O – Patient outcomes: mJOA score (1^{o} outcome), Nurick score, Ranawat score, Quality of Life (QoL) SF-36
S – Randomized Controlled Trial(s)

3. Introduction

Cervical spondylotic myelopathy (CSM) refers to degenerative compression of the cervical spinal cord, affecting over 5% of adults[1,2,3]. In cases of moderate and severe CSM the evidence is clear: at short-, medium- and long-term follow up patients have significantly better mJOA, Nurick and Ranawat scores when managed surgically and guidelines therefore recommend surgical intervention[4]. However, most patients with CSM have mild symptoms[5] and the decision to operate should be based on which patients are likely to deteriorate given that cervical surgery usually stabilizes rather than improves symptoms and is associated with morbidity and mortality[3,6]. Unfortunately, the natural history of CSM is poorly understood with conflicting results in seminal studies[7,8] whilst MRI findings don't correlate well with symptoms[9]. Our knowledge is therefore limited to CSM being considered a progressive disease of unknown rate in individual cases[10].

Figure 1: C6/7 cord compression with myelopathic changes

4. Methods

- **Literature search:** Single reviewer of Cochrane Central Register of Controlled Trials (CENTRAL), Medline & Embase (Inception to January 2022) using free text words and MeSH terms. Reference lists from the identified studies were reviewed for additional studies.
- **International/National/Local Guidelines:** NICE + BASS Guidelines, Review articles, Trust intranet
- **Expert opinion:** Semi-structured interviews with four consultant spinal surgeons at local unit

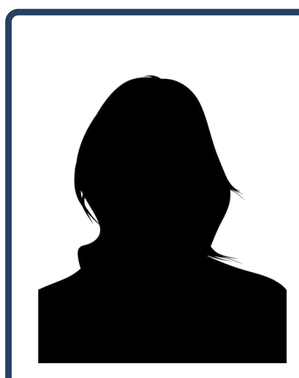
5. Methods

Ovid and CENTRAL search (**see QR code**) identified 210 articles → Title/abstract reviewed → 195 excluded → 15 full articles reviewed → 6 studies included (2 RCT; 2 Cochrane reviews; 2 systematic reviews +/- meta-analysis) with 1 further systematic review identified from reference lists (**see QR code**)

6. Expert Opinion

Spinal Cons 1

"If there is any form of myelopathy then I offer surgery. Patients are left with an open appointment in case they decline"



Spinal Cons 2

"I don't use any scoring systems as they don't give enough weight to examination findings. Most important factor is falls risk given paralysis could ensue"

Spinal Cons 3

"Clumsiness is more important feature than pain. I follow all patients up 3 monthly for 6 months, then 6 monthly for 2 years"

Spinal Cons 4

"If there is any form of myelopathy no matter how severe I offer surgery. Patients who decline are left with an open appointment"

7. Summary of Findings

- **mJOA, Nurick, Ranawat and SF-36 scores were no different between surgically and conservatively managed patients following consideration of RCT, Cochrane reviews and Systematic reviews**
- Those operated on ≤3 months of myelopathy onset = better outcome than those operated ≥3 months[4]
- mJOA and other clinical scoring systems don't necessarily correspond strongly to quality of life measures; QoL actually improves significantly in mild CSM following surgery despite no change in mJOA score[11]
- Cervical decompressive surgery associated with risk: mortality rate 1.8%; non-fatal complications up to 8%[12]

Cochrane Reviews (x2)

- No difference in mJOA scores between surgical vs non-surgical groups however: (i) Cochrane Review #1[13] only included historic RCT and (ii) Cochrane Review #2 [12] was the same patient cohort but published under different authors therefore didn't add any new knowledge

Systematic Reviews +/- Meta-anaylsis (x3) *No systematic review accounted for possible publication bias*

- **Review #1:** Largest review including n=517 and found a 17% improvement in mJOA score in surgical vs conservative group however cohort studies predominate and baseline characteristics unmatched with worse mJOA in surgical group therefore have greater capacity to improve[14]
- **Review #2:** Includes many of the same studies as Review #1 but more historic. Draws same conclusions re: mJOA score in addition to Nurick + Ranawat scores. Doesn't differentiate mild, moderate + severe CSM[15]
- **Review #3**: No difference in mJOA, Ranawat and SF-36 between surgical vs conservative group however (i) patients treated equally despite vastly different follow up timeframes; (ii) baseline mJOA scores different between groups; (iii) only two case-control studies included and both fail to consider baseline CSM severity and lack generalisability as all patients either diagnosed with rheumatoid arthritis or fibromyalgia[16]

Appraisal of principle study identified in literature search

Study	Design	Main findings	Strengths	Limitations
Kadanka et al (2002)[17] UPDATED: **Kadanka et al (2011)[5]**	*RCT *Surgery (n=22) *Conservative (n=25) *All patients with mild mJOA score (15-17)	*mJOA: conservative group better at 6-months but at 2-, 3- and 10-years there was no difference	*Long follow-up data (10 years) provides clarity about deterioration in short-, medium- and long-term *Blinding of assessors reduces bias risk *Relevant as only considered patients with mild mJOA score *No other RCT explores question	*Not powered so differences may not be seen *Improvement in mJOA score less than expected in surgical group based on previous observational studies *High loss-to-follow-up (30%) *Baseline mJOA scores not matched between groups – randomisation failure and no stratification to account for this *Strict inclusion criteria limits generalisability

8. Guidelines

- No national or local guidelines exist for the management of CSM.
- Internationally, a consensus paper has led to guidelines as a collaboration of AOSpine North America + Cervical Spine Research Society[4]. Their recommendation = **offer patient surgery for mild CSM and if the patient declines offer then closely monitor and further offer if myelopathy deteriorates.** However, the quality of the evidence to support this is low, as recognised by the authors, due to the included articles used to make these recommendations: (i) failing to differentiate between the different severities of CSM and (ii) offering surgery to patients with worse mJOA scores introducing bias

9. The Future

- ✓ **Despite the importance of the question there is limited high quality research addressing it**
- ✓ **A prospective RCT, whilst providing Level Ib evidence is not feasible as power calculation suggests n=406 required for 80% power**
- ✓ **Therefore an observational study with propensity score matching should be utilized going forward, aiming to answer the question "which sub-group(s) of patient will benefit from surgery" rather than treating all patients as a homogenous group.**
- ✓ **Utilize EUROSPINE society Spine Tango registry providing data on 700,000 patients[18]**