Appendix 5. Details of outcomes in the selected randomized controlled trials.

1st author, year (Excel ID)	**Results- Primary outcome**	**Results- Secondary outcomes**	**Specific adverse effects / Complications**	**Credentials of interventionalists (years of training, designation, etc.)**	**Duration of follow-up if single study or frequency for procedures that were repeated**	**Comments (information regarding sterility for the procedure, etc.)**
CERVICAL FACET JOINT PROCEDURES: MBB, IAI, RFA						
Lord 1996 n=24	Median of pain relief (pain<50% of baseline): - 263 days in RFA group vs 8 days in control group	Second procedure- 5/12 patients in both groups	*Numbness in 5 patients in RFA group *Psoriatic rash in 1 patient in RFA group (1week post-op)	Surgeon (no details)	*27 weeks	Not specified
Barnsley 1994 n=41	No difference between groups in the time required for return of pain to >50% of baseline level: *Corticosteroid: 3 days *LA: 3.5 days	None	*Transient facial flushing in 2 patients (group not specified)	Experienced physicians	*12 weeks	Not specified
Park 2012 n=400	Increased cervical ROM, greater mean NRS pain reduction, and decreased	Decreased number of visits to the pain clinic in the injection group as compared	No cervical IA injection	Not specified	12 months	Not specified

	incidence of combined tension-type headache in the IA injection group compared with the non-injection group at all follow-ups	to the non-injection group				
van Eerd 2021 n=76	* No difference between groups (55.6% of RFA+MBB reported >30% reduction in pain NRS compared with 51.3% in the MBB group)	*No difference between groups in all measures except better QOL in domain bodily pain in intervention group (P=0.010). *Median time to end of treatment success for patients in the RFA+MBB group was 42 months compared with 12 months in the MBB group (p=0.01)	*None related to treatment	Not specified	*6 months (extended to 48 months for successful interventions)	Not specified
LUMBAR FACET JOINT PROCEDURES: MBB, IAI, RFA						
Van Wijk 2005(4) n=81 (364)	No difference between groups (success 27.5% (RFA) vs 29.3% (Sham))	GPE improved in RF group (p=0.044)	*36% patients had severe procedure-related pain in RF group vs 26% in sham	Not specified	*3 months end of blinding *12 months maximum followup	

			group			
Sae-Jung 2016(5) n=99(1426)	*lower ODI in combined and MPA injection groups at 4+12weeks compared with diclofenac *Combined group showed lower ODI than MPA only at 4weeks. *Combined+MPA showed lower VAS than diclofenac at 4 weeks.	NA	*12% of diclofenac-dyspepsia *44% -post-injection site discomfort	Not specified	*12 weeks	
Nath 2008(6) n=40(3187)	*RFA significantly better than sham in global improvement, generalized pain, back pain, referred pain. The differences in reduction between groups were statistically significant (P=0.004).	*RFA significantly better than sham in spine ROM, hip movement, QOL, SIJ test, paravertebral tenderness, tactile sensory deficit, analgesic requirements	No complications	Not specified	*6 months	

Tekin 2007(7) n=60(3284)	*PRF+CRF better than sham post procedurally, but CRF maintained at 6+12 months, PRF did not. At 1 year, pain VAS was similar in control and PRF but lower in CRF. *At 1 year, ODI lower in CRF and PRF compared to sham.	*Analgesic use: control> PRF >CRF at 1-year follow-up *Satisfaction was lower in control group than other groups (P=0.03), highest in CRF group.	No complications	Not specified	*12 months	
Lilius 1989(8) n=109(4180)	*Lower pain VAS in all groups compared to pre-procedure. *No difference between groups in pain score at any time *Pain relief persisting in 36% of patients after 3 months	*Work status better in all groups regardless of intervention. *Disability score better in all groups regardless of intervention.	Few side effects were reported by the patients and their occurrence did not differ between groups (no further details).	Not specified	3 months	
Cohen 2018 (?) n=229 (None)	No difference in the proportion of patients in the 3 groups with ≥2	No significant differences in the secondary outcome	complications were minor, occurring in 7% of	Attending physician board certified	6 months	

	point reduction in VAS at 1 month after the procedures	Measures - medication reduction, Oswestry disability index, and satisfaction scores	patients - rash, localized skin infection, vasovagal episode, nausea, numbness, and worsening pain	in pain medicine or by a trainee under their supervision		
van Tilburg 2016(10) n=60 (2058)	*No significant difference between groups in pain NRS decrease at 1 and 3 months.	*No significant differences in GPE or satisfaction between groups	*No serious adverse events.	Not specified	*3 months *A crossover for the sham group was provided after a minimum of 3 months.	
Zhou 2016(11) n=80 (2087)	*pain VAS scores of RFA group were significantly lower than the control at each time point. *The mean VAS at 6 months increased, but still lower than baseline and lower than control.	*Schober index did not significantly differ at 1 week, but was higher in RFA group at 1 & 6 months. *Half-year efficacy was greater in RFA group.	None	Not specified	*6 months	
Gallagher 1994(12) n=41(6930)	*Among patients with good response to IAI of LA: RFA was better than	None	no adverse events	“Doctors working in the pain clinic”	*6 months	

	placebo at 1 month in pain VAS and Mc-Gill score. *At 6 months only pain VAS was lower, with Mc-Gill similar. *Among patients with equivocal response, no significant decrease in VAS or better McGill score were observed.					
van Kleef 1999(13) n=31 (758)	At 8 weeks: *Higher success rate was found in RFA group compared with sham procedure. At 3,6,12 months success rate was higher in the RFA group.	At 8 weeks: * Pain VAS and ODI decreased significantly more in RFA group than the sham group. *GPE was higher in RFA group than in sham group Change in analgesic use and quality of life not reported.	No complications	Not specified	*12 months	

Ribeiro 2013(14) n=60(2476)	* Pain VAS significantly reduced in both groups without difference. *Roland-Morris questionnaire showed improvement in both groups without difference. *IAI group had greater improvement on "role physical" profile than control. *No differences were found between the groups regarding the other SF-36 profiles *Likert scale was better in IAI group only at 1 week. *Improvement percentage at weeks 7 and 12 were better in IAI group.	*VAS for spontaneous pain and pain on extension, and functional capacity assessed by Roland-Morris questionnaire improved over time, with no statistical differences between the groups at any timepoint	No differences between groups in rate of adverse events. Local events reported were post-procedure pain (9) and cutaneous hypochromia (1). The most frequently reported systemic events were increase in blood glucose levels (5), vaginal bleeding (3), dizziness (3), and nausea (3). One patient from control group had gastrointestinal bleeding between week 12 and week 24 and underwent endoscopic therapy. 1 died due to heart failure.	A rheumatologist with experience in minimally invasive procedures	*24 weeks	Primary and secondary outcomes are not specified by authors

	*Analgesic use-acetaminophen use was similar between groups, but less diclofenac was used in the IAI group.					
Lakemeier 2013(15) n=56 (2517)	At 6 months: * RMQ improved in both groups. No difference between the 2 groups	At 6 months: *Pain VAS and ODI decreased in both groups. No difference between groups.	None	Primary evaluation by an experienced orthopedic surgeon. IAI/RFA proceduralist not mentioned.	*6 month	
Carette 1991(16) n=97(4122)	At 1 and 3 months: *No difference between groups in all outcome measures. At 6 months: *Intervention better than placebo in: -Self reported improvement. - Pain VAS - SIP score	Important remark: More concurrent interventions reported in MPA than placebo during 6 months of study. In an adjusted analysis to concurrent interventions, only SIP score and present pain intensity were still significant. Pain VAS and overall improvement differences decreased to insignificant values.	No adverse effects other than transient local pain at injection sites	Not specified	*6 months	* The skin overlying the facet joints were prepared, draped and infiltrated with 1% lidocaine.

Leclaire 2001(17) n=70(13905)	At 4 weeks: *Roland-Morris score improved in the treatment group more than sham group. *No difference in ODI. At 12 weeks: *No significant treatment effect in both groups as measured by both Roland-Morris and ODI *Pain VAS-no difference between the two groups.	At 4+12 weeks: *No difference in spinal mobility and strength measures. * No difference in work status change.	None	Two experienced specialists who had performed the techniques for more than 10 years.	*12 weeks	*RFA according to the procedure described by Lazorthes andVerdie27and modified from Shealy *Under sterile conditions
Kennedy 2019 (18)n=56(117)	*No difference between groups in progression rate to RFA.	*No statistically significant difference in the average time to RFA At one year: *Patients who progressed to RFA from both groups had less pain NRS then those who didn't.	Not reported	Evaluation by either a board-certified physical medicine and rehabilitation (PM&R) physician or a board-certified orthopedic spine surgeon. Proceduralist not defined.	*52 weeks	
Kennedy 2018 (19)n=24(236)	*24 of 28 patients (85.7%, 95% CI =	Not reported (due to concurrent	Not reported	Not specified	*6 weeks	

	72.7%–98.7%) had a positive response to MBB. *No difference in progression to RFA * No difference in time to RFA. * Over 75% of all patients progressed to RFA before the 6 weeks assessment.	intervention (RFA) before 6 weeks assessment in >75% of patients				
Juch 2017(20) n=251 (737-1)	*RFA+ exercise resulted in no improvement in LBP compared with exercise program alone.	No difference between groups in any secondary outcome measure.	None	Not specified	*12 months	
Ackerman 2008 (?) n=46 (None)	*Pain scores lower in the IAI group at 12 weeks	*ODI scores lower in the IAI group at 12 weeks *A higher number of patients in the IAI group had pain relief at 12 weeks	Not reported	fellowship trained and board certified in anesthesiology by the American Board of Anesthesiology, with added qualifications in pain medicine as recognized by the American Board of Medical Specialties	12 weeks	Procedures done after sterile skin preparation and after a fenestrated sterile drape was placed

SACROILIAC JOINT PROCEDURES: LBB, IAI, RFA						
Luukkainen 2002(21) n=24(3711)	*Steroid group better than saline group in both pain VAS and pain index, statistically significant.	None	Not reported	Not specified	* 1 month	
Tilburg 2016(22) n=60 (14700)	At 1+3 months: *No difference in pain NRS between groups over time. Statistical manipulation that did produce significance at 1 month: The Period factor, however, yielded a significant difference(F1,58= 61.67;P< 0.001), that is, when pooled together the mean pain level of the patients was significantly reduced at T1 comparedwith T0.	At 1+3 months: *No difference in GPE between groups	a fall from the stairs during the follow-up period.	Not specified	*3months	

Patel 2012(23) n=51 (2676)	At 3 months: * Pain NRS in RFA group significantly lower than in the sham group.	At 1+3 months: *ODI better in treatment groups than sham. *SF-36BP better in treatment group than sham. At 3 months: *SF36PF better in treatment group than sham. *Treatment success (Over 50% pain NRS decrease+1 other successful test mentioned) was in significantly higher rates in the treatment group than sham (16/34, 2/17) At 3 months: *Quality of life score better in treatment group than sham.	In a small portion of patients soreness or numbness at the introducer sites in the 2 weeks following treatment.	Not specified	*9 months *blinding ended after 3 months	
Cohen 2008(24) n=28 (3160)	At 1 month: *Significantly decreased pain NRS in the treatment group vs sham group.	At 1 month: *Significant difference in ODI, GPE, analgesic use between the two groups.	*A majority of patients reported temporary worsening pain typically lasting between 5 and 10	Physician	*6 months *Blinding ended after 3 months	

	At 3+6 months: *No significant difference in pain NRS between the two groups	At 3+6 months: *No difference between groups in ODI, GPE, analgesic use *Percent successful treatment was higher in treatment groups at 1+3+6 months. *Duration of pain relief: mean 5.8 months in treatment group vs 0.7 months in placebo group.	days after the procedure *No serious complications *In RFA group, one patient reported transient nonpainful buttock paresthesias that resolved without therapy			
Luukainen 1999(25) n=20 (3808)	At 2 months: *Significant difference in pain VAS reduction and pain index between the two groups.		Not reported	Physician	*2 months	
Juch 2017(20) n=228 (737-2)	At 3 months: *RFA statistically better than exercise alone, but not clinically important (defined as a 2 point difference in pain NRS score).	*GPE: significant difference at 3+6 weeks and 3 months. *ODI significant at 3 months.	1 treatment-related complication (vasovagal reaction to treatment).	Not specified	*12 months	

Salman 2016(9) n=30 (5083)	*RFA better than IAI. *In RFA group, 73%, 60% and 55% of patients, gained >50% pain relief at 1, 3 and 6 months respectively.	*More patients in RFA group showed>25% decrease in analgesic intake	No complications	Not specified	*6 months	
EPIDURAL STEROID INJECTIONS: ILE, TFE/SNRB, CE						
Okmen 2017(26) n=120 (1794)	At 2 weeks, 0.5+1+3+6+12 months: *Significant lower pain VAS scores in steroid group. * Significant lower ODI in steroid group.	* No significant significant correlation between age or BMI and outcome	Not reported	Not specified	*12 months *2nd ILE performed if < 50% reduction in pain VAS at 0.5 month after 1st ILE	
Carette 1997(27) n=158 (3884)	*No significant difference between groups in ODI at 3 weeks.	At 3 weeks: *No significant significant difference between groups except better finger-to-floor distance and sensory deficits, both better in steroid group. At 6 weeks:	*Dural puncture in 2 patients (1 in each group). Treated with blood patch. *Transient headache in 27% and 20% in MPA and LA groups, respectively.	Injections were done by an anesthesiologist	*3 months	

		*Significant improvement in steroid group for radicular pain At 3 months: *No difference in any parameter between groups.				
Nandi 2017(28) n=98(1858)	At 4 weeks: *Steroid group with significantly higher rates of treatment success (68% vs 17%) At 12 weeks: *No significant difference between saline (48%) and steroid (60%) group.	At 4+12 weeks: *Both groups showed improvement from baseline in all secondary outcomes except in in SLR. *The differences in improvement between groups was significant (in favour of steroid) in all secondary outcome criteria (except Schober's test at 3 months). *Younger patients more susceptible to treatment failure. *At 12 weeks wider canal diameter was significantly associated with success.	*Steroid group: -2 patients with backache and hypotension -1 patient with headache 24 hours post-procedure.	Not specified	*12 weeks	

Nam 2011(29) n=36 (1967)	At 2+4+12 weeks: *Steroid group significantly better than lidocaine group in pain VAS and ODI. At 12 weeks: * Patient satisfaction significantly higher in steroid group		Not reported	Not specified	*3 months	
Ghai 2015(30) n=69 (2235)	*At 3+6+9+12 months: *Significantly higher proportion of patients in LS group achieved EPR (86% vs. 50%).	At all-time intervals: *NRS and ODI were significantly lower in both groups compared to baseline. *NRS and ODI were significantly lower in LS group compared to L group. *No difference in ventral epidural and perineural spread *No difference in number of injections patients received.	*2 IV injections (1 in each group). *1 patient in group L treated with atropine for vasovagal response to injection.	Not specified	*12 month *Additional injections if pain relief was < 50% (minimum 15 days apart)	

Pandey 2016(31) n=152 (173)	At 6+12 months: *Improvement in all 3 groups from baseline. *At 6 & 12 months: ROI with TFE significant better than ILE or CA, no significant difference between ILE or CE		15 patients from caudal group complained of sweating and transient drowsiness during the time of injection. In all 15 patients post injection hypotension was recorded	ILE: Anesthetists.	*12 months	CE: Prone position, using anatomical landmarks then fluoroscopy for needle placement verification. ILE: Sitting position. Anatomical landmarks then verification with fluoroscopy. TFE: Prone under fluoroscopy. superficial sterilization of the skin and subcutaneous tissue”
El_Maadawy 2018(32) n=40 (1808)	At 1 day, 1+3+6 months: *VAS and MODQ were significant lower from baseline in both groups.	*For side effects, intraoperative nerve trauma was significantly greater in infraneural group (1 person vs. 0; p-value = 0.0001) and	* 1 patient in TFE group suffered paresthesia from direct neural contact following difficult needle placement.	Not specified	6 months	

	*TFE had significant lower VAS and MODQ compared to ILE.	postoperative headache was significantly higher in parasagittal group (1 person vs. 0; p-value = 0.0001). No significant differences in intraoperative hypotension and postoperative fever, or in the rate of experiencing no complications	Resolved after 3 days. * 1 patient in ILE group had a transient mild headache which was resolved after 1 week of NSAIDS treatment. *3 patients (not mentioned which group) had hypotension treated with ephedrine and saline bolus.			
Rogers 1992(33) n=30 (6975)	At 1 month: *Both groups improved from baseline in work status, pain description and SLR, but the steroid group improved more than LA group At follow up period (mean 20 months): *8 patients (4 from each group)		No adverse events	Not specified	*Formal results at 1 month. *Follow up for a mean of 20 months in steroid group and 21 months in LA group.	

	required disc surgery. *No difference in outcome between groups.					
Song 2016(34) n=29 (1889)	At 1+3 months: *VAS + FRI (functional rate index) improved significantly from baseline in both groups, without a difference between groups.		No adverse events	Not specified	*3 months	
Iversen 2011(35) n=133(2740)	At 6+12+52 weeks: *No difference in ODI from baseline in any group. *No difference between groups.	At 6+12+52 weeks: *No difference from baseline in secondary outcomes in any group. *No difference between groups.	No serious adverse events.	An experienced anaesthesiologist gave all injections	*One year	
Arden 2005(36) n=228 (3507)	At 3 weeks: *Epidural steroid group significantly better in ODQ. At 6+12+26+52 weeks: *No difference in ODQ between the two groups.	At 3+6+12+26+52 weeks: *No significant difference in any secondary outcome except Likert scale at 3 weeks which was better in steroid group. *No predictor for success of epidural	*Four patients in each group reported nonspecific headache after injection. *PDPH -no numbers specified.	Anaesthetists experienced in the procedure	*12 months	

		steroid injection was found.				
Helliwell 1985(37) n=39 (7058)	At 1+3 months: *Pain VAS and SLR angle improved only in the treatment group, significantly. *Better abolition of impulse pain and positive stretch test in treatment group *No difference in rates of decreased analgesic requirement between groups *Significantly more patient in the treatment group classified their situation as definite improvement		No complications	Not specified	*3 months	
Saqib 2016(38) n=109 (9605)	*Both groups, steroids and LA, improved significantly in pain VAS and ODI at 4 weeks.		* Complications were: local pain (13.8%), headache (9.2%) and urinary retention (7.3%) *Three patients	Not specified	*4 weeks	

	*No difference between groups.		developed a spinal epidural hematoma (2.8%)			
Mondal 2017(40) n=56(4821)	At 1 month: *Pain NRS, ODI and pelvic angle improved in both groups compared to baseline, but only significant change in epidural group			Not specified	*1 month	
Friedly 2014(41) n=400 (13512)	At 3 weeks: *Both groups improved in RMDQ and pain NRS from baseline, with steroid group superior to LA. At 6 weeks: *Both Steroid and LA groups improved in RMDQ and pain NRS from baseline, without difference between groups. At 3+6 weeks:	At 6 weeks: * No significant difference between the two groups in BPI, SSSQ, EQ-5D, or GAD-7 scales. *On the PHQ-8 scale, the steroid group had more improvement in symptoms of depression. *On the SSSQ satisfaction scale, more patients from the steroid group reported being very or somewhat satisfied with the treatment.	*No difference in overall rate of adverse events between groups (21.5% vs 15.5% in the steroid and LA groups, respectively). *There were more adverse events on average per person in the steroid group than in the LA group (P=0.02). *At 3+6 weeks more patients in steroid group had adrenal suppression	26 board-certified anesthesiologists, physiatrists, and radiologists with expertise in administering epidural glucocorticoid injections performed the procedures.	*4 weeks * Patients could receive a repeat injection at 3 weeks if they wished	

	*No difference between group in proportion of patients reaching >30% nor >50% improvement in RMDQ or pain NRS.	*No significant difference between groups when analyzing TFE vs ILE.	(cortisol measured)			
Datta 2011(42) n=207 (1962)	At 3 weeks: *All 4 groups showed significant improvement from baseline without differences between groups At 12 weeks: *Only the 3 steroid groups showed significant improvement in RMDQ *All 4 groups had improved pain VAS score.	At 3+12 weeks: *Methylprednisolone group showed greater improvement in finger-to-floor distance. *SLR improved in all 4 groups. *Diclofenac use decreased significantly in the three steroid groups by 12 weeks. *Use of physiotherapy decreased in all groups at 6 weeks but only in the three steroid groups at 12 weeks. *Overall pain relief was significantly	Complications were negligible and temporary	Not specified	*12 weeks *Injections were repeated every three weeks until a total of 210 mg of methylprednisolone (and equivalent) or three injections.	

	*At 3-6-9-12 weeks: Significant improvement VAS in steroid group	better at all follow-up evaluations in the steroid group than in the control group ($p<0.001$ at all evaluations.				
Kamble 2015(43) n=90 (2167)	At 1 hour,1+6 months: *All three groups (TFE,ILE,CE) improved from baseline in pain VAS and ODI. *TFE improved in ODI more than ILE and CE *No difference between ILE and CE At 1+6 months: *TFE improved more than ILE and CE.		Not specified	Not specified	*6 months *Maximum 3 injections were used per patient, with a minimum interval of 2 weeks between injections	
Tafazal 2009(44) n=150 (3046)	At 6+12 weeks: *Both LA +Steroids and LA only groups improved from baseline. *No difference between groups in		None	The same senior surgeon performed all of the procedures	*12 months	

	ODI, leg and back pain VAS, and LBOS (Low back outcome score). At 12 weeks: *There was a greater reduction in ODI in patients with lumbar disc herniation when compared with patients with spinal stenosis, regardless of intervention At minimum 1 year (median 20 months): *No difference in rates of further intervention (surgery or further root blocks)					
Riew 2000(45) n=55(1311)	At final follow up: *More patients in steroid+LA group did not have an operation (20/28 in combined	None	Not reported	Three radiologists, experienced in the injection technique	*Follow-up 13-28 months (mean 23 months)	The entry site was marked with indelible ink. Sterile preparation was performed with alcohol followed by

	group vs 9/27 in LA only group) *Patients with stenosis had higher rates of decreased neurological symptoms compared with disc herniation. *Patients with stenosis had higher rates of pain relief compared with disc herniation.					Betadine(povidone-iodine) solution. Following the procedure, the needle was removed, the site was cleaned, and Betadine (povidone-iodine) ointment and a bandage were applied.
PARAVERTEBRAL INJECTIONS						
Ji 2009(46) n=132	At 1+3+6+12 months: *The incidence of reported pain was significantly reduced in the PVB group. *For patients with pain and/or allodynia, the severity (VAS score) was similar in the 2 groups *QOL improved in both groups		None	A single physician performed all injections, no experience specified.	*1 year	

	without difference between them. * The decrease in diclofenac use was significantly greater in the PVB group than in the standard group.					
Deng 2021 (**) n=47,723	In the year following index PVB: *49% patients received 1-9 PVB *26% patients received ≥ 10 PVB *8% patients received ≥ 30 PVB *Average interval between subsequent PVBs: 32±45 days * Mean number of other interventional pain procedures received per patient increased from 2.19 ± 9.35 in the year before index PVB to	*Mean number of physician visits to indexed specialists per patient increased from 2.92 ± 3.61 to 9.64 ± 11.77 in the 1 year pre- to 1 year post-period *Greatest increase in physician visits was related to family medicine physicians and mostly associated with repeat PVB injections *No change in daily oral morphine equivalent dose following PVB a scompared to pre-PVB	None reported	Family Medicine, Anesthesiology, Radiology, Emergency Medicine, Physical Medicine and Rehabilitation, Orthopedics, Neurosurgery, Neurology	12 months	

	31.68 ± 52.26 the year after. *49.3% of the cohort received 10 or more other interventionalpain procedures in the post-period					