



Abstract: 3357

Scientific Abstracts > Acute Pain

Systemic Steroids for Cervical Radicular Pain: A Systematic Review

Nolan Gall, Cyrus Ghaffari, Jyotsna Koduri, Christopher Dove, Joshua Levin

Stanford University

Introduction

Systemic steroids are commonly used treatments that have been studied extensively for lumbar radicular pain, with overall negative results(1). However, very little evidence exists for the use of systemic steroids for cervical radicular pain. The purpose of this review is to A) compile the current literature on systemic steroids in the treatment of cervical radicular pain and B) analyze and grade its effectiveness.

Materials and Methods

As the systematic review is devoid of patient identifiable information, it is exempt from IRB review requirements as per Stanford Medicine policy.

Search Strategy:

We identified studies by searching two electronic databases (PubMed and Ovid Medline) and previously known articles. We combined (using the Boolean Operator "AND") the following search terms: "Steroid* and Cervical Radic*" or "Steroid* and Cervicobrachialgia".

Inclusion/Exclusion Criteria:

We included all published articles involving cervical radicular pain treated with systemic steroids among adult users (≥ 18 years old). Information extracted included: (1) study design (2) characteristics of trial participants (3) diagnostic criteria; (4) treatment intervention protocol; (5) outcome measure; and (6) follow-up time.

Statistical Analysis:

Differences were evaluated across all included studies in addition to secondary outcomes, as defined by the studies. 95% Confidence Intervals (CI) were calculated for two studies(2,3).

Results/Case Report

We identified a total of 1,345 articles (Figure 1), of which 476 were duplicates and an additional 862 articles were excluded after reading the title and abstract. The characteristics of the studies included in this review are listed in Table 1.

Randomized Controlled Trials:

In 1993, Stav et al published results of a RCT evaluating the efficacy of IL epidural steroid injections versus paraspinal IM steroid injections for refractory cervicobrachialgia(3). The IL group experienced better relief with 76% [95%CI: 60 - 92%] of patients achieving at least 50% pain relief compared to 35% [95%CI: 13 - 58%] in the IM group ($P < 0.0377$). At the one-year follow up, the IL group experienced similar results with 68% [95% CI: 50 - 86%] achieving at least 50% pain relief compared to 12% [95%CI: 0 -27%] in the IM group ($P < 0.0004$).

In 2013, Ghasemi et al published results of a double-blinded randomized placebo-controlled trial evaluating the efficacy of oral steroids for treating acute cervical radicular pain(2). The prednisone group experienced greater reductions in NDI (35.7 ± 21.4 versus 12.9 ± 10.2 , $P < 0.001$) and NPRS (4.4 ± 2.7 versus 1.6 ± 1.2 , $P < 0.001$) as compared with the placebo group. Based on the minimal clinically important change in NDI (NDI = 8.5), pain was improved in 76% (22/29) [95%CI: 60 - 92%] of the prednisolone group and 30% (9/30) [95%CI: 14 - 46%] of the placebo group ($P < 0.001$).

Retrospective Study:

In 2017, Crovo et al published a prospective study evaluating if pain reduction following oral steroid treatment predicted pain reduction after an interlaminar cervical epidural steroid injection (ESI)(4). Forty-nine patients (69% [95%CI: 58% - 80%]) reported success (greater than 0% in pain relief during course of oral steroid treatment) whereas 22 (31% [95%CI: 20 - 42%]) reported failure.

Longitudinal Cohort Study:

In 1996, Saal et al published a study evaluating a systematically applied treatment program with increasing intervention as further pain control was needed for patients with cervical radicular pain(5). 13/22 (59% [95%CI: 38 - 80%]) subjects achieved self-defined "adequate pain control" of symptoms with oral prednisone, and the remaining 9 patients (41%) progressed to a cervical ESI.

Retrospective Chart Review:

In 2006, Nortman et al published an abstract retrospectively evaluating the use and effectiveness of oral corticosteroids for acute radicular pain(6). Of the 100 patients, 21 patients had cervical radicular symptoms, with 11/21 (52%) having confirmatory evidence of radiculopathy (defined as MRI, EMG, or objective clinical findings). After treatment, NPRS scores improved from 7.4 ± 2.5 to 5.3 ± 2.9 (mean difference 2.1 ± 2.8 ; 95% CI: 1.5, 2.6; $P < 0.001$), however scores were not stratified by lumbar or cervical location.

Case Reports:

In 1999, Stitik et al reported on two patients with EMG confirmed cervical radicular pain after manipulation via a salon sink while having their hair washed(7). Both patients were treated with a methylprednisolone 24mg/day taper over 6 days, and both reported that their "symptoms resolved".

In 2008, Mitra et al reported on two patients with radicular pain presumed to be caused by a perineural cyst (one cervical and one lumbar)(8). The patient with cervical radicular pain was treated with an oral methylprednisolone 24mg/day taper over 6 days. At 3-month follow-up, the VAS improved from 9/10 to 6/10, and the wrist extensor weakness had resolved.

Discussion

There are few studies that assess the use of systemic steroids for the treatment of cervical radicular pain. The only placebo-controlled RCT, conducted by Ghasemi et al, reported greater improvements in NDI (35.7 ± 21.4 versus 12.9 ± 10.2 , $P < 0.001$) and NPRS (4.4 ± 2.7 versus 1.6 ± 1.2 , $P < 0.001$) in the oral steroid group compared to placebo. Stav et al conducted the only invasive RCT included in our review, comparing IM steroid injections with IL epidural steroid injections(3). In this study, the ESI group outperformed the IM group.

Using the GRADE classification(9), we found moderate quality evidence that oral steroids are superior to placebo for the treatment of cervical radicular pain, however this is based on only one study. For IM steroids, we found low quality evidence that IM steroids are inferior to ESIs.

Based on one moderate-quality study, oral steroids are more effective than placebo. Based on one low quality study, intramuscular steroids are less effective than epidural steroid injections. Additional high-quality studies are needed to further evaluate the safety and effectiveness of systemic steroids as a treatment for cervical radicular pain.

References

1. Roncoroni C, Baillet A, Durand M, Gaudin P, Juvin R. Efficacy and tolerance of systemic steroids in sciatica: a systematic review and meta-analysis. *Rheumatol Oxf Engl*. 2011;50(9):1603-1611. doi:10.1093/rheumatology/ker151
2. Ghasemi M, Masaeli A, Rezvani M, Shaygannejad V, Golabchi K, Norouzi R. Oral prednisolone in the treatment of cervical radiculopathy: A randomized placebo controlled trial. *J Res Med Sci Off J Isfahan Univ Med Sci*. 2013;18(Suppl 1):S43-46.
3. Stav A, Ovadia L, Sternberg A, Kaadan M, Weksler N. Cervical epidural steroid injection for cervicobrachialgia. *Acta Anaesthesiol Scand*. 1993;37(6):562-566. doi:10.1111/j.1399-6576.1993.tb03765.x
4. Crovo DG, Craig WY, Curry CS, Richard JM, Pisini JV. Does Pain Reduction with Oral Steroids Predict Pain Reduction after a First-Time Cervical Epidural Steroid Injection in Patients with Cervical Radicular Pain? A Pilot Study. *Pain Med Malden Mass*. 2017;18(10):1873-1881. doi:10.1093/pm/pnx008
5. Saal JS, Saal JA, Yurth EF. Nonoperative management of herniated cervical intervertebral disc with radiculopathy. *Spine*. 1996;21(16):1877-1883. doi:10.1097/00007632-199608150-00008
6. Nortman S, Schaefer M, Govil H, Chae J. POSTER BOARD S9: USE AND EFFECTIVENESS OF ORAL CORTICOSTEROIDS FOR ACUTE RADICULOPATHY: A RETROSPECTIVE CHART REVIEW: *American Journal of Physical Medicine & Rehabilitation*. Accessed November 28, 2021. https://journals.lww.com/ajpmr/Citation/2006/03000/POSTER_BOARD_S9__USE_AND_EFFECTIVENESS
7. Stitik TP, Nadler SF, Foye PM. Salon sink radiculopathy: a case series. *Am J Phys Med Rehabil*. 1999;78(4):381-383. doi:10.1097/00002060-199907000-00019
8. Mitra R, Kirpalani D, Wedemeyer M. Conservative management of perineural cysts. *Spine*. 2008;33(16):E565-568. doi:10.1097/BRS.0b013e31817e2cc9

9. Guyatt GH, Oxman AD, Vist GE, et al. GRADE: an emerging consensus on rating quality of evidence and strength of recommendations. *BMJ*. 2008;336(7650):924-926. doi:10.1136/bmj.39489.470347.AD

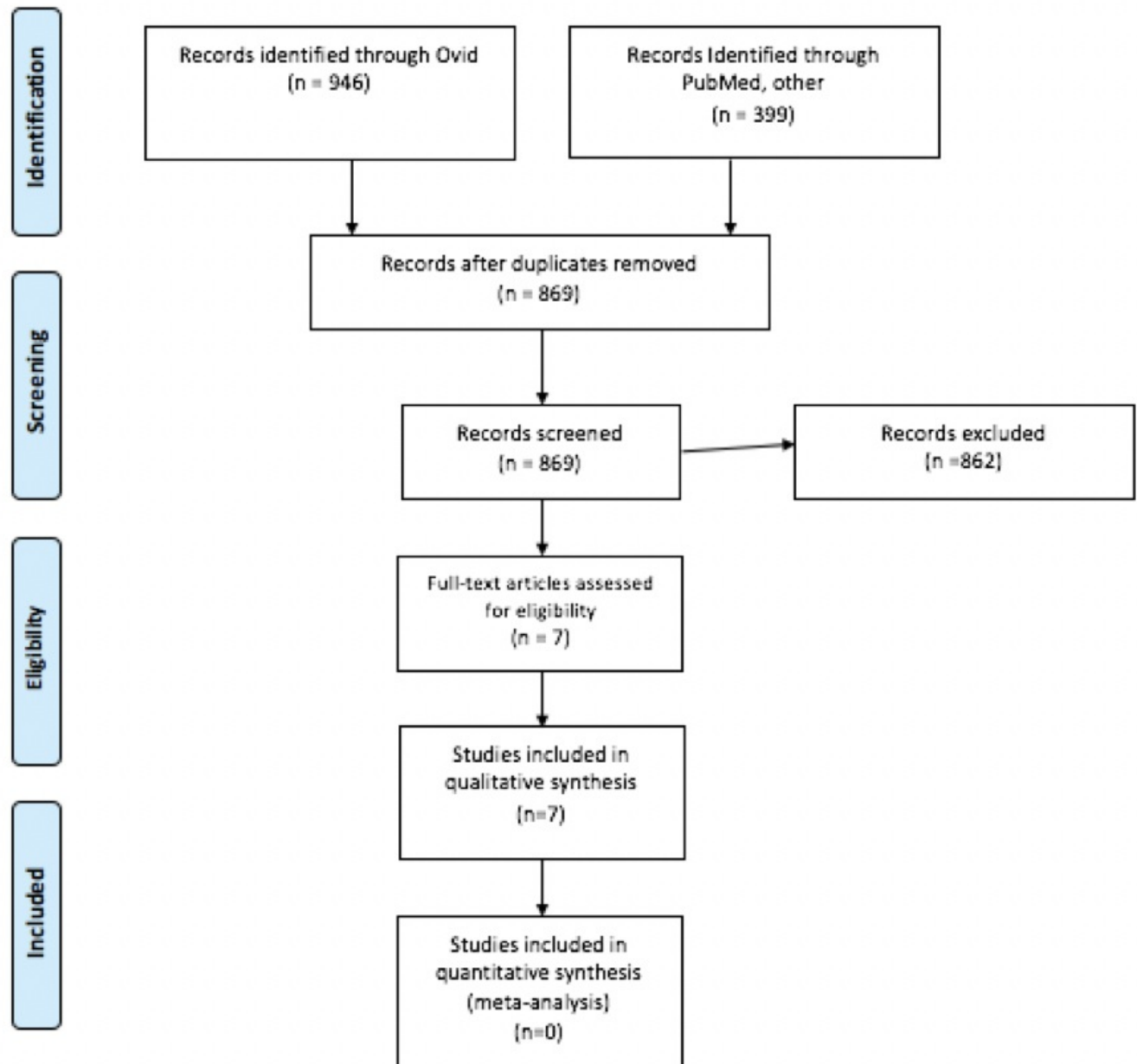
Disclosures

No

Tables / Images



PRISMA 2009 Flow Diagram



From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. *PLoS Med* 6(7): e1000097. doi:10.1371/journal.pmed.1000097

Figure 1. Systematic review flow diagram.

Author, Year	Study Design	Population (Mean age, SD)	Diagnosis	Intervention	Control	Primary Outcome	Follow-up Time
Stav, 1993	Randomized, controlled trial	N= 17 (49.3, 3.00)	Cervicobrachialgia for at least 6 months had clinical and radiological signs of pathology in the C4-C7 region, with or without signs of mechanical pressure on the dura mater and/or the nerve root.	Interlaminar epidural injection of 80 mg (2 ml) of methylprednisolone sodium acetate and 5 ml 1% lidocaine	Paraspinal intramuscular injection of 80 mg (2 ml) of methylprednisolone sodium acetate and 5 ml 1% lidocaine	Patient reported visual analog scale	1 week and 1 year
Saal, 1996	Longitudinal Cohort Study	N=28 (43.1, 2.7)	Focal cervical disc protrusion of less than 4mm identified on MRI and a chief complaint of upper extremity pain compatible with cervical radiculopathy	Oral prednisone (max 60mg/day x3 days) taper over 1 week	None	Patient reports adequate symptom control	2.3 ± 0.3 years (Mean)
Stitik, 1999	Case Report	N=2 (57, 0)	Radicular pain and electromyography	Oral methylprednisolone 24mg/day taper over 6 days	None	Patient reported pain	NR
Nortman, 2006	Retrospective Chart Review (Abstract)	N= 21 †	Signs and symptoms of radiculopathy	Oral Steroids	None	Numerical Pain Rating Scale (0-10)	Within 6 weeks
Mitra, 2008	Case Series	N=1 (38)	Myotomal pain and weakness with MR imaging confirmation of perineural cyst at C6 nerve root	Oral methylprednisolone 24mg/day taper over 6 days	None	Patient reported pain via visual analog scale and physician manual motor testing	3 months
Ghasemi, 2013	Randomized, controlled trial	N= 59 (46.2, 9.0)	Neck or shoulder pain and confirmed by electromyography and MR imaging of cervical	Oral prednisone 50mg/day taper over 5 days	Placebo	Neck Disability Index, Numerical Pain Rating Scale (0-10)	NR
Coxo, 2017	Retrospective Study†	N=71 (51.8, 11.0)	Acute cervical radicular pain with no clinically significant weakness of at least six weeks' duration and had undergone magnetic resonance imaging of the cervical spine in the past six months.	Oral Steroids	None	Any report of greater than 0% pain relief during the course of oral steroid treatment expressed as a binary variable (yes/no).	NR

Table 1. Study characteristics.

Not reported (NR)

†Original study consisted of a prospective cohort study that retrospectively assessed data of interest to this study.

‡Total N=100 (38.9 +/- 9.2) which included both lumbar (79) and cervical radiculopathy (21)

Author, Year	Intervention	Mean Pre-Intervention Outcome (SD)	Mean Post-Intervention Outcome (SD)
Stay, 1993	Interlaminar epidural versus paraspinal intramuscular injection of 80 mg (2 ml) of methylprednisolone sodium acetate and 5 ml 1% lidocaine	No baseline pain data reported	One week after the last injection, the IL group experienced better relief with 76% [95%CI: 60 - 92%] of patients achieving at least 50% pain relief compared to 35% [95%CI: 13 - 58%] in the IM group (P<0.0377). At the one year follow up the IL group experienced similar results with 68% [95% CI: 50 - 86%] achieving at least 50% pain relief compared to 12% [95%CI: 0 -27%] in the IM group (P<0.0004).
Saal, 1996	Oral prednisone (max 60mg/day x3 days) taper over 1 week	Radicular pain	13/22 received "adequate control" of symptoms
Stitik, 1999	Oral methylprednisolone 24mg/day taper over 6 days	Radicular pain	"Symptoms resolved"
Nortman, 2006	Oral Steroids	No Cervical Specific data‡	No Cervical Specific data‡
Mitra, 2008	Oral methylprednisolone 24mg/day taper over 6 days	VAS: 9/10 Wrist extension MMT: 4/5	VAS: 6/10 Wrist extension MMT: 5/5
Ghasemi, 2013	Prednisone 50mg/day taper over 5 days	NPRS: 8.4 (1.5) NDI: 68.8 (17.5)	NPRS: 4.0 (2.6)* NDI: 33.1 (24)*
Croyo, 2017	Oral Steroids	N=70 with radicular pain	N=49 with >0% pain improvement

Table 2. Study results.

*Statically significant (P<0.05)

‡Pretreatment and post treatment pain scores for both lumbar and cervical patients were 7.35 +/- 2.46 and 5.27 +/- 2.91, respectively (mean difference 2.09 +/- 2.76; 95% CI: 1.54, 2.63; P < 0.001)

Author, Year	Study Comparison	Bias Related to Randomization Process	Bias Related to Deviations from Intended Interventions	Bias Related to Missing Outcome Data	Bias Related to Outcome Measurement	Bias Related to Selection of Reported Results	RCT Other Bias Source	RCT Overall Risk of Bias
Stay et al, 1993	Interlaminar epidural versus paraspinal intramuscular injection of 80 mg (2 ml) of methylprednisolone sodium acetate and 5 ml 1% lidocaine	Low risk	Low Risk	Low risk	No reported baseline pain scores for either group	No reported sensory or motor deficits data reported but mentioned no significant improvements in the text.	Exclusion of 8 patients after randomization, exclusively from the IM steroid group, because they started the process of litigation; No reported blinding.	Moderate Risk
Ghasemi et al, 2013	Prednisone 50mg/day taper over 5 days	Low risk	Low risk	Low risk	Low risk	No follow up time frame reported	None identified	Low risk

Table 3. Cochrane Risk of Bias Assessment