Minimally Invasive Decompression vs Fusion in Degenerative Lumbar Scoliosis with Stenosis: Functional Outcomes. Reoperation and Complication Rates: A Systematic Review and Meta-Analysis

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Background

- Degenerative lumbar scoliosis complicated by spinal stenosis is a frequent source of pain and disability in older adults.
- Debate persists over whether the extra stability achieved with instrumented fusion justifies its greater operative burden when compared with minimally invasive decompression (MID) alone.

Objective

A meta-analysis to compare MID and Fusion and which is associated with better post operative outcomes?

Methods

Search Strategy- Databases

PubMed, Embase, the Cochrane Library, Scopus and Web of Science

Eligibility

Adults with degenerative lumbar scoliosis + stenosis who underwent either fusion (intervention) or MID (comparator)

Randomised controlled trials + comparative cohort/case–control studies only.

Study selection

Outlined in the PRISMA flow diagram below.

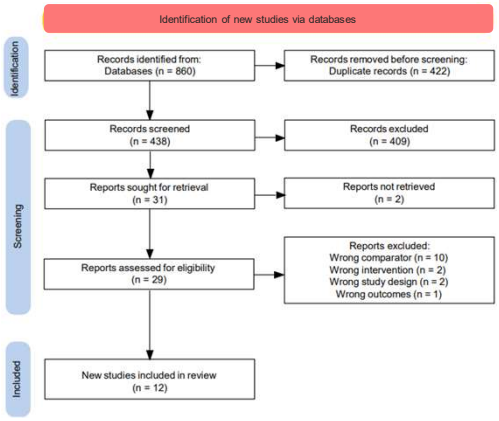


Fig 1: PRISMA flow diagram

Data Extraction

- Primary outcomes: changes in Visual Analogue Scale (VAS) pain, Oswestry Disability Index (ODI), re-operation rate and patient satisfaction.
- Secondary outcomes: peri-operative complications and length of stay.
- Statistical Analysis: risk of bias (RoB-2 or Newcastle–Ottawa Scale). Random-effects meta-analyses were performed where appropriate.

Results

- VAS: Fusion reduced VAS from 6.3 to 2.8 whereas MID reduced from 5.8 to 3; favouring fusion (-0.4, $p<0.05$).
- ODI: Fusion improved from 48.3 to 22.2 and MID from 51.3 to 26.5; mean difference = -4.3, $p<0.05$.
- Re-operation Rate rate: Re-operation required in 7.2% of fusion cases but 9% of MID cases
- Complication Rate: Complications higher with fusion at 22.3% compared to MID with 8.9%

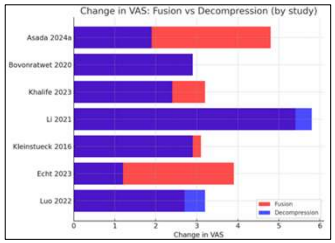


Fig 2: Change in VAS

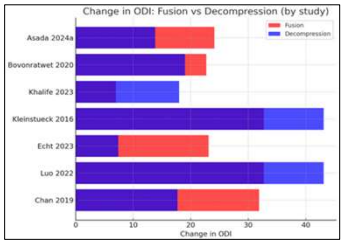


Fig 3: Change in ODI

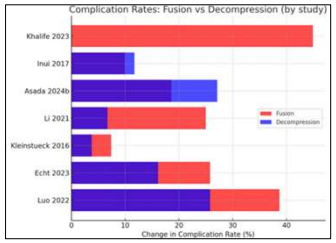


Fig 4: Comparison of complication rates

Discussion

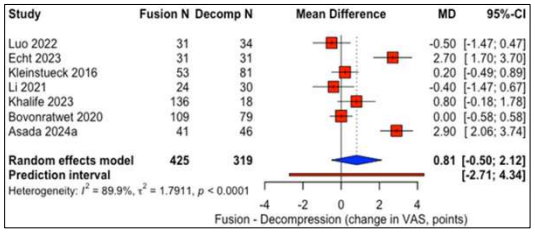


Fig 5: Meta-Analysis of VAS between Fusion and MID

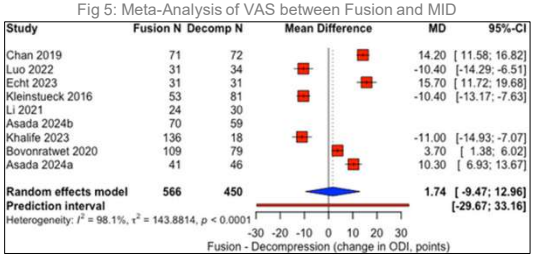
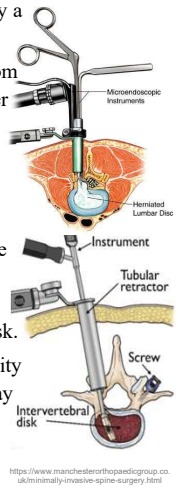


Fig 6: Meta-Analysis of ODI between Fusion and MID

- VAS and ODI suggest fusion is only a marginally superior method.
- Fusion only offers marginal symptom improvement, at significantly higher complication risk (22.3% vs 8.9% with MID)
- Patient selection also demonstrates clinical relevance:
- Older, comorbid patients with stable alignment and minimal deformity progression may benefit more from MID due to lower peri-operative risk.
- In patients with mechanical instability or progressive deformity, fusion may be justified for greater surgical correction despite higher complication rates.



Conclusions

- Fusion offers modestly greater improvements in pain and function and slightly fewer re-operations. However, this is offset by a significantly higher complication rate.
- Minimally invasive decompression remains a safe and effective alternative.
- Well-designed, long-term randomised trials are required to determine the optimal surgical approach and refine patient selection

Limitations

- Technique-level differentiation
- Predominance of non-randomised designs.
- Incomplete reporting of satisfaction and other patient- reported outcome measures due to lack thereof.

Future Directions

- Clear need for adequately powered randomised controlled trials that compare strategy-level care pathways in DLS
- Prioritise at least a 2-5 year follow-up
- Use patient characteristics to steer choice of surgery

References

References available on this QR code:

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