Supplementary material

Supplementary Table 1. Data search strategy.

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| --- | --- |
| Database | Search query01 December 2023 |
| Cochrane Central Register for Controlled Trials | #7 - #3 AND #6#6 - #4 AND #5#5 - (“mandibular canal” OR “inferior alveolar nerve” OR “mental nerve” OR “mandibular nerve” OR “maxillary nerve” OR “palatine nerve” OR “infraorbital nerve” OR “facial nerve” OR “trigeminal nerve” OR “mandibular branch” OR “mandibular branches” OR “maxillary branch” OR “maxillary branches” OR “maxillary branch”):ti,ab,kw#4 - (“disturbance” OR “disturbances” OR “pain” OR “injury” OR “injuries” OR “injured” OR “damage” OR “damages” OR “hurt” OR “altered sensation” OR “sensory alterations” OR “sensory disturbance” OR “sensory disturbances” OR “neurosensory disturbance” OR “neurosensory disturbances” OR “allodynia” OR “hyperalgesia” OR “paresthesia” OR “dysesthesia” OR “hypoesthesia” OR “hypesthesia” OR “numbness” OR “neuropathy” OR “neuropathies” OR “neuropathic” OR “painful post-traumatic trigeminal neuropathy” OR “Neuropathic Pain” OR “Atypical Neuralgia” OR “Atypical Neuralgias” OR “Mandibular Nerve Injuries” OR “Trigeminal Nerve Diseases” OR “Cranial Nerve Injuries” OR “Trigeminal Nerve Injuries” OR “trigeminal neuralgia” OR “Facial Pain” OR “Facial Neuralgia” OR “Facial Nerve Injuries” OR “Glossopharyngeal Nerve Diseases” OR “idiopathic pain”):ti,ab,kw#3 - #1 OR #2#2 - (“Dental Implants” OR “Dental Implantation” OR “Dental Implant”):ti,ab,kw#1 - (implant OR implants):ti,ab,kw AND (oral OR teeth OR tooth OR incisor OR canine OR premolar OR molar OR mandible OR maxilla OR jaw):ti,ab,kw |
| Embase | ((implant:ab,ti OR implants:ab,ti) AND (oral:ab,ti OR teeth:ab,ti OR tooth:ab,ti OR incisor:ab,ti OR canine:ab,ti OR premolar:ab,ti OR molar:ab,ti OR mandible:ab,ti OR maxilla:ab,ti OR jaw:ab,ti) OR ‘dental implants’:ab,ti OR ‘dental implantation’:ab,ti OR ‘dental implant’:ab,ti) AND (‘disturbance’:ab,ti OR ‘disturbances’:ab,ti OR ‘pain’:ab,ti OR ‘injury’:ab,ti OR ‘injuries’:ab,ti OR ‘injured’:ab,ti OR ‘damage’:ab,ti OR ‘damages’:ab,ti OR ‘hurt’:ab,ti OR ‘altered sensation’:ab,ti OR ‘sensory alterations’:ab,ti OR ‘sensory disturbance’:ab,ti OR ‘sensory disturbances’:ab,ti OR ‘neurosensory disturbance’:ab,ti OR ‘neurosensory disturbances’:ab,ti OR ‘allodynia’:ab,ti OR ‘hyperalgesia’:ab,ti OR ‘paresthesia’:ab,ti OR ‘dysesthesia’:ab,ti OR ‘hypoesthesia’:ab,ti OR ‘hypesthesia’:ab,ti OR ‘numbness’:ab,ti OR ‘neuropathy’:ab,ti OR ‘neuropathies’:ab,ti OR ‘neuropathic’:ab,ti OR ‘painful post-traumatic trigeminal neuropathy’:ab,ti OR ‘neuropathic pain’:ab,ti OR ‘atypical neuralgia’:ab,ti OR ‘atypical neuralgias’:ab,ti OR ‘mandibular nerve injuries’:ab,ti OR ‘trigeminal nerve diseases’:ab,ti OR ‘cranial nerve injuries’:ab,ti OR ‘trigeminal nerve injuries’:ab,ti OR ‘trigeminal neuralgia’:ab,ti OR ‘facial pain’:ab,ti OR ‘facial neuralgia’:ab,ti OR ‘facial nerve injuries’:ab,ti OR ‘glossopharyngeal nerve diseases’:ab,ti OR ‘idiopathic pain’:ab,ti) AND (‘mandibular canal’:ab,ti OR ‘inferior alveolar nerve’:ab,ti OR ‘mental nerve’:ab,ti OR ‘mandibular nerve’:ab,ti OR ‘maxillary nerve’:ab,ti OR ‘palatine nerve’:ab,ti OR ‘infraorbital nerve’:ab,ti OR ‘facial nerve’:ab,ti OR ‘trigeminal nerve’:ab,ti OR ‘mandibular branch’:ab,ti OR ‘mandibular branches’:ab,ti OR ‘maxillary branches’:ab,ti OR ‘maxillary branch’:ab,ti) AND [embase]/lim NOT ([embase]/lim AND [medline]/lim) |
| LILACS | (((implant OR implants OR implante OR implantes) AND (oral OR teeth OR tooth OR incisor OR canine OR premolar OR molar OR mandible OR maxilla OR jaw OR oral OR orais OR dentes OR dientes OR dente OR diente OR dentales OR incisivo OR canino OR pré-molar OR premolar OR molar OR mandíbula OR maxila OR maxilar))) AND (((disturbance OR disturbances OR pain OR injury OR injuries OR injured OR damage OR damages OR hurt OR “altered sensation” OR “sensory alterations” OR “sensory disturbance” OR “sensory disturbances” OR “neurosensory disturbance” OR “neurosensory disturbances” OR allodynia OR hyperalgesia OR paresthesia OR dysesthesia OR hypoesthesia OR hypesthesia OR numbness) OR (neuropathy OR neuropathies OR neuropathic OR “painful post-traumatic trigeminal neuropathy” OR “Neuropathic Pain” OR “Atypical Neuralgia” OR “Atypical Neuralgias” OR “Mandibular Nerve Injuries” OR “Trigeminal Nerve Diseases” OR “Cranial Nerve Injuries” OR “Trigeminal Nerve Injuries” OR “trigeminal neuralgia” OR “Facial Pain” OR “Facial Neuralgia” OR “Facial Nerve Injuries” OR “Glossopharyngeal Nerve Diseases” OR “idiopathic pain” OR distúrbio OR distúrbios OR disurbios OR perturbación OR dor OR dolor OR injúria OR injúrias OR lesión OR lesiones OR dano OR danos OR daño OR “sensação alterada” OR “sensações alteradas” OR “alteração sensorial” OR “alterações sensoriais” OR “alteración sensorial” OR “alteraciones sensoriales” OR “cambios sensoriales” OR “distúrbio sensorial” OR “distúrbios sensoriais” OR “distúrbios neurossensoriais” OR “trastornos neurosensoriales” OR “trastorno neurossensorial” OR alodínia OR alodinia OR hiperalgesia OR parestesia OR disestesia OR hipoestesia OR dormência OR entumecimiento OR neuropatia OR neuropatía OR neuropatias OR neuropatías OR neuropática OR neuropático OR “Neuralgia atípica” OR “neuralgias atípicas” OR “injúrias do nervo mandibular” OR “lesiones del nervio mandibular” OR “injúria do nervo mandibular” OR “lesión del nervio mandibular” OR “doença do nervo trigêmeo” OR “enfermedad del nervio trigémino” OR “doenças do nervo trigêmeo” OR “enfermedades del nervio trigémino” OR “doenças do nervo trigeminal” OR “doença do nervo trigemial” OR “injúria do nervo trigeminal” OR “injúrias do nervo trigeminal” OR “injúria do nervo trigêmeo” OR “injúrias do nervo trigêmeo” OR “neuralgia do trigêmeo” OR “neuralgias do trigêmeo” OR “neuralgia trigeminal” OR “neuralgias trigeminais” OR “neuralgia trigeminal” OR “dor facial” OR “dolor facial” OR “dores faciais” OR “neuralgia facial” OR “neuralgias faciais” OR “injúria do nervo facial” OR “lesión del nervio facial” OR “injúrias do nervo facial” OR “lesiones del nervio facial” OR “dor idiopática” OR “dolor idiopático”))) AND ( db:(“LILACS”)) |
| Medline/PubMed | #3 - #1 AND #2#2 - ((“mandibular canal”[Title/Abstract] OR “inferior alveolar nerve”[Title/Abstract] OR “mandibular nerve”[MeSH Terms] OR “mental nerve”[Title/Abstract] OR “mandibular nerve”[Title/Abstract] OR “maxillary nerve”[Title/Abstract] OR “maxillary nerve”[MeSH Terms] OR “palatine nerve”[Title/Abstract] OR “infraorbital nerve”[Title/Abstract] OR “facial nerve”[MeSH Terms] OR “facial nerve”[Title/Abstract] OR “trigeminal nerve”[MeSH Terms] OR “trigeminal nerve”[Title/Abstract] OR “mandibular branch”[Title/Abstract] OR “mandibular branches”[Title/Abstract] OR “maxillary branch”[Title/Abstract] OR “maxillary branches”[Title/Abstract] OR ((“mandibular”[Title/Abstract] OR “jaw”[Title/Abstract] OR “jaw”[MeSH Terms] OR “mandible”[Title/Abstract] OR “mandible”[MeSH Terms] OR “maxilla”[Title/Abstract] OR “maxilla”[MeSH Terms]) AND (“nerve”[Title/Abstract] OR “nerves”[Title/Abstract] OR “branch”[Title/Abstract] OR “branches”[Title/Abstract] OR “canal”[Title/Abstract]))) AND (“disturbance”[Title] OR “disturbances”[Title] OR “pain”[Title] OR “injury”[Title] OR “injuries”[Title] OR “injured”[Title] OR “damage”[Title] OR “damages”[Title] OR “hurt”[Title] OR “altered sensation”[Title] OR “sensory alterations”[Title] OR “sensory disturbance”[Title] OR “sensory disturbances”[Title] OR “neurosensory disturbance”[Title] OR “neurosensory disturbances”[Title] OR “allodynia”[Title] OR “hyperalgesia”[Title] OR “hyperalgesia”[MeSH Terms] OR “paresthesia”[Title] OR “paresthesia”[MeSH Terms] OR “dysesthesia”[Title] OR “hypoesthesia”[Title] OR “hypesthesia”[MeSH Terms] OR “numbness”[Title])) OR (“neuropathy”[Title/Abstract] OR “neuropathies”[Title/Abstract] OR “neuropathic”[Title/Abstract] OR “painful post-traumatic trigeminal neuropathy”[Title/Abstract] OR “Neuropathic Pain”[Title/Abstract] OR “Atypical Neuralgia”[Title/Abstract] OR “Atypical Neuralgias”[Title/Abstract] OR “Mandibular Nerve Injuries”[MeSH Terms] OR “Mandibular Nerve Injuries”[Title/Abstract] OR “Trigeminal Nerve Diseases”[MeSH Terms] OR “Trigeminal Nerve Diseases”[Title/Abstract] OR “Cranial Nerve Injuries”[MeSH Terms] OR “Cranial Nerve Injuries”[Title/Abstract] OR “Trigeminal Nerve Injuries”[MeSH Terms] OR “Trigeminal Nerve Injuries”[Title/Abstract] OR “trigeminal neuralgia”[MeSH Terms] OR “trigeminal neuralgia”[Title/Abstract] OR “Facial Pain”[MeSH Terms] OR “Facial Pain”[Title/Abstract] OR “Facial Neuralgia”[MeSH Terms] OR “Facial Neuralgia”[Title/Abstract] OR “Facial Nerve Injuries”[MeSH Terms] OR “Facial Nerve Injuries”[Title/Abstract] OR “Glossopharyngeal Nerve Diseases”[MeSH Terms] OR “Glossopharyngeal Nerve Diseases”[Title/Abstract] OR “idiopathic pain”[Title/Abstract])#1 - ((“implant”[Title/Abstract] OR “implants”[Title/Abstract]) AND (“dent\*”[Title/Abstract] OR “oral”[Title/Abstract] OR “teeth”[Title/Abstract] OR “tooth”[Title/Abstract] OR “prosthes\*”[Title/Abstract] OR “incisor”[Title/Abstract] OR “canine”[Title/Abstract] OR “premolar”[Title/Abstract] OR “molar”[Title/Abstract] OR “mandible”[Title/Abstract] OR “maxilla”[Title/Abstract] OR “jaw”[Title/Abstract])) OR (“Dental Implants”[MeSH Terms] OR “Dental Implants”[Title/Abstract] OR “Dental Implantation”[Title/Abstract] OR “Dental Implant”[Title/Abstract]) |
| SCOPUS | (TITLE-ABS-KEY(implant OR implants) AND TITLE-ABS-KEY(oral OR teeth OR tooth OR incisor OR canine OR premolar OR molar OR mandible OR maxilla OR jaw) OR (“Dental Implants” OR “Dental Implantation” OR “Dental Implant”)) AND (TITLE-ABS-KEY(“disturbance” OR “disturbances” OR “pain” OR “injury” OR “injuries” OR “injured” OR “damage” OR “damages” OR “hurt” OR “altered sensation” OR “sensory alterations” OR “sensory disturbance” OR “sensory disturbances” OR “neurosensory disturbance” OR “neurosensory disturbances” OR “allodynia” OR “hyperalgesia” OR “paresthesia” OR “dysesthesia” OR “hypoesthesia” OR “hypesthesia” OR “numbness” OR “neuropathy” OR “neuropathies” OR “neuropathic” OR “painful post-traumatic trigeminal neuropathy” OR “Neuropathic Pain” OR “Atypical Neuralgia” OR “Atypical Neuralgias” OR “Mandibular Nerve Injuries” OR “Trigeminal Nerve Diseases” OR “Cranial Nerve Injuries” OR “Trigeminal Nerve Injuries” OR “trigeminal neuralgia” OR “Facial Pain” OR “Facial Neuralgia” OR “Facial Nerve Injuries” OR “Glossopharyngeal Nerve Diseases” OR “idiopathic pain”)) AND (TITLE-ABS-KEY(“mandibular canal” OR “inferior alveolar nerve” OR “mental nerve” OR “mandibular nerve” OR “maxillary nerve” OR “palatine nerve” OR “infraorbital nerve” OR “facial nerve” OR “trigeminal nerve” OR “mandibular branch” OR “mandibular branches” OR “maxillary branch” OR “maxillary branches” OR “maxillary branch”)) |
| Web of Science | (((TS=(implant OR implants)) AND TS=(oral OR teeth OR tooth OR incisor OR canine OR premolar OR molar OR mandible OR maxilla OR jaw)) OR TS=(“Dental Implants” OR “Dental Implantation” OR “Dental Implant”)) AND ((TS=(“disturbance” OR “disturbances” OR “pain” OR “injury” OR “injuries” OR “injured” OR “damage” OR “damages” OR “hurt” OR “altered sensation” OR “sensory alterations” OR “sensory disturbance” OR “sensory disturbances” OR “neurosensory disturbance” OR “neurosensory disturbances” OR “allodynia” OR “hyperalgesia” OR “paresthesia” OR “dysesthesia” OR “hypoesthesia” OR “hypesthesia” OR “numbness” OR “neuropathy” OR “neuropathies” OR “neuropathic” OR “painful post-traumatic trigeminal neuropathy” OR “Neuropathic Pain” OR “Atypical Neuralgia” OR “Atypical Neuralgias” OR “Mandibular Nerve Injuries” OR “Trigeminal Nerve Diseases” OR “Cranial Nerve Injuries” OR “Trigeminal Nerve Injuries” OR “trigeminal neuralgia” OR “Facial Pain” OR “Facial Neuralgia” OR “Facial Nerve Injuries” OR “Glossopharyngeal Nerve Diseases” OR “idiopathic pain”)) AND TS=(“mandibular canal” OR “inferior alveolar nerve” OR “mental nerve” OR “mandibular nerve” OR “maxillary nerve” OR “palatine nerve” OR “infraorbital nerve” OR “facial nerve” OR “trigeminal nerve” OR “mandibular branch” OR “mandibular branches” OR “maxillary branch” OR “maxillary branches” OR “maxillary branch”)) |
| Grey Literature |
| Google Scholar | (“Dental Implants” OR “Dental Implantation” OR “Dental Implant”) AND (“altered sensation” OR “sensory alterations” OR “sensory disturbance” OR “sensory disturbances” OR “neurosensory disturbance” OR “neuropathy” OR “neuropathies” OR “neuropathic”) |
| Open Grey | (“Dental Implants” OR “Dental Implantation” OR “Dental Implant”) AND (“disturbance” OR “disturbances” OR “pain” OR “injury” OR “injuries” OR “injured” OR “damage” OR “damages” OR “hurt” OR “altered sensation” OR “sensory alterations” OR “sensory disturbance” OR “sensory disturbances” OR “neurosensory disturbance” OR “neurosensory disturbances” OR “allodynia” OR “hyperalgesia” OR “paresthesia” OR “dysesthesia” OR “hypoesthesia” OR “hypesthesia” OR “numbness”) |
| Proquest Dissertations and Thesis | noft(“Dental Implants” OR “Dental Implantation” OR “Dental Implant”) AND noft(“disturbance” OR “disturbances” OR “pain” OR “injury” OR “injuries” OR “injured” OR “damage” OR “damages” OR “hurt” OR “altered sensation” OR “sensory alterations” OR “sensory disturbance” OR “sensory disturbances” OR “neurosensory disturbance” OR “neurosensory disturbances” OR “allodynia” OR “hyperalgesia” OR “paresthesia” OR “dysesthesia” OR “hypoesthesia” OR “hypesthesia” OR “numbness” OR “neuropathy” OR “neuropathies” OR “neuropathic” OR “painful post-traumatic trigeminal neuropathy” OR “Neuropathic Pain” OR “Atypical Neuralgia” OR “Atypical Neuralgias” OR “Mandibular Nerve Injuries” OR “Trigeminal Nerve Diseases” OR “Cranial Nerve Injuries” OR “Trigeminal Nerve Injuries” OR “trigeminal neuralgia” OR “Facial Pain” OR “Facial Neuralgia” OR “Facial Nerve Injuries” OR “Glossopharyngeal Nerve Diseases” OR “idiopathic pain”) |

Supplementary Table 2. Excluded articles and reasons for exclusion (n = 63).

|  |  |
| --- | --- |
| Author, year | Reason for exclusion |
| Agbaje *et al*. [1], 2016 | 4 |
| Amadou-Diaw, Braud and Boucher, 2022 [2] | 3 |
| Al-Khabbaz, Griffin & Al-Shammari, 2007 [3] | 2 |
| Bagheri & Meyer, 2013 [4] | 1 |
| Benevides, De Moraes & De Moraes, 2019 [5] | 1 |
| Bozkaya *et al.* [6], 2014 | 1 |
| Brook, 2012 [7] | 1 |
| Campos *et al.* [8], 2013 | 1 |
| Carter *et al.* [9], 2016  | 4 |
| Chaushu *et al*. [10], 2002  | 3 |
| Choi *et al*. [11], 2014  | 3 |
| Deppe *et al*. [12], 2015  | 4 |
| Devine, Taylor & Renton, 2016 [13] | 2 |
| Diakonoff and Moreau, 2022 [14] | 3 |
| Doustkam *et al*. [15], 2017  | 3 |
| Elias, 1994 [16] | 1 |
| Esposito *et al*. [17], 2014  | 3 |
| Felice *et al*. [18], 2014  | 3 |
| Franco *et al*. [19], 2016  | 1 |
| Froum *et al*. [20], 2023  | 5 |
| Garcia-Blanco *et al*. [21], 2021 | 4 |
| Givol *et al*. [22], 2013  | 3 |
| Göçmen and Bayram, 2023 [23] | 3 |
| Hakimiha *et al*. [24], 2020  | 4 |
| Hillerup, 2007 [25] | 4 |
| Hillerup, 2008 [26] | 4 |
| Ishigaki *et al.* [27], 2009  | 1 |
| Ishigaki, Ono & Yatani, 2014 [28] | 5 |
| Jinno *et al*. [29], 1994  | 1 |
| Kalladka *et al*. [30], 2008 | 4 |
| Kang *et al*. [31], 2021  | 4 |
| Karabit & Kattan, 2018 [32] | 3 |
| Karanam and Krishna, 2022 [33] | 4 |
| Khawaja & Renton, 2009 [34] | 1 |
| Kim & Kim, 2019 [35] | 3 |
| Kim *et al*. [36], 2015  | 3 |
| Klazen *et al*. [37], 2018  | 4 |
| Kumar, Ganapathy & Visalakshi, 2019 [38] | 3 |
| Libersa, Savignat & Tonnel, 2007 [39] | 4 |
| Lim *et al*. [40], 2017 | 1 |
| Martínez-González *et al*. [41], 2011 | 3 |
| Miloro & Criddle, 2018 [42] | 4 |
| Na *et al*. [43], 2019 | 3 |
| Oliveira, 2018 [44] | 4 |
| Pääsky, Suomalainen & Ventä, 2021 [45] | 5 |
| Peñarrocha *et al*. [46], 2012 | 4 |
| Perea-Pérez *et al*. [47], 2014 | 3 |
| Politis *et al*. [48], 2017 | 2 |
| Progrel *et al*. [49], 2011 | 6 |
| Renton & Devine, 2013 [50] | 1 |
| Renton & Yilmaz, 2011 [51] | 4 |
| Renton *et al*. [52], 2012 | 3 |
| Sanner *et al*. [53], 2022 | 3 |
| Scarano *et al*. [54], 2017 | 3 |
| Sharma *et al*. [55], 2022 | 3 |
| Shin *et al*. [56], 2021  | 5 |
| Tay & Zuniga, 2007 [57] | 4 |
| Tufekcioglu *et al*. [58], 2015 | 6 |
| Vázquez-Delgado *et al*. [59], 2018 | 3 |
| von Eckardstein, Keil & Rohde, 2015 [60] | 3 |
| Walton, 2000 [61] | 7 |
| Wismeijer *et al*. [62], 1997 | 7 |
| Yates & Zuniga, 2012 [63] | 1 |

1—Book chapters, conference abstracts, expert opinion, letters, literature reviews, study protocol, magazine section, and case series with less than five patients; 2—Non-neuropathic pain postoperative assessment; 3—Evaluation other outcomes than prevalence and treatment; 4—Evaluation of neuropathic pain and/or nerve injury after procedures other than dental implant; 5—Full-text not available; 6—Incomplete data; 7—Presence of nerve injury and/or neuropathies before the implant surgery.

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Supplementary Table 3. Neuropathies’ prevalence data according to analysis times after dental implant surgery (if applicable).

Supplementary Table 3A. Prevalence of neuropathies after dental implant placement without nerve lateralization (outcome 1).

|  |  |  |  |
| --- | --- | --- | --- |
| Study | Total sample | Until one week | More than three months |
| Abarca *et al.* [29] 2006 | 58 | NR | 32.75% |
| Bartling, Freeman & Kraut 1999 | 94 | 8.51% | 4.25% |
| Dannan, Alkattan & Jackowaski 2013 | 19 | 21.05% | 15.79% |
| Ellies & Hawker 1993 | 87 | 18.39% | 4.60% |
| Felice *et al.* [34] 2009 | 15 | 13% | 0% |
| Felice *et al.* [25] 2009 | 60 | 30% | 0% |
| Filipov *et al.* [21] 2023 | 9 | 22.22% | 11.11% |
| Hartmann, Welte-Jzyk & Seiler 2017 | 60 | 0% | 0% |
| Porporatti *et al.* [27] 2017 | 20 | 0% | 0% |
| Tejada *et al.* [15] 2021  | 225 | NR | 8.88% |

NR: not reported.

Supplementary Table 3B. Prevalence of neuropathies after dental implant placement with nerve lateralization (outcome 2).

|  |  |  |  |
| --- | --- | --- | --- |
| Study | Total sample | Until one week | More than three months |
| Al-Almaie *et al.* [20], 2020 | 10 | 60% | 20% |
| Atef & Mounir, 2018 | 7 | 85.71% | 0% |
| Castellano-Navarro *et al.* [18], 2019 | 139 | 94.96% | 70.51% |
| de Campos *et al.* [17], 2019\*  | 34 | 100% | 50% |
| Deryabin & Grybauskas, 2021 | 23 | 100% | 65.22% |
| Díaz & Gías, 2013  | 19 | 100% | NR |
| Di Pillo & Ropoport, 2009  | 12 | 91.66% | 75% |
| Ferrigno, Laureti & Fanali, 2005 | 19 | 52.63% | 21.05% |
| Friberg, Ivanoff & Lekholm, 1992 | 10 | 100% | 50% |
| Hashemi, 2010  | 110 | 100% | 2.72% |
| Hori *et al.* [43], 2001 | 8 | 100% | 87.5% |
| Kan *et al.* [44], 1997 | 21 | NR | 52.38% |
| Khojasteh *et al.* [45], 2016\* | 14 | NR | 92.86% |
| Lorean *et al.* [46], 2013\* | 57 | 7.02% | NR |
| Martínez-Rodríguez *et al.* [47], 2016 | 27 | 100% | 25.93% |
| Mavriqi, Mortellaro & Scarano, 2016 | 12 | NR | 8.33% |
| Morrison, Chiarot & Kirby, 2002 | 20 | NR | 25% |
| Nishimaki *et al.* [50], 2016 | 7 | 100% | 71.43% |
| Peleg *et al.* [51], 2002\* | 10 | 60% | 0% |
| Rathod *et al.* [52], 2019\* | 10 | 100% | 80% |

NR: not reported; \*Articles in which the samples are patients, and not surgery sites.

Supplementary Table 4. Methodological quality of included studies according Joanna Briggs Institute critical appraisal tools.

Supplementary Table 4A. Case series (n = 20).

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 | Q8 | Q9 | Q10 | Quality |
| Abarca *et al.* [29], 2006 | Y | Y | Y | Y | Y | Y | Y | NA | NA | U | High |
| Al-Amaie *et al.* [20], 2020 | N | Y | Y | Y | Y | Y | Y | NA | NA | U | Moderate |
| Bartling *et al.* [30], 1999 | Y | Y | Y | Y | Y | Y | Y | NA | NA | U | High |
| Castellano-Navarro *et al.* [18], 2019 | Y | Y | N | N | N | Y | Y | NA | NA | N | Low |
| Dannan et al., 2013 | Y | Y | Y | Y | Y | Y | Y | NA | NA | Y | High |
| Deryabin & Grybauskas, 2021 | Y | Y | N | Y | Y | Y | Y | NA | NA | N | Moderate |
| Ellies & Hawker *et al.* [31], 1993 | Y | Y | Y | Y | Y | Y | Y | NA | NA | Y | High |
| Filipov *et al.* [21], 2023 | Y | Y | Y | Y | Y | N | Y | NA | NA | Y | High |
| Garcia-Blanco *et al.* [4], 2017 | Y | U | U | Y | Y | Y | Y | NA | NA | Y | Moderate |
| Hashemi 2010, | Y | Y | N | Y | Y | Y | Y | NA | NA | N | Moderate |
| Hori *et al.* [43], 2001 | N | Y | N | Y | Y | Y | Y | NA | NA | N | Low |
| Kan *et al.* [44], 1997 | N | Y | Y | Y | Y | Y | Y | NA | NA | N | Moderate |
| Khojasteh *et al.* [45], 2016 | Y | Y | Y | Y | Y | Y | Y | NA | NA | Y | High |
| Lorean *et al.* [46], 2013 | N | Y | Y | Y | Y | Y | Y | NA | NA | N | Moderate |
| Martínez-Rodríguez *et al.* [47], 2016 | Y | Y | Y | Y | Y | Y | Y | NA | NA | Y | High |
| Mavriqi, Mortellaro & Scarano, 2016 | N | Y | Y | Y | Y | Y | Y | NA | NA | N | Moderate |
| Morrison, Chiarot & Kirby, 2002 | Y | Y | Y | Y | Y | Y | Y | NA | NA | Y | High |
| Peleg *et al.* [51], 2002 | N | Y | N | N | N | Y | Y | NA | NA | N | Low |
| Tejada *et al.* [15], 2021 | Y | Y | Y | Y | Y | Y | Y | NA | NA | Y | High |
| Vazquez *et al.* [33], 2008 | Y | Y | N | Y | Y | Y | Y | NA | NA | Y | High |

Q1: Were there clear criteria for inclusion in the case series?

Q2: Was the condition measured in a standard, reliable way for all participants included in the case series?

Q3: Were valid methods used for identification of the condition for all participants included in the case series?

Q4: Did the case series have consecutive inclusion of participants?

Q5: Did the case series have complete inclusion of participants?

Q6: Was there clear reporting of the demographics of the participants in the study?

Q7: Was there clear reporting of clinical information of the participants?

Q8: Were the outcomes or follow up results of cases clearly reported?

Q9: Was there clear reporting of the presenting site(s)/clinic(s) demographic information?

Q10: Was statistical analysis appropriate?

Supplementary Table 4B. Before-and-after and not randomized trial (n = 16).

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 | Q8 | Q9 | Quality |
| Atef & Mounir, 2018 | Y | Y | Y | NA | N | Y | Y | Y | Y | High |
| Díaz & Gías, 2013 | Y | Y | Y | NA | N | Y | Y | N | Y | Moderate |
| Di Pillo & Rapoport, 2009 | Y | Y | Y | NA | N | Y | Y | N | Y | Moderate |
| Felice *et al.* [34], 2009 A | Y | Y | Y | N | N | Y | Y | Y | Y | Moderate |
| Felice *et al.* [35], 2009 B | Y | Y | Y | N | N | Y | Y | Y | Y | Moderate |
| Ferrigno, Laureti & Fanali, 2005 | Y | Y | Y | NA | N | Y | Y | N | Y | Moderate |
| Friberg, Ivanoff & Lekholm, 1992 | Y | Y | Y | NA | N | Y | Y | N | Y | Moderate |
| Gagik *et al.* [53], 2020 | Y | Y | Y | Y | N | Y | Y | N | Y | Moderate |
| Hartmann, Welte-Jzyk & Seiler, 2017 | Y | Y | Y | Y | Y | Y | Y | Y | Y | High |
| Juodzbalys *et al.* [59], 2011 | Y | Y | Y | NA | Y | Y | Y | Y | Y | High |
| Kim *et al.* [54], 2013 | Y | Y | Y | NA | Y | Y | Y | N | Y | High |
| Nishimaki *et al.* [50], 2016 | Y | Y | Y | NA | N | Y | Y | N | Y | Moderate |
| Park, Lee, and Kim, 2010 | Y | Y | Y | NA | Y | Y | Y | N | Y | High |
| Porporatti, 2006; Porporatti *et al.* [27], 2017 | Y | Y | Y | NA | Y | Y | Y | Y | Y | High |
| Rathod *et al.* [52], 2019 | Y | Y | Y | NA | Y | Y | Y | N | Y | High |

Q1: Is it clear in the study what is the “cause” and what is the “effect” (*i.e.*, there is no confusion about which variable comes first)?

Q2: Were the participants included in any comparisons similar?

Q3: Were the participants included in any comparisons receiving similar treatment/care, other than the exposure or intervention of interest?

Q4: Was there a control group?

Q5: Were there multiple measurements of the outcome both pre and post the intervention/exposure?

Q6: Was follow up complete and if not, were differences between groups in terms of their follow up adequately described and analyzed?

Q7: Were the outcomes of participants included in any comparisons measured in the same way?

Q8: Were outcomes measured in a reliable way?

Q9: Was appropriate statistical analysis used?

Supplementary Table 4C. Randomized controlled trials (n = 2).

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 | Q8 | Q9 | Q10 | Q11 | Q12 | Q13 | Quality |
| de Campos *et al.* [17], 2019 | Y | Y | Y | Y | N | U | Y | Y | N | Y | U | Y | Y | Low |
| Ghasemi *et al.* [57], 2022 | Y | Y | Y | Y | N | N | Y | Y | N | Y | Y | Y | Y | Moderate |

Q1: Was true randomization used for assignment of participants to treatment groups?

Q2: Was allocation to treatment groups concealed?

Q3: Were treatment groups similar at the baseline?

Q4: Were participants blind to treatment assignment?

Q5: Were those delivering treatment blind to treatment assignment?

Q6: Were outcomes assessors blind to treatment assignment?

Q7: Were treatment groups treated identically other than the intervention of interest?

Q8: Was follow up complete and if not, were differences between groups in terms of their follow up adequately described and analyzed?

Q9: Were participants analyzed in the groups to which they were randomized?

Q10: Were outcomes measured in the same way for treatment groups?

Q11: Were outcomes measured in a reliable way?

Q12: Was appropriate statistical analysis used?

Q13: Was the trial design appropriate, and any deviations from the standard RCT design (individual randomization, parallel groups) accounted for in the conduct and analysis of the trial?