

Supplementary Information

Appendix S2

MEDLINE (PubMed) search strategy

```
#1 "radiculopathy"[Mesh]
#2 "spinal stenosis"[Mesh]
#3 "intervertebral disc displacement"[Mesh]
#4 "spondylosis"[Mesh]
#5 "radiculopathy"[tiab]
#6 "spinal stenosis"[tiab]
#7 "intervertebral disc displacement"[tiab]
#8 "spondylosis"[tiab]
#9 nerve root compression*[tiab]
#10 nerve root disorder*[tiab]
#11 nerve root inflammation*[tiab]
#12 radiculitis*[tiab]
#13 radicular pain*[tiab]
#14 sciatica*[tiab]
#15 sciatica neuralgia*[tiab]
#16 degenerative disc*[tiab]
#17 degenerative disk*[tiab]
#18 disc* hernia*[tiab]
#19 herniated disc*[tiab]
#20 herniated disk*[tiab]
#21 herniated intervertebral disc*[tiab]
#22 herniated intervertebral disk*[tiab]
#23 spondylithes*[tiab]

#24 #1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11 OR #12 OR #13 OR #14
OR #15 OR #16 OR #17 OR #18 OR #19 OR #20 OR #21 OR #22 OR #23
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#25 Ultrasonography[Mesh]
#26 ultrasonography[tiab]
#27 ultrasonograph*[tiab]
#28 ultrasound*[tiab]
#29 ultrasonic*[tiab]
#30 echotomograph*[tiab]
#31 ultra sonograph*[tiab]
#32 ultra sound*[tiab]
#33 ultra sonic*[tiab]
#34 #25 OR #26 OR #27 OR #28 OR #29 OR #30 OR #31 OR #32 OR #33
#35 Injections[Mesh]
#36 "Nerve block"[Mesh]
#37 injection*[tiab]
#38 injectable*[tiab]
#39 nerve block*[tiab]
#40 block* nerve*[tiab]
#41 nerve root block*[tiab]
#42 transforaminal[tiab]
#43 "selective nerve"[tiab]
#44 periradicul*[tiab]
#45 #35 OR #36 #37 OR #38 OR #39 OR #40 OR #41 OR #42 OR #43 OR #44
#46 "randomized controlled trial"[Publication Type]
#47 "controlled clinical trial"[Publication Type]
#48 "randomized"[tiab]
#49 "placebo"[tiab]
#50 "drug therapy"[MeSH]
#51 "randomly"[tiab]

#52 "trial"[tiab]

#53 "groups"[tiab]

#54 "animals"[MeSH]

#55 "humans"[MeSH]

#56 #46 OR #47 OR #48 OR #49 OR #50 OR #51 OR #52 OR #53 NOT (#54 NOT #55)

#57 #24 AND #34 AND #45 AND #56

CENTRAL (Cochrane Library) search strategy

([mh "radiculopathy"] OR [mh "spinal stenosis"] OR [mh "intervertebral disc displacement"] OR [mh spondylosis] OR radiculopathy:ti,ab OR "spinal stenosis":ti,ab OR "intervertebral disc displacement":ti,ab OR spondylosis:ti,ab OR ("nerve root" NEXT compression*):ti,ab OR ("nerve root" NEXT disorder*):ti,ab OR ("nerve root" NEXT inflammation*):ti,ab OR radiculitis*:ti,ab OR

("radicular" NEXT pain*):ti,ab OR sciatica*:ti,ab OR ("sciatica" NEXT neuralgia*):ti,ab OR ("degenerative" NEXT disc*):ti,ab OR ("degenerative" NEXT disk*):ti,ab OR (disc* NEXT hernia*):ti,ab OR ("herniated" NEXT disc*):ti,ab OR ("herniated" NEXT disk*):ti,ab OR ("herniated intervertebral" NEXT disc*):ti,ab OR ("herniated intervertebral" NEXT disk*):ti,ab OR spondylolisthesis*:ti,ab) AND ([mh Ultrasonography] OR ultrasonography:ti,ab OR ultrasonograph*:ti,ab OR ultrasound*:ti,ab OR ultrasonic*:ti,ab OR echotomograph*:ti,ab OR ("ultra" NEXT sonograph*):ti,ab OR ("ultra" NEXT sound*):ti,ab OR ("ultra" NEXT sonic*):ti,ab) AND ([mh Injections] OR [mh "Nerve block"] OR injection*:ti,ab OR injectable*:ti,ab OR ("nerve" NEXT block*):ti,ab OR (block* NEXT nerve*):ti,ab OR ("nerve root" NEXT block*):ti,ab OR transforaminal:ti,ab OR "selective nerve":ti,ab OR periradicul*:ti,ab)

EMBASE (Dialog) search strategy

S1 EMB. EXACT. EXPLODE("radiculopathy")

S2 EMB.EXACT.EXPLODE("spinal stenosis")

S3 EMB.EXACT.EXPLODE("intervertebral disc displacement")

S4 EMB.EXACT.EXPLODE("spondylosis")

S5 ab(radiculopathy) OR ti(radiculopathy)

S6 ab(spinal stenosis) OR ti(spinal stenosis)

S7 ab(intervertebral disc displacement) OR ti(intervertebral disc displacement)

S8 ab(spondylosis) OR ti(spondylosis)

S9 ab(nerve root compression) OR ti(nerve root compression)

S10 ab(nerve root disorder) OR ti(nerve root disorder)

S11 ab(nerve root inflammation) OR ti(nerve root inflammation)

S12 ab(radiculitis) OR ti(radiculitis)

S13 ab(radicular pain) OR ti(radicular pain)

S14 ab(sciatica) OR ti(sciatica)

S15 ab(sciatica neuralgia) OR ti(sciatica neuralgia)

S16 ab(degenerative disc) OR ti(degenerative disc)

S17 ab(degenerative disk) OR ti(degenerative disk)

S18 ab(disc hernia) OR ti(disc hernia)

S19 ab(herniated disc) OR ti(herniated disc)

S20 ab(herniated disk) OR ti(herniated disk)

S21 ab(herniated intervertebral disc) OR ti(herniated intervertebral disc)

S22 ab(herniated intervertebral disk) OR ti(herniated intervertebral disk)

S23 ab(spondylithes) OR ti(spondylithes)

S24 S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8 OR S9 OR S10 OR S11 OR S12 OR S13 OR S14

OR S15 OR S16 OR S17 OR S18 OR S19 OR S20 OR S21 OR S22 OR S23

S25 EMB. EXACT. EXPLODE("Ultrasonography")

S26 ab(ultrasonography) OR ti(ultrasonography)

S27 ab(ultrasound) OR ti(ultrasound)

S28 ab(ultrasonic) OR ti(ultrasonic)

S29 ab(echotomograph) OR ti(echotomograph)

S30 ab(ultra sonograph) OR ti(ultra sonograph)

S31 ab(ultra sound) OR ti(ultra sound)

S32 ab(ultra sonic) OR ti(ultra sonic)

S33 S25 OR S26 OR S27 OR S28 OR S29 OR S30 OR S31 OR S32

S34 EMB. EXACT. EXPLODE("Injections")

S35 EMB. EXACT. EXPLODE("Nerve block")

S36 ab(injection) OR ti(injection)

S37 ab(injectable) OR ti(injectable)

S38 ab(nerve block) OR ti(nerve block)

S39 ab(block nerve) OR ti(block nerve)

S40 ab(nerve root block) OR ti(nerve root block)

S41 ab(transforaminal) OR ti(transforaminal)

S42 ab(selective nerve) OR ti(selective nerve)

S43 ab(periradicular) OR ti(periradicular)

S44 S34 OR S35 OR S36 OR S37 OR S38 OR S39 OR S40 OR S41 OR S42 OR S43

S45 (ab(random*) OR ti(random*)) OR (ab(clinical NEAR/1 trial*) OR ti(clinical NEAR/1 trial*)) OR (EMB.EXACT("health care quality"))

S46 S24 AND S33 AND S45

ICTRP search strategy

("radiculopathy" OR "spinal stenosis" OR "intervertebral disc displacement" OR "spondylosis" OR "nerve root" OR "radicular pain" OR "sciatica" OR "degenerative disc" OR "herniated disc" OR "herniated intervertebral disc" OR "spondylolisthes")

AND

("ultrasonography" OR "ultrasonographies" OR "ultrasound" OR "ultrasounds" OR "ultrasonic" OR "ultrasonics" OR "echotomography" OR "echotomographs" OR "ultra sonograph" OR "ultra sonographs" OR "ultra sound" OR "ultra sounds" OR "ultra sonic" OR "ultra sonics")

AND

("injection" OR "injectable" OR "nerve block" OR "block nerve" OR "nerve root block" OR "transforaminal" OR "selective nerve" OR "periradicular")

ClinicalTrials.gov search strategy

Condition or disease:

“radiculopathy” OR “spinal stenosis” OR “intervertebral disc displacement” OR “spondylosis” OR “nerve root” OR “radicular pain” OR “sciatica” OR “degenerative disc” OR “herniated disc” OR “herniated intervertebral disc” OR “spondylolisthes”

Intervention:

(“ultrasonography” OR “ultrasound” OR “ultrasonic” OR “ultra sonograph” OR “ultra sound” OR “ultra sonic”)

AND

(“injection” OR “nerve block” OR “block nerve” OR “nerve root block” OR “transforaminal” OR “selective nerve” OR “periradicular”)

Appendix S3

List of reports excluded from this review and reasons for exclusion

Reason for exclusion	references
Wrong intervention	Ji-seon Son. Ultrasound-guided transforaminal block versus selective nerve root block for epidural distribution of contrast agent in patients with cervical radiculopathy. CRiS KCT0007099.
Wrong intervention	Gelinimoghaddam A, et al. Comparative studies on the success level of sonographic guided epidural steroid injection and its effectiveness with fluoroscopy techniques in treating lumbar radicular pain. <i>Bio science Biotechnology Research Communications</i> , 2017, 10.2: 148-54.
Protocols without results	Nevert Adel, Ultrasound-guided versus combined ultrasound and fluoroscopy-guided cervical selective nerve root block for lower cervical radiculopathy: non-inferiority randomized controlled study. Clinical Trials.gov NCT05521373.
Protocols without results	Dongping Do. Cervical transforaminal injection of steroids guided by ultrasound. ClinicalTrials.gov NCT02295709.
Protocols without results	Paul Gruson. Ultrasound-guided lumbar periradicular injection: a non irradiating infiltration technique. ClinicalTrials.gov NCT03453775.
Protocols without results	Xianzheng Zeng. Safety, accuracy and effectiveness of ultrasound-guided cervical transforaminal steroid injection. ChiCTR1900026544.
Protocols without results	Qiaosheng Zhong. Comparison of ultrasound-guided and CT guided for selective lumbar nerve root block. ChiCTR2000040289.
Protocols without results	Zheng Shuyue. Cervical transforaminal injection for the treatment of cervical radiculopathy under the guidance of ultrasound and radiography. ChiCTR2100052149.
Data of outcome was unclear	Bakr, IA, Abu Elhusein AK, Mohamed AEL, et al. Comparison of Ultrasound and fluoroscopy guidance in selective lumbar nerve root injection for treatment of radicular pain. <i>Minia Journal of Medical Research</i> , 2023.

Appendix S4

Risk of bias table for major adverse events

		Risk of bias domains				
		D1	D2	D3	D4	D5
Study	Cui 2022					
	Jee 2013					
	Loizides 2013					
	Obernauer 2013					
	Yang 2016					
	Yue 2023					

Domains:
D1: Bias arising from the randomization process.
D2: Bias due to deviations from intended intervention.
D3: Bias due to missing outcome data.
D4: Bias in measurement of the outcome.
D5: Bias in selection of the reported result.

Judgement
 Some concerns
 Low

Appendix S5

Risk of bias table for procedure time

		Risk of bias domains				
		D1	D2	D3	D4	D5
Study	Cui 2022					
	Loizides 2013					
	Obernauer 2012					
	Plaikner 2023					
	Yang 2016					
	Yue 2023					
	Zhang 2022					

Domains:
D1: Bias arising from the randomization process.
D2: Bias due to deviations from intended intervention.
D3: Bias due to missing outcome data.
D4: Bias in measurement of the outcome.
D5: Bias in selection of the reported result.

Judgement
 Some concerns
 Low

Appendix S6

Risk of bias table for change in functional disability score

		Risk of bias domains				
		D1	D2	D3	D4	D5
Study	Cui 2022					
	Jee 2013					
	Yue 2023					
	Zhang 2022					

Domains:
D1: Bias arising from the randomization process.
D2: Bias due to deviations from intended intervention.
D3: Bias due to missing outcome data.
D4: Bias in measurement of the outcome.
D5: Bias in selection of the reported result.

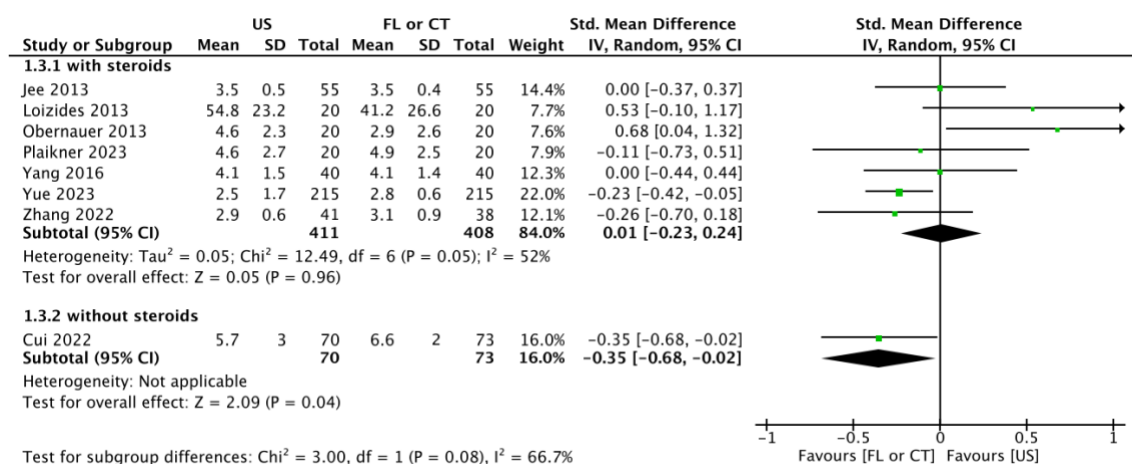
Judgement
 High
 Some concerns
 Low

Appendix S7

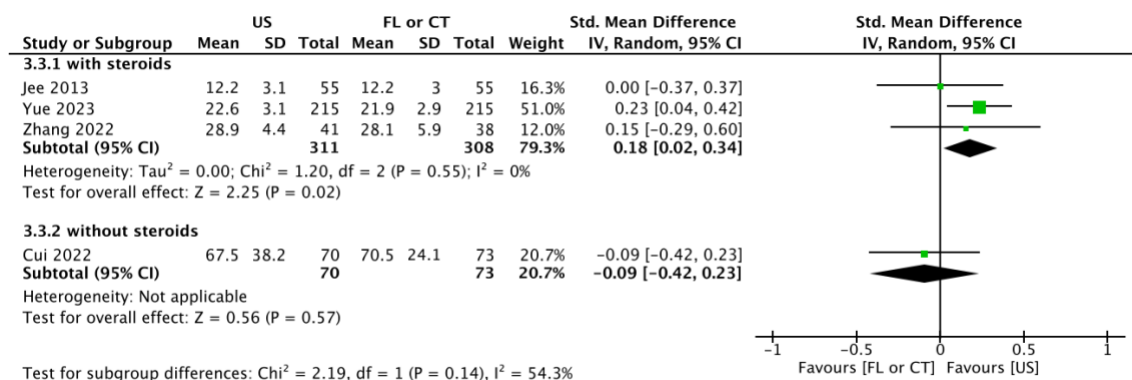
Risk of bias table for minor adverse events

		Risk of bias domains					
		D1	D2	D3	D4	D5	Overall
Study	Cui 2022						
	Jee 2013						
	Loizides 2013						
	Obernauer 2013						
	Yang 2016						
	Yue 2023						
		Domains:					Judgement
		D1: Bias arising from the randomization process.					Some concerns
		D2: Bias due to deviations from intended intervention.					
		D3: Bias due to missing outcome data.					
		D4: Bias in measurement of the outcome.					
		D5: Bias in selection of the reported result.					Low

Appendix S8



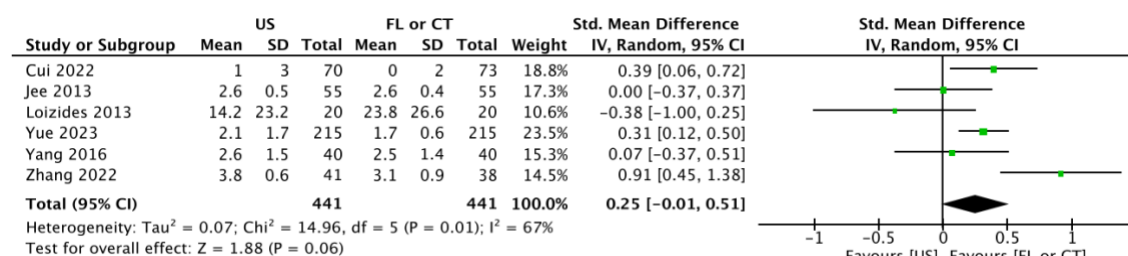
Appendix S9



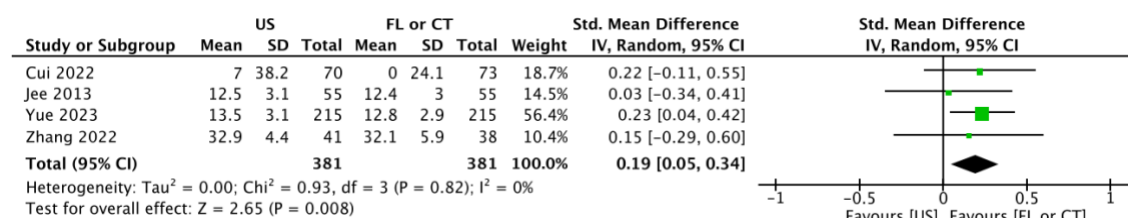
Forest plot of included studies comparing ultrasound (US) guided spinal nerve injections with fluoroscopy (FL) or computed tomography (CT) guided spinal nerve injections, the subgroup analysis between those with steroids and those without steroids. Change in pain score

(Appendix S8); Change in functional disability score (Appendix S9) (SD, standard deviation; IV, inverse-variance method; CI, confidence interval; df, degree of freedom).

Appendix S10

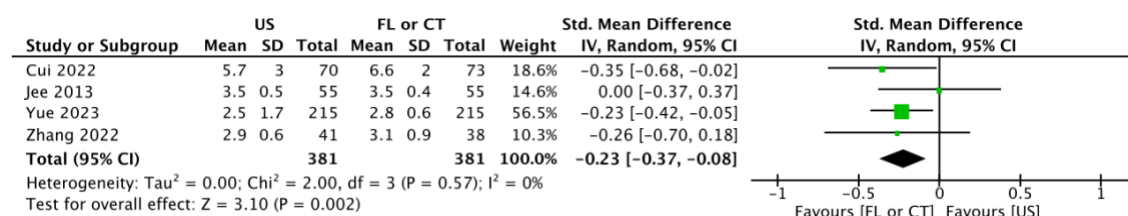


Appendix S11



Forest plot of included studies comparing ultrasound (US) guided spinal nerve injections with fluoroscopy (FL) or computed tomography (CT) guided spinal nerve injections. The sensitivity analysis that includes studies reporting post intervention values. Pain score (Appendix S10); Functional disability score (Appendix S11) (SD, standard deviation; IV, inverse-variance method; CI, confidence interval; df, degree of freedom).

Appendix S12



Forest plot of included studies comparing ultrasound (US) guided spinal nerve injections with fluoroscopy (FL) or computed tomography (CT) guided spinal nerve injections. The sensitivity analysis that excludes studies reporting only short term results less than 3 months in pain score. (SD, standard deviation; IV, inverse-variance method; CI, confidence interval; df, degree of freedom).