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Systematic Reviews /Meta-analyses

Comparison of anterior and posterior approaches for functional improvement in cervical myelopathy: A systematic review and meta-analysis of 33,025 patients

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ABSTRACT

Background: Cervical myelopathy is caused by pressure on the spinal cord in the neck, leading to pain, numbness, and balance issues. Surgery aims to decompress the spinal cord, with different approaches; anterior, posterior, or both depending on specifies. This systematic review and meta-analysis aimed to compare the risks and benefits of anterior and posterior surgical techniques.

Methods: Adhering to the PRISMA guidelines, we conducted a systematic search across the databases including PubMed, Scopus, and Web of Science for studies comparing anterior and posterior surgical approaches for cervical myelopathy. Studies that met our predefined inclusion criteria were selected by 2 independent reviewers. The methodological quality of the selected studies was assessed using NOS and Rob-2 tools and analysis was done using the Review Manager tool. One RCT and 22 cohort studies including 33,025 patients were included in the analysis.

Results: The anterior approach was associated with better neurological recovery and a greater improvement in Cobb's angle with MD of 4.18 (95%CI: 0.38, 7.91, p=.03), and 6.91 (95%CI: 1.85, 11.97, p=.007), respectively. The anterior approach showed a statistically significant decrease in VAS, and NDI scales with MD of −0.44 (95%CI: −0.75, −0.12, p=.007), and −1.91 (95%CI: −3.74, −0.09, p=.04), respectively as compared to posterior approach.

Conclusions: Studies suggest that an anterior approach for cervical myelopathy may improve nerve function, correct spinal curvature more effectively, and lead to fewer complications, less pain, reduced blood loss, and a shorter hospital stay compared to a posterior approach.

Background

As people around the world live longer due to advances in healthcare, there is a growing focus on geriatric medical care. By 2050, the number of people over 80 is expected to reach 40 million globally, more than double the World Health Organization's prior estimate.

One of the challenges of aging is spinal degeneration, which can lead to cervical spinal myelopathy (CSM). This is a condition where the spinal cord in the neck becomes compressed. CSM is a common cause of spinal cord dysfunction in older adults [1–3].

CSM is the leading cause of spinal cord dysfunction worldwide [4]. This compression arises from various changes in the spine's anatomy, such as thickened facet joints (facet joint hypertrophy), worn-out discs (degenerative disc degeneration), bony growths on vertebrae (osteophytes), and hardening of ligaments in the spinal canal (ossification of the posterior longitudinal ligament, OPLL) [3].

Another cause can be abnormal spinal alignment, which stretches the cord or allows excessive movement between vertebrae, damaging the neural tissue [3].

FDA device/drug status: Not applicable.

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Regardless of the cause, the outcome is similar: restricted blood flow (ischemia), malfunctioning cells lining blood vessels (endothelial cell dysfunction), inflammation within the spinal cord (neuroinflammation), disruption of the blood-brain barrier, and ultimately, cell death (neurons and oligodendrocytes) [5]. This chain of events caused by compression leads to permanent nerve damage and a decline in neurological function [5].

People with CSM experience not only general neurological problems but also specific nerve root issues (radicular symptoms) [4]. Common signs include clumsiness in hands, tingling or numbness (paresthesia), weakness in arms and legs, abnormal walking patterns, and Lhermitte's sign (an electrical shock sensation that shoots down the spine and into the limbs).

Anterior, posterior, and combination anterior-posterior techniques can all be used for decompression. When treating cervical kyphosis, anterior pathologies and/or 1- to 2-level diseases may favor anterior methods, while larger decompressions, diseases involving more than 3 levels, and ossified posterior longitudinal ligaments might favor posterior approaches [6]. However, anatomy often creates a clinical equipoise between the 2, leaving surgeon judgment as the deciding factor.

Due to equipoise in this population with uncertain best outcomes, randomized controlled trials have not provided definitive guidance [7]. Therefore, to compare the risks and benefits of anterior and posterior techniques, we conducted a meta-analysis encompassing all published research.

Materials and methods

We followed the Preferred Reporting Items of Systematic Reviews and Meta-Analyses (PRISMA) conducting the methods and analyses strictly per the guidelines of the Cochrane Handbook of Systematic Review and Meta-analysis. The protocol and details of this systematic review were registered in the International Prospective Register of Systematic Reviews (PROSPERO) (register number CRD42024539042).

Searching databases

According to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines [8], we searched PubMed, Scopus, and Web of Science for articles that fulfill our eligibility to be included in the systematic review and meta-analysis comparing anterior and posterior approaches used in CSM. The search was based on 3 main keywords: "anterior", "posterior", and "cervical myelopathy".

Screening

The resulting articles from the search process were uploaded to Rayyan software [9]. After this, we conducted the process of title, and abstract screening followed by full-text screening. These processes were conducted by 4 authors who worked independently and any disagreements were settled by consensus or referred to a senior author if persisted. We included all the observational studies (cohort, case-control, and cross-sectional), and interventional randomized controlled trials (RCTs) which compared anterior and posterior approaches in CSM patients regarding the safety and efficacy of the procedures.

Data extraction

This process was conducted by 4 authors working independently on a preprepared Microsoft Excel spreadsheet. Any disagreements were resolved by consensus and if the disagreements persisted, the senior author resolved it. We extracted the baseline data of the included studies including design, country, sample size, age, and gender of the included participants. In addition, the outcome data were extracted for the meta-analysis including the following: Japanese Orthopedic Association (JOA) score, neurological recovery rate, complications, operation time, blood loss, Cobb's angle, visual analog scale (VAS), neck disability index (NDI), and duration of hospital stay.

Quality assessment and risk of bias assessment

Two independent researchers conducted a quality assessment and risk of bias assessment, and any disagreements were resolved by consensus or by the senior author. The New Castle Ottawa Scale (NOS) [10], which assigns a star rating to each study between 0 and 9, was used to assess the quality of observational studies. Every question has the option to receive 1, 2, or zero stars, except the comparison question, which can receive any number of stars. If a study gets 1-3 stars, it is considered low quality; if it gets 4-6 stars, it is considered moderate quality; and if it gets 7-9 stars, it is considered high quality We used the Cochrane risk-of-bias tool (Rob 2.0) [11], which consists of 5 domains (randomization, deviations from intended interventions, missing outcome data, measurement of the outcome, and selection of the reported result) each with a set of questions. The results are then combined through a diagram to determine 1 of 3 levels of bias: low risk, some concerns, or high risk.

Statistical analysis

All the steps of statistical analysis were conducted using Review Manager version 5.4 software [12]. For dichotomous variables, pooled analysis of the odds ratio was calculated using the event and total. Regarding the continuous variables, the mean difference (MD) was calculated between the mean change in JOA, and Cobb's angle between both groups, while for the other continuous variables, the MD was calculated between the mean of both groups. We implemented the random effect model for heterogeneous outcomes, but we used a fixed effect model for homogeneous ones at a confidence interval (CI) of 95%, and p-value of .05. The heterogeneity was measured using I^2, and a p-value of .05.

Results

Database search and screening

Our search process resulted in a total of 1,725 articles from the 3 searched databases. We removed 707 articles and conducted the title and abstract screening for the rest 1018 articles. A total of 29 articles were eligible for full-text screening and then a final 23 articles (1-23) were included in our meta-analysis (Fig. 1).

Baseline characteristics

Among the included 23 articles, 22 were of cohort design, while only one was an RCT study. These studies compared anterior and posterior approaches in CSM patients with a total of 33,025 patients (16,748 in the anterior group, and 16277 in the posterior group). The studies were conducted in different countries including the USA, China, Germany, Egypt, and other countries. The mean age of patients ranged from 47.43 years old to 84.5 years old (Table 1).

Quality assessment

The included RCT assessed by Rob-2 was shown to exhibit a low risk of bias (Fig. 2).

According to the NOS used for cohort studies, 12 studies were of high quality, 8 were of moderate quality and 2 were of low quality (Table 2).

Meta-analysis

The comparative outcomes between anterior and posterior approaches using various techniques are given below.

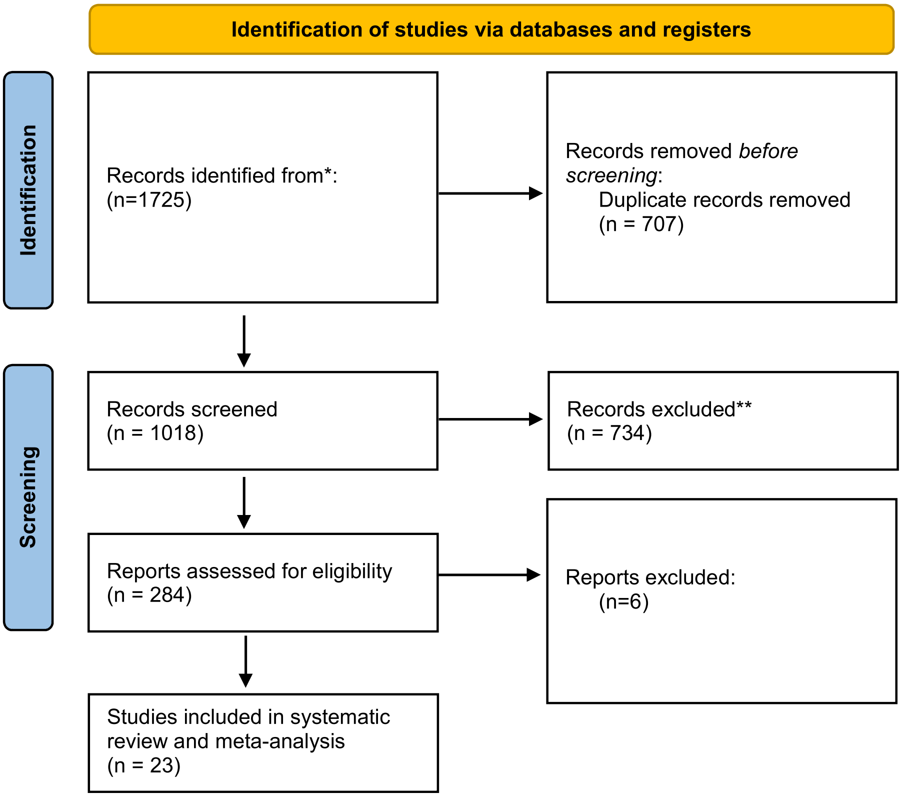

Fig. 1. PRISMA flow diagram of database searching and screening.

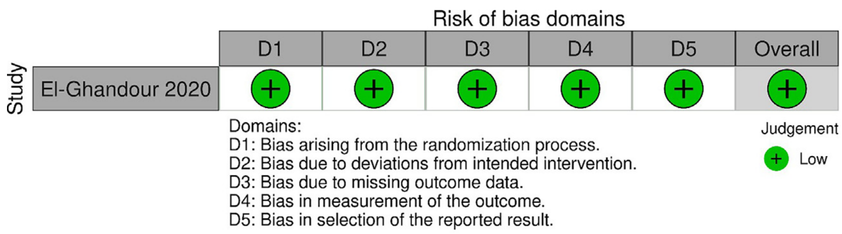

Fig. 2. Risk of bias assessment of the included randomized controlled trial using the Rob-2 tool.

Table 1
Baseline characteristics of the included studies.

Study ID	Design	Country	Age		Male, n (%)		Sample size	
			Anterior	Posterior	Anterior	Posterior	Anterior	Posterior
Badhiwala et al. 2020 [22]	Cohort	Canada	62.7 (10.1)	63.4 (10.9)	4065 (58.6)	4104 (59.1)	6942	6942
Asher et al. 2018 [35]	Cohort	USA	61.35 (11.2)	64.9 (11.3)	76 (47)	41 (52)	163	82
Audat et al. 2018 [23]	Cohort	Jordan	47.43	56.52	37 (55.2)	57 (78)	67	73
Ahmed et al. 2020[21]	Cohort	Egypt	63.4 (6.8)	61.8 (6.7)	10 (66.7)	10 (66.7)	15	15
Bourgonjon et al. 2019 [24]	Cohort	Belgium	60	69	30 (62)	30 (71)	42	48
Cabraja et al. 2010 [25]	Cohort	Germany	60.4 (9.9)	66.2 (8.8)	12 (50)	17 (70.8)	24	24
Chen et al. 2019 [26]	Cohort	China	55.4 (10.9)	63.9 (10.4)	60 (75)	40 (71.4)	80	56
El-Ghandour 2020 [15]	RCT	Egypt	52.7 (6.7)	53.4 (9.6)	22 (68.8)	25 (75.8)	32	33
Gill et al. 2011[27]	Cohort	India	47.7(9.4)	52.8 (7.9)	26 (86.7)	21 (80.8)	30	26
Hitchon et al. 2019 [14]	Cohort	USA	63.4 (10.8)	63.6 (16)	22 (57.8)	35 (68.6)	38	51
Inose et al. 2020 [28]	Cohort	Japan	60.3 (11.3)	67.8 (9.1)	23 (62)	16 (57)	37	28
Joo et al. 2022 [13]	Cohort	USA	61.3 (9.4)	61.4 (9.5	893 (48.1)	893 (48.1)	1857	1857
Kato et al. 2017 [29]	Cohort	Canada	52.4 (11.1)	61.1 (11)	147 (57.6)	120 (66.7)	255	180
Kong et al. 2021[30]	Cohort	China	60.7 (7.2)	57.6 (6.3)	13 (62)	17 (53)	21	32
Cahueque et al. 2016 [31]	Cohort	Mexico	69 (8.1)	77 (8.8)	10 (52.6)	16 (70)	19	23
Lenga et al. 2023 [16]	Cohort	Germany	81.8 (1.4)	84.5 (3.4)	12 (57.1)	17 (65.4)	21	26
Lin et al. 2013 [32]	Cohort	China	52.2 (9.7)	54.5 (10.3)	19 (70)	18 (71)	27	24
Nunna et al. 2022 [17]	Cohort	USA	NR	NR	3481(56.8)	3481 (56.8)	6124	6124
Qian et al. 2014 [34]	Cohort	China	65 (7.75)	65.4 (8)	24 (55.8)	88 (56.7)	43	155
Seng et al. 2013 [33]	Cohort	Singapore	58.6 (10.7)	60.6 (10.8)	40 (62.5)	40 (77)	64	52
Wilkerson et al. 2022 [20]	Cohort	USA	58.6 (11.8)	64.8 (10.6)	407 (51.5)	198 (55.0)	791	360
Xu et al. 2019 [19]	Cohort	China	55.2 (12.1)	54.8 (10.7)	12 (70.5)	25 (75.7)	17	33
Zou et al. 2023 [18]	Cohort	China	69.1 (5.3)	68.4 (5.4)	17 (53.6)	18 (54.5)	39	33

Table 2
Quality assessment of the included cohort studies using the New Caste Ottawa Scale.

Study name	Representativeness of the exposed cohort (★)	Selection of the nonexposed cohort (★)	Ascertainment of exposure (★)	Demonstration that outcome of interest was not present at the start of the study (★)	Comparability of cohorts based on the design or analysis (max★★)	Assessment of outcome (★)	Was follow-up long enough for outcomes to occur? (★)	Adequacy of follow-up of cohorts (★)	Quality level
Badhiwala et al. 2020 [22]	★	★	★	★	★★	★	0	★	High (8)
Asher et al. 2018 [35]	★	★	0	★	★	★	★	0	Moderate (6)
Audat et al. 2018 [23]	★	★	0	0	★★	0	★	★	Moderate (6)
Ahmed et al. 2020 [21]	★	★	0	★	★	★	★	0	Moderate (6)
Bourgonjon et al. 2019 [24]	★	★	0	★	★	★	★	0	Moderate (6)
Cabraja et al. 2010 [25]	★	★	0	0	★★	★	★	★	High (7)
Chen et al. 2019 [26]	★	★	★	★	★★	0	0	★	High (7)
Gill et al. 2011 [27]	★	★	★	★	★★	★	0	0	High (7)
Hitchon et al. 2019 [14]	★	★	★	★	★★	★	★	0	High (8)
Inose et al. 2020 [28]	★	★	★	★	★★	0	★	★	High (8)
Joo et al. 2022 [13]	0	0	★	0	★★	★	★	★	Moderate (6)
Kato et al. 2017 [29]	★	★	★	0	★★	★	★	★	High (8)
Kong et al. 2021 [30]	0	0	★	★	★★	★	★	0	Moderate (6)
Cahueque et al. 2016 [31]	★	★	★	★	★★	★	★	★	High (9)
Lenga et al. 2023 [16]	★	★	★	0	★★	★	★	★	High (8)
Lin et al. 2013 [32]	0	★	0	★	★	0	0	0	Low (3)
Nunna et al. 2022 [17]	★	★	★	★	★★	0	★	★	High (8)
Qian et al. 2014 [34]	★	★	★	★	★★	★	0	0	High (7)
Seng et al. 2013 [33]	★	★	★	★	★	0	★	0	Moderate (6)
Wilkerson et al. 2022 [20]	★	0	★	★	★	★	★	0	Moderate (6)
Xu et al. 2019 [19]	0	0	0	0	★	★	★	0	Low (3)
Zou et al. 2023 [18]	★	★	★	★	★★	0	★	★	High (8)

Japanese Orthopedic Association Score

No significant difference was observed between anterior and posterior approaches regarding the JOA with MD of −0.04 (95%CI: −0.56, 0.47, p=.87) (Fig. 3).

Neurological recovery rate and change in Cobb's angle

The anterior approach was associated with higher neurological recovery and a higher chance of Cobb's angle with MD of 4.18 (95%CI: 0.38, 7.91, p=.03) with I^2=51%, p=.09, and 6.91 (95%CI: 1.85, 11.97, p=.007) with I^2=79%, p=.002, respectively (Figs. 4 and 5).

Neck pain and disability

Regarding pain and disability, the anterior approach showed a statistically significant decrease in VAS, and NDI scales with MD of -0.44 (95%CI: −0.75, −0.12, p=.007) with I^2=0%, and −1.91 (95%CI: -3.74, −0.09, p=.04) and I^2=49%, p=.07, respectively (Figs. 6 and 7).

Blood loss and surgery time

Concerning blood loss, the anterior approach was associated with a statistically significant lower amount of blood loss compared to the posterior approach with MD of −61.97 (95CI: −101.95, −21.99, p=.002) and I^2=97%, p<.00001 (Fig. 8). However, it was associated with longer operation time with MD of 23.75 (95%CI: 7.67, 39.83, p=.004) and I^2=95%, p<.00001 (Fig. 9).

Incidence of complications and length of hospital stay

The anterior approach showed less incidence of complications compared to the posterior approach with OR of 0.65 (95%CI: 0.5, 0.84, p=.001) and I^2=60%, p=.007 (Fig. 10).

Regarding the length of hospital stay, the anterior approach was associated with a statistically significant decrease in hospital stay with MD of -1.66 (95%CI: −1.77, −1.56, p<.00001) and I^2=47%, p=.07 (Fig. 11).

Discussion

The current study investigates the efficacy and safety of anterior versus posterior approaches in patients with CSM. We found anterior approaches to be generally superior across most outcomes. This included higher neurological recovery rates, less blood loss, lower pain scores (VAS), lower disability scores (NDI), greater improvement in spinal alignment (Cobb's angle), shorter hospital stays, and fewer complications. However, anterior surgery also had a longer operative time compared to the posterior approach, and there was no significant difference between the 2 techniques in terms of JOA scores.

Literature reveals high heterogeneity in studies comparing anterior and posterior approaches for treating CSM.

Luo et al. conducted a meta-analysis of 8 publications, revealing no significant difference in preoperative JOA score or recovery rate between anterior and posterior surgery groups. While the anterior group had a shorter length of stay, it also experienced significantly higher intraoperative blood loss, operation duration, postoperative JOA score, and complication rate, aligning with previous findings [25].

There are published meta-analyses examining the decision-making process for CSM treatment. A review and meta-analysis by Liu et al. [36] compared surgical techniques (anterior vs. posterior) for multilevel CSM. They found no definitive answer on which approach is best. While the anterior approach showed higher postoperative neural function, there was no significant difference in neural function recovery rate between the 2 techniques [36]. Lawrence et al. [37] also found no clear advantage in terms of efficacy or safety for either approach in treating multilevel CSM. However, another study suggested that for less than 3

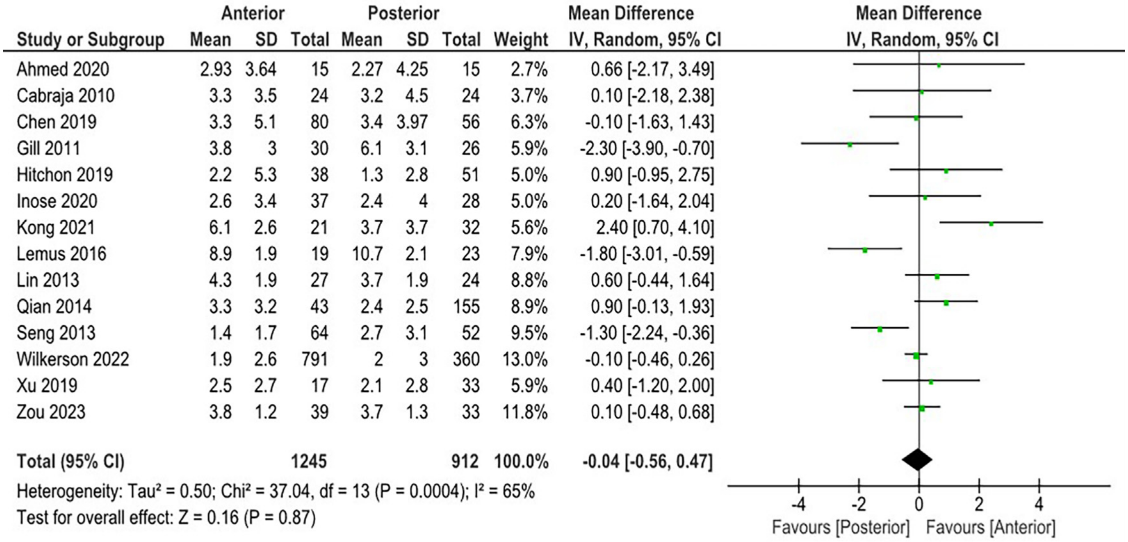

Fig. 3. Comparison between anterior and posterior approaches regarding change in Japanese Orthopedic Association score.

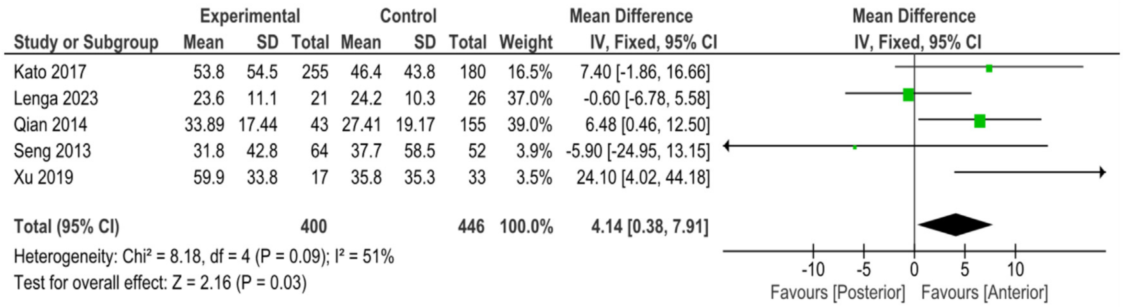

Fig. 4. Comparison between anterior and posterior approaches regarding neurological recovery rate.

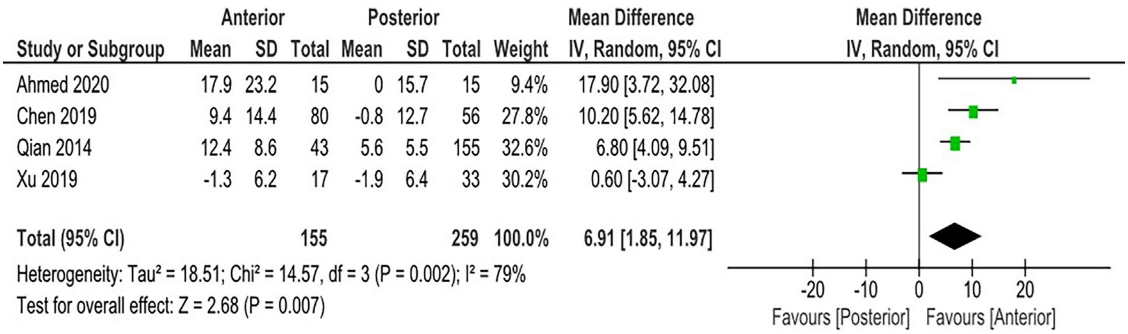

Fig. 5. Comparison between anterior and posterior approaches regarding change in Cobb's angle.

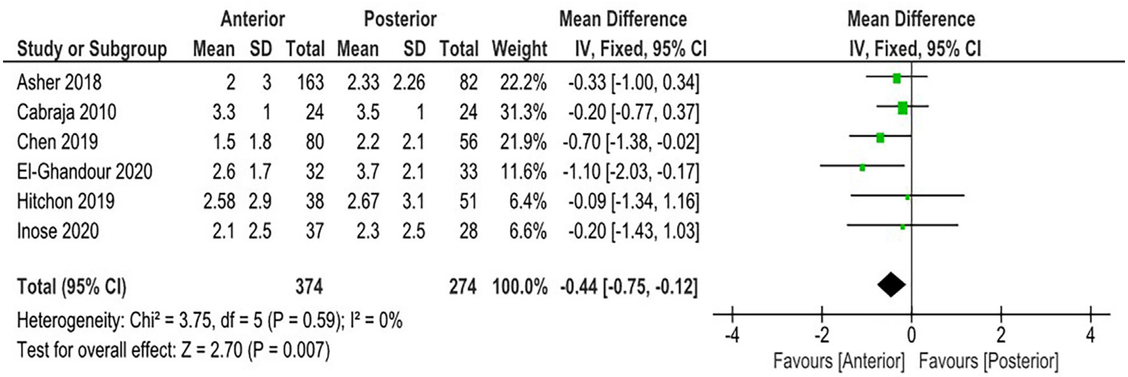

Fig. 6. Comparison between anterior and posterior approaches regarding visual analog scale.

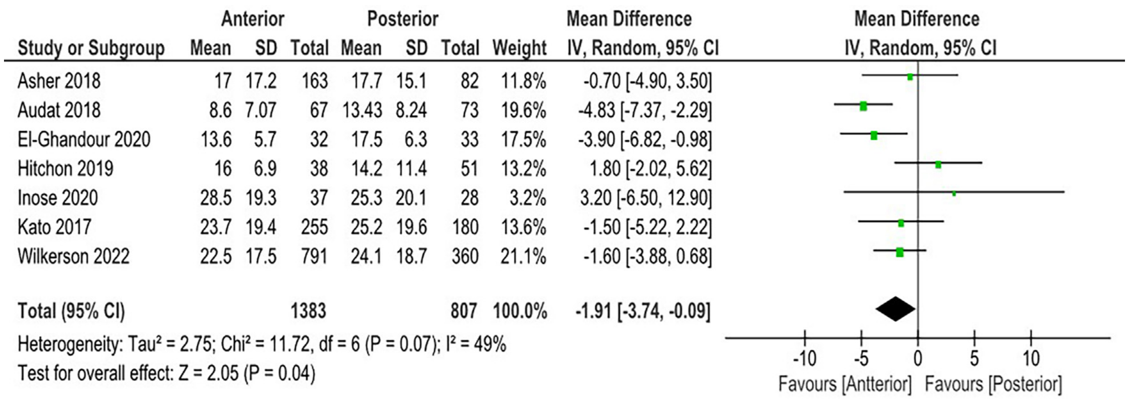

Fig. 7. Comparison between anterior and posterior approaches regarding the Neck Disability scale.

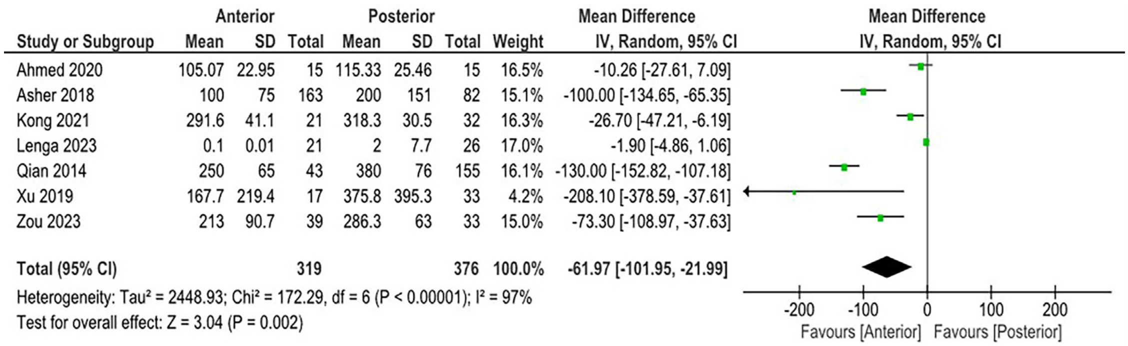

Fig. 8. Comparison between anterior and posterior approaches regarding blood loss.

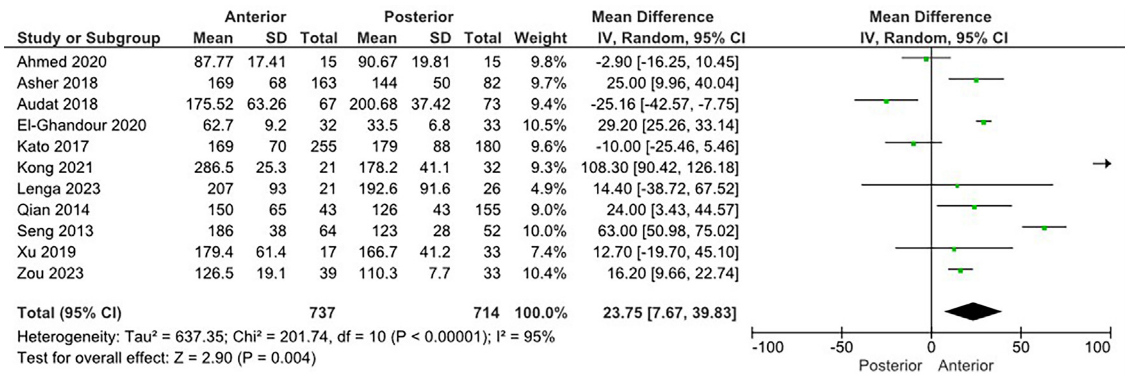

Fig. 9. Comparison between anterior and posterior approaches regarding operation time.

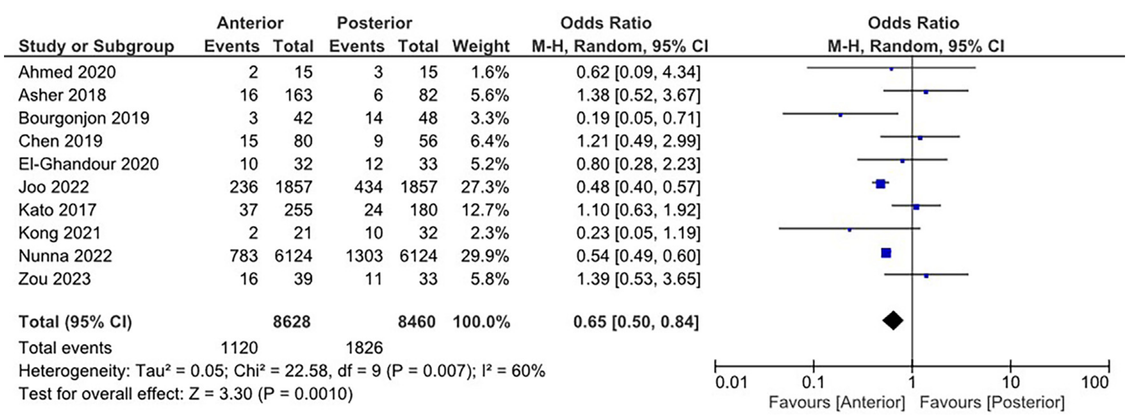

Fig. 10. Comparison between anterior and posterior approaches regarding complications.

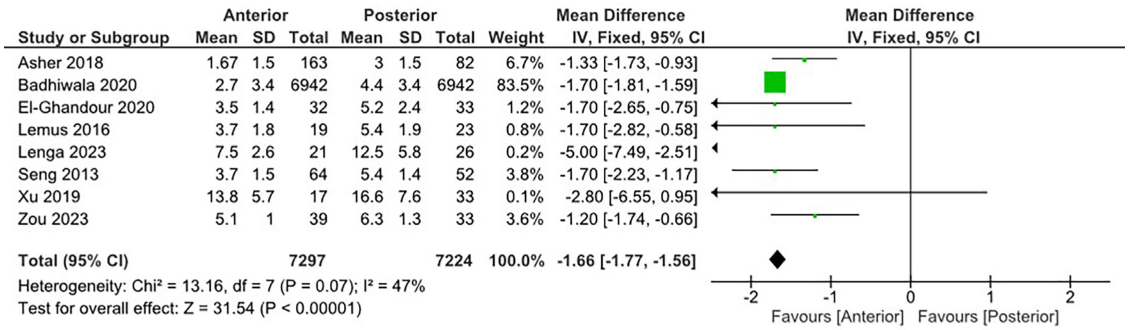

Fig. 11. Comparison between anterior and posterior approaches regarding hospital stay.

affected segments, anterior corpectomy and fusion might be preferable [38]. Conversely, for 3 or more segments, posterior laminoplasty might be better due to the higher surgical trauma and complication rates associated with multilevel anterior corpectomy [38].

Our study stands out as the most comprehensive one, analyzing the largest number of studies and incorporating the highest sample size. This robust approach positions our analysis to yield significant results that can directly guide further clinical practice.

The success of surgery for CSM can be influenced by several factors. Elderly patients, particularly those over 80, are more susceptible to higher morbidity and mortality rates due to their poorer baseline health [39,40]. This necessitates careful consideration when recommending surgery. In a retrospective study of 411 patients with degenerative CSM, Gembruch et al. [40] found that patients over 70 had significantly worse clinical conditions compared to younger patients, as assessed by the Charlson Comorbidity Index (around 50%). Another study by Gembruch et al. [41] identified a strong correlation between patients' pre- and postoperative neurological statuses and the presence of comorbidities, suggesting a longer recovery period for patients with higher comorbidity rates. Older age and the Charlson Comorbidity Index were found to be predictive factors for neurological recovery. However, Lenga et al. [16] presented contrasting findings, indicating that comorbidities were a separate risk factor for postoperative complications. Their study used regression analysis to determine if the Charlson Comorbidity Index could predict neurological outcomes. This difference might be due to their focus on patients over 80 with poor baseline health regardless of surgical approach. Nevertheless, they emphasized the importance of thoroughly evaluating and considering a patient's clinical history before planning surgery.

Nunna et al. [17] demonstrated a correlation between posterior fusion and increased rates of 30-day readmission and inpatient complications. Longer hospital stays in posterior fusion patients might explain higher risks of deep vein thrombosis/pulmonary embolism and urinary tract infections. Additionally, the prone stance during surgery with decreased venous return may predispose patients to these thromboembolic problems. As shown in this and other studies, the enhanced oesophageal manipulation associated with anterior methods is widely acknowledged to account for the much higher likelihood of dysphagia. A detailed investigation of 30-day complications in Nunna et al.'s [17] study discovered that a posterior approach was linked to higher rates of wound dehiscence, surgical site infection, and wound revision surgery. The literature supports these findings with elevated rates of wound complications (9, 10). Prolonged hospital stays and bed rest with pressure on the incision after posterior fusions could explain these results. Moreover, the posterior approach increases the possibility of wound breakdown or infection by requiring a more complex multilayer closure with increased force on the surgical incision. Further, investigated follow-up data retrieved from the human database that patients who underwent posterior spinal fusion had a significantly higher rate of pseudoarthrosis (nonunion) compared to those who did not (4.7% vs. 2.0%). They also showed a noticeably greater incidence of revision or extension surgery within the same group. This result was not the case for the anterior fusion group, which required more nonrevision surgery – in this case, a posterior approach. The reluctance of spine surgeons to reopen an anterior approach due to scar formation and the difficulties of correcting these grafts may account for their propensity to conduct a posterior fusion following the nonunion of an anterior approach. This preference might also be explained by the fact that posterior approach revision surgery has been shown to have higher fusion rates and a reduced incidence of repeat revision surgery after initial anterior approach pseudoarthrosis.

In brief, Nunna et al. [17] found that posterior spinal fusion is linked to higher rates of 30-day readmission, surgical site infection, and pseudoarthrosis compared to anterior approaches. This might be due to factors like prolonged bed rest, complex wound closure, and difficulty in revision surgery [17].

Limitations

Although our study included a comprehensive overview of the comparison between anterior and posterior approaches in CSM patients, there exist some limitations that should be considered. These limitations include the decreased availability of RCTs investigating our aim, in addition to the limited data that demonstrates the effect of other factors on the success of procedures. Therefore, we recommend further RCTs to validate our findings in addition to the investigation of confounding factors.

Conclusions

This study suggests that in patients with CSM, the anterior approach proved to be superior to the posterior approach regarding both efficacy and safety outcomes. The anterior approach was associated with a higher neurological recovery rate, higher change in Cobb's angle, lower incidence of complications, lower VAS, blood loss, and length of hospital stay compared to the posterior approach.

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Institutional review board statement

Not applicable as this is a systematic review and meta-analysis study.

Informed consent statement

Not required since there is no recruitment of patients in this study.

Declaration of competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

CRediT authorship contribution statement

Abdulsalam Aleid: Conceptualization, Writing – original draft, Writing – review & editing. **Saud Aldanyowi:** Conceptualization, Writing – original draft, Writing – review & editing. **Hasan Alaidarous:** Conceptualization, Writing – original draft, Writing – review & editing. **Zainab Aleid:** Conceptualization, Writing – original draft, Writing – review & editing. **Abdulaziz Alharthi:** Conceptualization, Writing – original draft, Writing – review & editing. **Abbas Al Mutair:** Conceptualization, Writing – original draft, Writing – review & editing.

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References

[1] Kalsi-Ryan S, Karadimas SK, Fehlings MG. Cervical spondylotic myelopathy: the clinical phenomenon and the current pathobiology of an increasingly prevalent and devastating disorder. Neuroscientist 2013;19(4):409–21.
[2] Young WF. Cervical spondylotic myelopathy: a common cause of spinal cord dysfunction in older persons. Am Family Phys 2000;62(5):1064–70.
[3] Nouri A, Tetreault L, Singh A, Karadimas SK, Fehlings MG. Degenerative cervical myelopathy: epidemiology, genetics, and pathogenesis. *Spine* (Phila Pa 1976) 2015;40(12):E675–93.
[4] Tracy JA, Bartleson JD. Cervical spondylotic myelopathy. Neurologist 2010;16(3):176–87.
[5] Karadimas SK, Erwin WM, Ely CG, Dettori JR, Fehlings MG. Pathophysiology and natural history of cervical spondylotic myelopathy. *Spine* (Phila Pa 1976) 2013;38(22 Suppl 1):S21–36.
[6] Klineberg E. Cervical spondylotic myelopathy: a review of the evidence. Orthop Clin North Am 2010;41(2):193–202.
[7] Zhang L, Chen J, Cao C, et al. Anterior versus posterior approach for the therapy of multilevel cervical spondylotic myelopathy: a meta-analysis and systematic review. Arch Orthop Trauma Surg 2019;139(6):735–42.
[8] Moher D, Liberati A, Tetzlaff J, Altman DG. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. BMJ 2009;339:b2535.
[9] Rayyan [Available from: https://rayyan.ai/.
[10] Wells GA, Wells G, Shea B, Shea B, O'Connell D, Peterson J, et al., editors. The Newcastle-Ottawa scale (NOS) for assessing the quality of nonrandomised studies in meta-analyses 2014.
[11] RoB 2: a revised Cochrane risk-of-bias tool for randomized trials | Cochrane Bias [available from: https://methods.cochrane.org/bias/resources/rob-2-revised-cochrane-risk-bias-tool-randomized-trials.
[12] RevMan: systematic review and meta-analysis tool for researchers worldwide | Cochrane RevMan [available from: https://revman.cochrane.org/info.
[13] Joo PY, Jayaram RH, McLaughlin WM, et al. Four-level anterior versus posterior cervical fusions: perioperative outcomes and five-year reoperation rates: outcomes after four-level anterior versus posterior cervical procedures. N Am Spine Soc J 2022;10:100115.
[14] Hitchon PW, Woodroffe RW, Noeller JA, Helland L, Hramakova N, Nourski KV. Anterior and posterior approaches for cervical myelopathy: clinical and radiographic outcomes. *Spine* (Phila Pa 1976) 2019;44(9):615–23.
[15] El-Ghandour NMF, Soliman MAR, Ezzat AAM, Mohsen A, Zein-Elabedin M. The safety and efficacy of anterior versus posterior decompression surgery in degenerative cervical myelopathy: a prospective randomized trial. J Neurosurg Spine 2020:1–9.
[16] Lenga P, Gülec G, Kiening K, Unterberg AW, Ishak B. Anterior cervical discectomy fusion versus posterior decompression and fusion in octogenarians with cervical myelopathy: clinical outcomes and complications with a 3-year follow-up. Brain Spine 2023;3:102683.
[17] Nunna RS, Khalid S, Chiu RG, et al. Anterior vs posterior approach in multilevel cervical spondylotic myelopathy: a nationwide propensity-matched analysis of complications, outcomes, and narcotic use. Int J Spine Surg 2022;16(1):88–94.
[18] Zou P, Zhang R, Yang JS, Li EL, Zhang Q, Zhao YT. Anterior and posterior approaches for 4-level degenerative cervical myelopathy: low-profile cage versus cervical pedicle screws fixation. J Clin Med 2023;12(2).
[19] Xu P, Zhuang JS, Huang YS, Tu C, Chen JT, Zhong ZM. Surgical outcomes of cervical myelopathy due to ossification of posterior longitudinal ligament: anterior decompression and fusion versus posterior laminoplasty. J Orthop Surg (Hong Kong) 2019;27(2):2309499019837907.
[20] Wilkerson CG, Sherrod BA, Alvi MA, et al. Differences in patient-reported outcomes between anterior and posterior approaches for treatment of cervical spondylotic myelopathy: A quality outcomes database analysis. World Neurosurg 2022;160:e436–41.
[21] Ahmed OEF, Galal A. Multiple levels anterior cervical discectomy and fusion versus posterior laminectomy for the management of multilevel cervical spondylotic myelopathy: clinical and radiological outcome. The Egyptian Journal of Neurology. Psychiatry Neurosurg 2020;56(1):32.
[22] Badhiwala JH, Ellenbogen Y, Khan O, et al. Comparison of the inpatient complications and health care costs of anterior versus posterior cervical decompression and fusion in patients with multilevel degenerative cervical myelopathy: a retrospective propensity score-matched analysis. World Neurosurg 2020;134:e112–19.
[23] Audat ZA, Fawareh MD, Radydeh AM, et al. Anterior versus posterior approach to treating cervical spondylotic myelopathy, clinical and radiological results with a long period of follow-up. SAGE Open Med 2018;6:2050312118766199.
[24] Bourgonjon B, Duerinck J, Moens M, D'Haens J. Comparison of the effect of anterior and posterior neurosurgical treatment for cervical spondylotic myelopathy: a clinical outcome. Acta Neurol Belg 2019;119(4):585–93.
[25] Cabraja M, Abbushi A, Koeppen D, Kroppenstedt S, Woiciechowsky C. Comparison between anterior and posterior decompression with instrumentation for cervical spondylotic myelopathy: sagittal alignment and clinical outcome. Neurosurg Focus 2010;28(3):E15.
[26] Chen Q, Qin M, Chen F, Ni B, Guo Q, Han Z. Comparison of outcomes between anterior cervical decompression and fusion and posterior laminoplasty in the treatment of 4-level cervical spondylotic myelopathy. World Neurosurg 2019;125:e341–7.
[27] Gill M, Maheshwari V, Yadav A, Gadhavi R. A clinicoradiological assessment following surgical intervention in patients of cervical spondylotic myelopathy: *an institutional experience*. Indian J Neurosurg 2021;11:1–7.
[28] Inose H, Yoshii T, Kimura A, et al. Comparison of clinical and radiographic outcomes of laminoplasty, anterior decompression with fusion, and posterior decompression with fusion for degenerative cervical myelopathy: a prospective multicenter study. *Spine* (Phila Pa 1976) 2020;45(20):E1342–8.
[29] Kato S, Nouri A, Wu D, Nori S, Tetreault L, Fehlings MG. Comparison of anterior and posterior surgery for degenerative cervical myelopathy: an MRI-based propensity-score-matched analysis using data from the prospective Multicenter AOSpine CSM North America and International Studies. J Bone Joint Surg Am 2017;99(12):1013–21.
[30] Kong QJ, Luo X, Tan Y, et al. Anterior controllable antedisplacement and fusion (ACAF) vs posterior laminoplasty for multilevel severe cervical ossification of the posterior longitudinal ligament: retrospective study based on a two-year follow-up. Orthop Surg 2021;13(2):474–83.
[31] Cahueque Lemus MA, Cobar Bustamante AE, Ortiz Muciño A, Caldera Hernandez G. Clinical outcome of anterior vs posterior approach for cervical spondylotic myelopathy. J Orthop 2016;13(3):123–6.
[32] Lin D, Zhai W, Lian K, Kang L, Ding Z. Anterior versus posterior approach for four-level cervical spondylotic myelopathy. Orthopedics 2013;36(11):e1431–6.
[33] Seng C, Tow BP, Siddiqui MA, et al. Surgically treated cervical myelopathy: a functional outcome comparison study between multilevel anterior cervical decompression fusion with instrumentation and posterior laminoplasty. Spine J 2013;13(7):723–31.
[34] Qian L, Shao J, Liu Z, et al. Comparison of the safety and efficacy of anterior 'skip' corpectomy versus posterior decompression in the treatment of cervical spondylotic myelopathy. J Orthop Surg Res 2014;9:63.
[35] Asher AL, Devin CJ, Kerezoudis P, et al. Comparison of outcomes following anterior vs posterior fusion surgery for patients with degenerative cervical myelopathy: an analysis from Quality Outcomes Database. Neurosurgery 2019;84(4):919–26.
[36] Liu X, Wang H, Zhou Z, Jin A. Anterior decompression and fusion versus posterior laminoplasty for multilevel cervical compressive myelopathy. Orthopedics 2014;37(2):e117–22.
[37] Lawrence BD, Jacobs WB, Norvell DC, Hermsmeyer JT, Chapman JR, Brodke DS. Anterior versus posterior approach for treatment of cervical spondylotic myelopathy: a systematic review. *Spine* (Phila Pa 1976) 2013;38(22 Suppl 1):S173–82.
[38] Liu X, Min S, Zhang H, Zhou Z, Wang H, Jin A. Anterior corpectomy versus posterior laminoplasty for multilevel cervical myelopathy: a systematic review and meta-analysis. Eur Spine J 2014;23(2):362–72.
[39] Fehlings MG, Smith JS, Kopjar B, et al. Perioperative and delayed complications associated with the surgical treatment of cervical spondylotic myelopathy based on 302 patients from the AOSpine North America Cervical Spondylotic Myelopathy Study. J Neurosurg Spine 2012;16(5):425–32.
[40] Gembruch O, Jabbarli R, Rashidi A, et al. Degenerative cervical myelopathy in higher-aged patients: how do they benefit from surgery? J Clin Med 2019;9(1):62.
[41] Gembruch O, Jabbarli R, Rashidi A, et al. Surgery for degenerative cervical myelopathy: what really counts? *Spine* (Phila Pa 1976) 2021;46(5):294–9.