

Impacted wisdom teeth

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ABSTRACT

INTRODUCTION: The incidence of impacted wisdom teeth is high, with some 72% of Swedish people aged 20 to 30 years having at least one impacted third molar. Impacted wisdom teeth occur because of a lack of space, obstruction, or abnormal position, and can cause inflammatory dental disease manifested by pain and swelling of infected teeth and may destroy adjacent teeth and bone. **METHODS AND OUTCOMES:** We conducted a systematic review and aimed to answer the following clinical questions: Should asymptomatic and disease-free impacted wisdom teeth be removed prophylactically? What are the effects of different surgical methods of removing impacted wisdom teeth? We searched: Medline, Embase, The Cochrane Library, and other important databases up to July 2009 (Clinical Evidence reviews are updated periodically, please check our website for the most up-to-date version of this review). We included harms alerts from relevant organisations such as the US Food and Drug Administration (FDA) and the UK Medicines and Healthcare products Regulatory Agency (MHRA). We performed a GRADE evaluation of the quality of evidence for interventions. **RESULTS:** We found 25 systematic reviews, RCTs, or observational studies that met our inclusion criteria. **CONCLUSIONS:** In this systematic review we present information relating to the effectiveness and safety of the following interventions: prophylactic extraction, active surveillance, and different surgical methods of removing impacted wisdom teeth.

QUESTIONS

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INTERVENTIONS

SHOULD ASYMPTOMATIC IMPACTED WISDOM TEETH BE REMOVED PROPHYLACTICALLY?	DIFFERENT SURGICAL METHODS FOR REMOVING IMPACTED WISDOM TEETH
 Unknown effectiveness Active surveillance New 4 Prophylactic extraction 3	 Unknown effectiveness Different surgical methods of extracting impacted wisdom teeth (unclear which method is most effective) 5

Key points

- Impacted wisdom teeth occur because of a lack of space, obstruction, or abnormal position. They can cause pain, swelling, and infection, and may destroy adjacent teeth and bone. The incidence of impacted wisdom teeth is high, with some 72% of Swedish people aged 20 to 30 years having at least one impacted third molar.
- Non-RCT evidence indicates that about one third of asymptomatic, unerupted wisdom teeth will change position resulting in wisdom teeth that are partially erupted, but non-functional or non-hygienic. Between 30% and 60% of people who retain their asymptomatic wisdom teeth proceed to extraction of one or more of them between 4 to 12 years after their first visit.
- Removal of impacted third molars (symptomatic and asymptomatic) is a common procedure performed by oral and maxillofacial surgeons.
- While symptomatic or diseased impacted wisdom teeth should be recommended for removal, current evidence neither refutes nor confirms the practice of **prophylactic removal of asymptomatic, disease-free wisdom teeth**. Some non-RCT evidence indicates that extraction of the asymptomatic tooth may be beneficial when disease, such as caries, are present in the adjacent second molar, or if periodontal pockets are present distal to the second molar.
- We do not know whether **active surveillance** is effective for asymptomatic, disease-free wisdom teeth, as we found no RCTs or prospective cohort studies on this topic.
- We do not know which is the most effective **method for extracting impacted wisdom teeth**.

DEFINITION

Wisdom teeth are present in most adults, and they generally become apparent between the ages of 18 and 24 years, although there is wide variation in the age of presentation. Impacted wisdom teeth are third molars that are not ordinarily expected to erupt into functional teeth. Wisdom teeth become partially or completely impacted owing to lack of space, obstruction, or abnormal position. Impacted wisdom teeth may be diagnosed because of symptoms such as pressure, pain, or swelling; by physical examination with probing or direct visualisation; or incidentally by routine dental radiography.

INCIDENCE/ PREVALENCE Third molar impaction is common. Over 72% of Swedish people aged 20 to 30 years have at least one impacted lower third molar. ^[1] Removal of impacted third molars (symptomatic and asymptomatic) is a common operation performed by oral and maxillofacial surgeons. The incidence of wisdom tooth removal is estimated to be 4 per 1000 person-years in England and Wales, making it one of the top 10 inpatient and day-case procedures. ^[2] ^[3] ^[4] In a report from 1994, up to 90% of people on oral and maxillofacial surgery hospital waiting lists were awaiting removal of wisdom teeth. ^[3] Fewer operations are now done, possibly because of guidance. ^[5]

AETIOLOGY/ RISK FACTORS Wisdom tooth impaction may be more common now than in the past, as modern diet tends to be softer. ^[6]

PROGNOSIS Impacted wisdom teeth can cause pain, swelling, and infection, and may destroy adjacent teeth and bone. The removal of diseased or symptomatic wisdom teeth alleviates pain and suffering, and improves oral health and function. About one third of asymptomatic, unerupted wisdom teeth have been found to change position with time, resulting in wisdom teeth that are partially erupted, but non-functional or non-hygienic. ^[7] Three prospective cohort studies have also demonstrated that 30% to 60% of people with previously asymptomatic impacted wisdom teeth will undergo extraction of one or more of their wisdom teeth because of symptoms or disease, between 4 and 12 years following study enrolment. ^[8] ^[9] ^[10] In another cohort study, a surprisingly high percentage (25%) of people with asymptomatic wisdom teeth had periodontal disease, as evidenced by probing depths greater than 5 mm. ^[11] Probing depths could be an indicator of future periodontal status. One prospective cohort study demonstrated that 40% of people with asymptomatic wisdom teeth with probing depths of greater than 4 mm had clinically significant progression of their periodontal status (probing depth increase of greater than 2 mm) in the subsequent 24 months. ^[12] The same study also found that, for those people with wisdom teeth with a probing depth of <4 mm, only 3% of teeth demonstrated progression of periodontal disease. ^[12]

AIMS OF INTERVENTION To maximise the benefits and minimise the adverse effects of wisdom-tooth management.

OUTCOMES **Dental disease:** development or progression of asymptomatic or symptomatic inflammatory dental disease (e.g., caries, acute and chronic periodontal disease, pain); incisor crowding; disruption to regular activities of daily living (e.g., chewing, speaking, and missing work or education); damage to adjacent teeth or restorations; maxillofacial lesions (e.g., odontogenic cysts or tumours); facial cellulitis of odontogenic origin; need for future treatment (e.g., extraction) of initially asymptomatic wisdom teeth. **Complications or adverse effects of extraction:** pain; swelling; prolonged or persistent trismus; persistent or excessive bleeding; surgical-site infection with or without cellulitis or osteomyelitis; disruption to regular activities of daily living (e.g., chewing, speaking, and missing work or education); wound dehiscence; alveolar osteitis; new or persistent periodontal defects on the adjacent teeth; damage to adjacent teeth or restorations; temporary or permanent inferior alveolar or lingual nerve injuries; maxillary tuberosity fracture; temporary or persistent oro-antral communication with or without sinusitis.

METHODS *Clinical Evidence* search and appraisal July 2009. The following databases were used to identify studies for this systematic review: Medline 1966 to July 2009, Embase 1980 to July 2009, and The Cochrane Database of Systematic Reviews and Cochrane Central Register of Controlled Clinical Trials 2009, Issue 1 (1966 to date of issue). We also searched for retractions of studies included in the review. Abstracts of the studies retrieved from the initial search were assessed by an information specialist. For the option on active surveillance, active surveillance was defined as scheduled clinical and radiographical evaluations of the wisdom teeth on a regular basis with the examination completed by a healthcare professional trained to discern the disease status of wisdom teeth. Selected studies were then sent to the contributor for additional assessment, using pre-determined criteria to identify relevant studies. Study design criteria for inclusion in the question on the effectiveness of prophylactic removal of impacted wisdom teeth were: published systematic reviews of RCTs, RCTs, and prospective cohort studies with a control group in any language containing more than 20 individuals. There was no minimum length of follow-up, no minimum level of blinding, or no maximum loss to follow-up required to include studies. Study design criteria for inclusion in the question on surgical extraction of impacted wisdom teeth were: published systematic reviews of RCTs and RCTs in any language containing more than 20 individuals. There was no minimum length of follow-up or level of blinding required to include studies. There was a maximum loss to follow-up of 20%. We included systematic reviews of RCTs, RCTs, and prospective cohort studies with a control group where harms of an included intervention were studied applying the same study design criteria for inclusion as we did of benefits. In addition, we use a regular surveillance protocol to capture harms alerts from organisations such as the US Food and Drug Administration (FDA) and the UK Medicines and Healthcare products Regulatory Agency (MHRA), which are added to the reviews as required. To aid readability of the numerical data in our reviews, we round many

percentages to the nearest whole number. Readers should be aware of this when relating percentages to summary statistics such as relative risks (RRs) and odds ratios (ORs). We have performed a GRADE evaluation of the quality of evidence for interventions included in this review (see table, p 17). The categorisation of the quality of the evidence (into high, moderate, low, or very low) reflects the quality of evidence available for our chosen outcomes in our defined populations of interest. These categorisations are not necessarily a reflection of the overall methodological quality of any individual study, because the *Clinical Evidence* population and outcome of choice may represent only a small subset of the total outcomes reported, and population included, in any individual trial. For further details of how we perform the GRADE evaluation and the scoring system we use, please see our website (www.clinicalevidence.com).

QUESTION Should asymptomatic and disease-free impacted wisdom teeth be removed prophylactically?

OPTION EXTRACTION OF ASYMPTOMATIC IMPACTED WISDOM TEETH

Dental disease

Compared with no extraction We don't know whether early third-molar extraction in children aged 13 to 19 years with asymptomatic impacted wisdom teeth is more effective at preventing late crowding of the lower incisors at 3 to 5 years ([very low-quality evidence](#)).

Complications or adverse effects of extraction

Compared with no extraction We don't know whether early third-molar extraction in children aged 13 to 19 years with asymptomatic impacted wisdom teeth is more effective at reducing pain, infection, or limited mouth opening at 3 years post extraction of impacted wisdom teeth ([very low-quality evidence](#)).

Note

Guidelines based on non-RCT evidence suggest that extraction is not advisable in people with deeply impacted wisdom teeth who have no history of pertinent local or systemic pathology. Permanent numbness of the lower lip or tongue may be as high as 1% after wisdom tooth removal.

For GRADE evaluation of interventions for impacted wisdom teeth, see [table, p 17](#).

Benefits:

Extraction versus no extraction plus no active surveillance:

We found four systematic reviews evaluating the extraction of impacted third molars (search dates 1997, ^[13] 2000, ^[14] 2003 ^[15] and 2004 ^[16]), which between them identified two RCTs that met *Clinical Evidence* inclusion criteria. The reviews did not conduct a meta-analysis of the results of the two RCTs because of differences in outcomes, and so we report data from the individual RCTs. ^[17] ^[18]

The first RCT (164 people, aged 14–18 years with asymptomatic impacted wisdom teeth) compared early third-molar extraction versus no extraction of third molars. ^[17] It found no significant difference between extraction and no extraction in the mean change between baseline and 5 years in incisor irregularity or inter-canine width (mean change in incisor irregularity: 0.80 mm with extraction v 1.10 mm with no extraction; P = 0.55; mean change in inter-canine width: –0.37 mm with extraction v –0.38 mm with no extraction; P = 0.92). The RCT found a small but significant difference between the two groups in incisor crowding measured by the mean change in arch length (–1.1 mm with extraction v –2.13 mm with no extraction; P = 0.001); however, the authors of the RCT did not consider this difference to be clinically important. There was a large loss to follow-up in the RCT, which limits reliability (77 [47%] people were followed up, for an average of 66 months).

The second RCT (52 people with unerupted third molars, aged 13–19 years) compared extraction of impacted wisdom teeth versus no extraction (people had impacted third molars on both sides of the lower jaw, and one molar was randomly selected for removal, and the non-extraction side acted as a control). ^[18] The RCT reported that incisor crowding (measured using the length of the arch; a straight line between the central fossa of the second molar and the incisal cross) did not change differently on the extraction side compared with the no extraction side at 3 years (absolute results not reported and significance not assessed). The RCT reported that 19 teeth in the control side were extracted "for various reasons" (timescale not clear, further details not reported).

The fourth systematic review also identified a further RCT ^[19] that was discontinued, the results of which have not yet been published. ^[16]

Extraction versus active surveillance:

We found no systematic review, RCTs, or prospective cohort studies with a control group comparing extraction versus active surveillance in people with asymptomatic impacted wisdom teeth.

Harms:

Extraction versus no extraction plus no active surveillance:

The first RCT gave no information on adverse effects of wisdom-tooth extraction.^[17] The second RCT found that postoperative adverse effects (pain, infection, or limited mouth opening) occurred in 4/52 (8%) teeth and secondary haemorrhage in 2/52 (4%) teeth in the extraction group; adverse effects in the control group were not reported.

Extraction versus active surveillance:

We found no systematic review, RCTs, or prospective cohort studies with a control group.

See also [harms of extraction of impacted wisdom teeth: different surgical methods, p 5](#).

Comment:

Clinical guide:

Prospective cohort studies have shown that 30% to 60% of asymptomatic patients may develop disease or become sufficiently symptomatic to warrant extraction.^{[8] [9] [10]} Delaying extraction of asymptomatic teeth could result in an increased risk for postoperative inflammatory complications^[20] and prolonged recovery after extraction.^[21] One treatment guideline for managing unerupted and impacted wisdom teeth (search date 2000; 8 clinical studies of different designs; number of people not reported)^[5] suggested that removal of asymptomatic disease-free wisdom teeth may be beneficial in the presence of caries in the adjacent second molar, which cannot be properly treated without the removal of the wisdom teeth. Extraction may also be beneficial in the presence of periodontal pockets distal to the second molar.^[22]

The harms associated with prophylactic extraction of asymptomatic, disease-free wisdom teeth are the expected adverse effects associated with any operation (e.g., costs, pain and swelling, loss of work or school time, and undergoing unnecessary surgery).^{[23] [24]} The removal of the lower wisdom teeth also carries the risk of damage to the inferior alveolar nerve (injured in 1–8% of people^{[25] [26]} and permanently damaged in up to 1% of people^[27]), and to the lingual nerve (permanently damaged in up to 1% of people).^[28] The risks seem to be greater with greater depth of impaction, and the risks are the same whether the wisdom tooth is symptomatic or asymptomatic. Observational studies have found limited evidence that the complications associated with the removal of wisdom teeth are more frequent when operators are less experienced, and in older people with deeply impacted teeth.^{[29] [30] [31] [32] [33] [34]} See also [harms of Extraction of impacted wisdom teeth: different surgical methods, p 5](#).

Of note, the four systematic reviews identified offer three different recommendations for management.^{[13] [14] [15] [16]} This variation may be attributable to the different data identified by each review. The first review identified 12 literature reviews,^[13] the second review identified two RCTs and 34 literature reviews,^[14] the third review identified five cohort studies,^[15] and the fourth review identified two RCTs.^[16] The first and second systematic reviews both advocated against prophylactic removal, but acknowledged the evidence supporting their position was weak.^{[13] [14]} The third systematic review recommended against prophylactic removal, but, given the low level of evidence supporting this position, deferred to patient preference regarding treatment choice.^[15] The fourth systematic review concluded that there was no evidence to support or refute prophylactic removal of asymptomatic wisdom teeth.^[16]

When managing asymptomatic, disease-free wisdom teeth, no RCT data are available to guide therapeutic choices. Consistent with the application of evidence-based medicine principles, after a thorough review of the risks and benefits of the treatment alternatives, patient preference should be the factor driving the clinical decision.^{[15] [35] [36]}

OPTION	ACTIVE SURVEILLANCE OF ASYMPTOMATIC IMPACTED WISDOM TEETH	New
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We found no direct information from RCTs or prospective cohort studies with a control group to provide guidance as to whether active surveillance is better than no extraction plus no active surveillance, or whether active surveillance is better than extraction, in people with asymptomatic impacted wisdom teeth.

Benefits:

Active surveillance versus no extraction plus no active surveillance:

We found no systematic review, RCTs, or prospective cohort studies with a control group comparing active surveillance versus no extraction plus no active surveillance in people with asymptomatic impacted wisdom teeth.

Active surveillance versus extraction:

We found no systematic review, RCTs, or prospective cohort studies with a control group comparing active surveillance versus extraction.

Different forms of active surveillance versus each other:

We found no systematic review, RCTs, or prospective cohort studies with a control group comparing different forms of active surveillance versus each other in people with asymptomatic impacted wisdom teeth.

Harms:

Active surveillance versus no extraction plus no active surveillance:

We found no systematic review, RCTs, or prospective cohort studies with a control group.

Active surveillance versus extraction:

We found no systematic review, RCTs, or prospective cohort studies with a control group.

Different forms of active surveillance versus each other:

We found no systematic review, RCTs, or prospective cohort studies with a control group.

See also [harms of extraction of impacted wisdom teeth: different surgical methods, p 5](#).

Comment:

Clinical guide:

Active surveillance is defined for this review as scheduled clinical and radiographical evaluations of wisdom teeth on a regular basis by a healthcare professional trained to discern the disease status of wisdom teeth. The goal of active surveillance is to detect and treat disease early. The benefits of active surveillance include avoiding the costs and adverse effects of prophylactic removal of asymptomatic wisdom teeth. The risks of active surveillance include failure to detect disease in a timely manner due to clinical error or oversight, and failure of the patient to comply with the recommended follow-up schedule, which can lead to delayed extraction. Extraction in people older than 24 years can lead to decreased postoperative quality of life compared with extraction at a younger age. ^[21]

Who should complete the active surveillance evaluations (either generalist or specialist), and the optimum frequency of the evaluations, are open to question: we found no RCTs on these issues. The benefit of having a specialist evaluate the patient lies in having an experienced clinician who will share in the responsibility and consequences of the management choice. However, there is concern that the specialist will remove impacted wisdom teeth unnecessarily. The benefits of having a generalist evaluate patients are decreased cost and increased patient convenience; however, there is concern that the generalist may miss disease or delay referral in a timely manner.

The benefits of more-frequent visits are the opportunity to detect and treat disease prior to the development of symptoms or damage to adjacent teeth or bone, and to prevent the progression of disease requiring treatment additional to the removal of the wisdom teeth (e.g., restoration or extraction of a carious second molar or the development of a jaw cyst or tumour). However, longer intervals between visits decrease costs, reduce exposure to radiation, and improve patient convenience. Non-RCT evidence indicates that clinically important changes in periodontal status can occur over a 26-month interval, and provides some basis for selecting examinations every 2 years. ^[12]

Based on non-RCT evidence, when active surveillance is the recommended management option, the interval for follow-up should be 24 months. In addition to assessing the patient's symptoms, the examination should include physical and radiographical components.

QUESTION What are the effects of different surgical methods of removing impacted wisdom teeth?

OPTION EXTRACTION OF IMPACTED WISDOM TEETH: DIFFERENT SURGICAL METHODS

Complications or adverse effects of extraction

Different bone removal techniques compared with each other We don't know whether Erbium (Er):YAG laser is more effective than surgical bur at reducing postoperative pain at 7 days. We don't know whether distolingual alveolectomy is more effective than chisel and tooth division with surgical bur at reducing pain, swelling, or temporary lingual sensory disturbances at up to 7 days ([low-quality evidence](#)).

Different soft-tissue flap designs compared with each other Modified triangular flap may be more effective than classic envelope flap at producing fewer postoperative wound dehiscences, but we don't know whether it is more effective at improving mouth opening at 7 days, pain at 24 to 72 hours, swelling at 2 weeks, or alveolar osteitis. Marginal flaps may be more effective than paramarginal flaps at producing fewer dehiscences at 5 days, but we don't know whether they are more effective at improving pain, swelling, trismus, or periodontal pocket depth of the adjacent second molar at 5 days, 10 days, or 3 months in people with impacted wisdom teeth ([very low-quality evidence](#)).

Lingual nerve protection versus no lingual nerve protection or standard retractor We don't know whether buccal approach with lingual retractor is more effective than buccal approach without lingual retractor; or whether operation

with lingual flap retractor technique or lingual nerve protection by retractor is more effective than with no lingual retractor; or whether standard retractor is more effective than broad retractor at reducing permanent lingual nerve injury (very low-quality evidence).

Different wound-irrigation techniques compared with each other We don't know whether manual irrigation is more effective than mechanical irrigation, or whether using a larger irrigation volume is more effective than a smaller irrigation volume at reducing postoperative infections or osteitis (very low-quality evidence).

Drain compared with no drain Placing a surgical drain to a wound may be more effective at reducing swelling at 24 hours to 7 days, but we don't know whether it is more effective at improving pain and mouth opening at 24 hours to 15 days. We don't know whether passive drainage (through the oblique vestibular incision) or no passive drainage (suture of the oblique vestibular incision) is more effective at improving swelling and pain at 72 hours to 15 days or mouth opening at 72 hours, but it may be more effective at improving mouth opening at 7 to 15 days (very low-quality evidence).

Complete removal of wisdom tooth compared with coronectomy Complete removal of a wisdom tooth may be less effective than successful coronectomy at reducing inferior alveolar nerve damage in people thought to be at high risk of injury to inferior alveolar nerve (very low-quality evidence).

For GRADE evaluation of interventions for impacted wisdom teeth, see table , p 17 .

Benefits: We found one systematic review (search date 1999, 1 RCT, 771 people) ^[37] and 18 further RCTs (for full details of the RCTs and numerical and statistical results see table 1, p 11). ^{[38] [39] [40] [41] [42] [43] [44] [45] [46] [47] [48] [49] [50] [51] [52] [53] [54] [55]} The review and RCTs all assessed comparative rates of postoperative adverse effects (see harms).

Harms: **Bone-removal techniques versus each other:** We found four RCTs comparing different bone removal techniques (see table 1, p 11). ^{[38] [39] [40] [41]}

One RCT (42 people) compared Erbium (Er):YAG laser versus surgical bur for removal of bone during surgery. ^[38] It found that postoperative pain was more common in the bur group at 7 days, although the difference between groups was not significant. The RCT reported no serious complications, and no cases of bleeding, alveolar osteitis, or infection.

Two RCTs compared distolingual alveolectomy versus chisel and tooth division with surgical bur. ^{[39] [40]} One RCT (52 people) found no significant difference between groups in temporary lingual sensory disturbance at day 7, and no significant difference between groups in pain or swelling at 6, 24, 48 hours, or 7 days. ^[39] The RCT reported no significant difference between groups at 4 weeks in infection rates or socket healing.

The other RCT (20 people) comparing distolingual alveolectomy versus chisel and tooth division with surgical bur found no cases of sensory impairment of the inferior alveolar or lingual nerves in either group, and no significant difference between groups in mean pain intensity or swelling at 1 to 6 days. ^[40] The RCT reported no cases of postoperative infection, dry socket, or delayed healing.

One RCT (90 people with symptomatic impacted mandibular wisdom teeth aged 14–62 years) compared three interventions: surgical bur technique, lingual-split technique, and simplified split bone technique. ^[41] There was a significant difference in postoperative pain among the three groups at 24 hours, 48 hours, and 7 days (the lingual-split group had the highest pain score at all intervals). There was a significant difference in swelling among the three groups at 24 hours (the surgical bur group had the highest swelling score), but no significant difference at 48 hours and 7 days. There was no significant difference in labial sensation among the three groups at 24 hours, 48 hours, and 7 days. The RCT found a significant difference in lingual sensation among the three groups at 24 hours (the lingual-split group had the lowest sensation score), but not at 48 hours and 7 days. Statistical results for direct comparisons between any two groups were not reported. The RCT also found that more people with the lingual-split technique had delayed wound healing, probably due to wound infection, compared with the simplified bone technique or the surgical bur technique, although significance was not assessed.

Different soft-tissue flap designs versus each other: We found three RCTs comparing different soft-tissue flap designs used for surgical access (see table 1, p 11). ^{[42] [43] [44]}

One RCT (60 people) compared a modified triangular flap versus the classic envelope flap. It found that the modified triangular flap produced a significantly smaller proportion of postoperative wound dehiscences compared with the classic envelope flap. ^[42] However, wound dehiscence may not

be of particular interest as an outcome, as teeth are frequently removed without primary closure, and healing progresses satisfactorily.

Another RCT (32 people with bilateral impacted mandibular molars aged 18–34 years) compared a buccal envelope-flap approach versus a modified triangular-flap approach. The RCT found no significant difference between the two groups in mouth opening at 7 days; pain at 24, 48, or 72 hours; or alveolar osteitis; however, it found that people in the envelope group had significantly less buccal cheek swelling at 2 weeks compared with the modified-flap group.^[43] The RCT reported no impairment of sensation over the lingual or inferior alveolar nerve.

One RCT (27 people) compared two different flap designs, marginal versus paramarginal.^[44] It found no significant difference between groups in, pain, trismus, or swelling at 5 days, 10 days, and 3 months, and little difference between groups in dehiscence at 5 days. The RCT found no significant difference between groups in bleeding.

Lingual nerve protection versus no lingual nerve protection or standard retractor:

We found one systematic review (search date 1999, 1 RCT, 771 people)^[37] and three RCTs^[45]^[46]^[47] comparing lingual nerve protection versus no lingual nerve protection or standard retractor (see table 1, p 11).

The systematic review compared a buccal approach with lingual retractor versus a buccal approach without a lingual retractor.^[37] The included RCT found a higher rate of temporary and permanent lingual nerve injury with the lingual retractor compared with no retractor, but the review did not report a statistical analysis between groups for the RCT.^[37] The review did not report a quality assessment of the RCT.^[37]

Two RCTs compared lingual flap retraction plus nerve protection with a subperiosteal retractor versus no lingual flap retraction or nerve protection.^[45]^[46] One of the RCTs (55 people) found that lingual flap retraction significantly increased temporary lingual nerve damage at 24 hours and 7 days compared with no flap retraction.^[45] The other RCT (300 people) found no significant difference between groups in temporary lingual nerve damage at 7 days.^[46] No permanent lingual nerve disturbances were found in either RCT.

Another RCT (150 people) compared a standard retractor versus a wider subperiosteal retractor for lingual nerve protection.^[47] There was a significantly lower incidence of lingual nerve injury with the broader retractor at 4 weeks, although it required a much larger soft-tissue flap to be raised to facilitate its placement.

Different wound irrigation regimens versus each other:

We found two RCTs comparing different types of wound irrigation regimens (see table 1, p 11).^[48]^[49]

The first RCT (103 people) compared manual (using 50 mL syringe to total of 350 mL) versus mechanical (350 mL) intraoperative wound irrigation, and found some evidence that mechanical irrigation was preferable, as there was a slightly reduced incidence of postoperative infections. However, a statistical analysis between groups was not reported.^[48]

The second RCT (211 people) compared different irrigation volumes (25 mL v 175 mL) and found proportionately fewer postoperative infections with the larger volume, although differences between groups were not significant.^[49]

Drain versus no drain:

We found four RCTs^[50]^[51]^[52]^[53] comparing placement of a surgical drain to the wound versus no drain, and one RCT^[54] comparing passive drainage (no suture of the oblique vestibular incision) versus no passive drainage (suture of the oblique vestibular incision) (see table 1, p 11).

The first RCT (23 people who had bilateral operations and randomised to receive drains unilaterally) found that the drain significantly reduced facial swelling at 3 and 7 days compared with no drain. However, the RCT found no significant difference between groups in pain at 3 days, and at 4 to 7 days.^[50] The RCT found that the surgical drain significantly improved mouth opening compared with no drain at 7 days.

The second RCT (21 people) found no significant difference in pain, swelling, or mouth opening at 2 and 7 days.^[51] It also found no significant difference between drain and no drain groups in dry socket (alveolar osteitis).

The third RCT (100 people with asymptomatic impacted lower third molars aged 18–40 years) found no significant difference between drain and no drain in pain at 24 hours. However, at 72 hours, the drain significantly increased pain compared with no drain; and at 5 days the drain significantly decreased postoperative pain compared with no drain. The drain significantly reduced the percentage of buccal cheek swelling compared with no drain at 24 hours, 72 hours, and 5 days, and significantly increased mean mouth opening compared with no drain at 24 hours, 72 hours, and 5 days. ^[52]

The fourth RCT (53 people with bilateral impacted lower third molars aged 14–30 years) found no significant differences between drain and no drain in the proportion of people with pain at 24 hours, 72 hours, 7 days, and 15 days. ^[53] The drain significantly reduced the percentage of buccal swelling compared with no drain at 24 and 72 hours; however, there were no significant differences between the two groups at 7 days and 15 days. The RCT also found no significant differences between the two groups in mean mouth opening at 24 hours, 72 hours, 7 days, and 15 days.

The fifth RCT (20 people with bilateral impacted lower third molars aged 18–40 years) compared no suture of the oblique vestibular incision (passive drainage) versus suture of the oblique vestibular incision (no passive drainage). ^[54] It found that a higher proportion of people with suture had postoperative pain at 48 hours compared with no suture, but the significance was not assessed. At 72 hours, 7 days, and 15 days there were no differences in pain between the two groups (significance not assessed). The RCT found no significant differences between the two groups in the percentage of swelling at 72 hours, 7 days, and 15 days. The RCT also found no significant differences between the two groups in mouth opening at 72 hours. However, at 7 and 15 days, people in the passive-drainage group had significantly increased mouth opening compared with people in the no passive-drainage group.

Coronectomy versus complete removal of wisdom tooth:

We found one RCT (128 people) comparing complete removal of a wisdom tooth versus coronectomy (planned division of tooth and retention of root; see table 1, p 11). ^[55] A large proportion of coronectomies failed (36/94 [38%]) as roots were dislodged during surgery. The RCT reported data for three groups: complete removal, failed coronectomy, and successful coronectomy. The RCT found a significant difference among the three groups in proportion of extractions with inferior alveolar nerve damage, with the highest rate occurring in the complete-removal group: this result is to be expected as there is no surgical manipulation near the nerve with complete removal of the impacted tooth. The RCT found a similar incidence of dry socket among groups, although statistical analysis was not reported. The RCT found that infection rates were greatest in the complete-removal group, although statistical analysis was not reported. The length of follow-up was about 2 years, which is not sufficient for the assessment of delayed eruption of the root fragments, as this process may continue for up to 10 years.

Comment:

Of the RCTs identified, most did not specify whether people were symptomatic or asymptomatic. Two RCTs reported that extraction was for prophylactic or orthodontic reasons, while four RCTs reported that people with pericoronitis (infections) were excluded. For the RCTs evaluating swelling, trismus, and pain postoperatively, a number noted statistically significant results between groups with regard to these outcomes, although the clinical significance of such differences is debatable.

Clinical guide:

While there has been disagreement about the removal of asymptomatic teeth, there has been no controversy about the need to remove symptomatic teeth and those showing pathological changes such as infection, non-restorable caries, cysts, tumours, or destruction of adjacent teeth and bone. Most commonly, wisdom teeth are removed because they are impacted against bone or soft tissue, preventing them from fully erupting. Bacteria and debris collect under the overlying flap of tissue and cause infections (pericoronitis), and removal of wisdom teeth in this situation is the management of choice. Wisdom teeth are also removed if they are causing caries of the adjacent tooth. This happens when the tooth is partially erupted, and its position in relation to the adjacent tooth or soft tissues makes the area inaccessible to usual oral hygiene measures. The symptoms of pericoronitis are pain, bad taste, swelling of the gum and face, and restricted mouth opening (trismus). The local infection may spread, resulting in a regional lymphadenopathy, pyrexia, and malaise. Rarely, the swelling may threaten the patency of the airway and breathing. Wisdom tooth caries may also cause pain and, if unmanaged, will ultimately lead to death of the tooth and to abscess formation. Abscess, like pericoronitis, may result in pain, lymphadenopathy, pyrexia, malaise, and, rarely, also threaten the patency of the airway. Removal of the tooth alleviates the symptoms and prevents progress of the disease. It also permits restoration of the adjacent tooth caries. We found one systematic review (search date not reported) including eight studies (6 RCTs and 2 prospective cohorts), which suggested that, overall, the second-molar periodontal probing depth or attachment levels either remained unchanged or improved after wisdom-tooth removal. ^[56] However, for the subset of people with healthy second-molar periodontium before surgery, the review found an in-

creased risk for worsening of probing depths or attachment levels after wisdom-tooth removal. The clinical significance of this is not clear. There is currently insufficient evidence to show meaningful clinical benefit for one type of surgery versus another.

GLOSSARY

Low-quality evidence Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.

Very low-quality evidence Any estimate of effect is very uncertain.

SUBSTANTIVE CHANGES

Active surveillance of asymptomatic impacted wisdom teeth New option for which we found no systematic review, RCTs, or prospective cohort studies with a control group. Categorised as "Unknown effectiveness".

Extraction of impacted wisdom teeth: different surgical methods Five RCTs added comparing different surgical techniques versus each other. [41] [43] [52] [53] [54] None of the RCTs found a definitive benefit for one technique compared with another. Considered with previously reported evidence, it remains unclear whether any individual surgical method is more effective than another. Categorisation unchanged (Unknown effectiveness).

Extraction of asymptomatic impacted wisdom teeth: prophylactic Three new systematic reviews added (search dates 1997, [13] 2000, [14] and 2003 [15]), none of which identified any new RCTs or prospective cohort studies with a control group. Previously reported evidence was re-evaluated, and was determined to be of insufficient strength to guide therapeutic decision making. Categorisation therefore changed from "Likely to be ineffective or harmful" to "Unknown effectiveness".

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TABLE 1 RCTs comparing different surgical methods for the extraction of impacted wisdom teeth

Reference	Population	Comparison	Results	Comment
Bone-removal techniques versus each other				
[38]	42 people	Erbium (Er):YAG laser v surgical bur	<p>Postoperative pain No significant difference in postoperative pain (measured by 10-point VAS) between groups at day 7 (proportion of people with pain 5/10 or more: 4/20 [20%] with bur v 1/22 [5%] with laser; P = 0.2)</p> <p>Complications No serious complications, or cases of bleeding, alveolar osteitis or infection reported in either group.</p>	Method of randomisation not described. Level of blinding not reported. Four (10%) people treated with both laser and surgical bur. Operations performed by consultant oral and maxillofacial surgeons
[39]	52 people, bilateral operations, one side removed by chisel, the other side by bur	Distolingual alveolectomy v chisel and tooth division with surgical bur	<p>Lingual sensory disturbance No significant difference between groups in the proportion of people with temporary lingual sensory disturbance at day 7 (1/52 [2%] with chisel v 4/52 [8%] with bur; P = 0.25). All sensory disturbance ceased by 4 weeks</p> <p>Pain or swelling No significant difference between groups in pain or swelling at 6, 24, 48 hours, or 7 days (results presented graphically, reported as not significant, P values not reported)</p> <p>Failure to heal No significant difference between groups at 4 weeks in failure to heal (due to acute abscess or dry socket) (3/52 [6%] with chisel v 3/52 [6%] with bur; reported as not significant; P value not reported)</p>	Method of randomisation not described. Lingual sensory disturbance assessed by written questionnaire. Single blind to patient and wounds examined by independent observer. All operated on by same experienced oral surgeon
[40]	20 people	Distolingual alveolectomy v chisel and tooth division with surgical bur	<p>Sensory impairment No cases of sensory impairment of the inferior alveolar or lingual nerves in either group</p> <p>Pain No significant difference in mean pain intensity (measured by 100-mm VAS) between groups on days 1 to 6 (results presented graphically, absolute numbers not reported; P = 0.12)</p> <p>Swelling No significant difference between groups in swelling (P = 0.88)</p> <p>Complications No reported cases of postoperative infection, dry socket, or delayed healing</p>	Method of randomisation not described. Level of blinding not reported. Small RCT

Reference	Population	Comparison	Results	Comment
[41]	90 people	Surgical bur technique (30 people) v lingual-split technique (30 people) v simple split bone technique (30 people)	<p>Pain Significant difference in pain (measured on a VAS; 0 = absent to 3 = severe) among the 3 groups at 24 hours, 48 hours, and 7 days, although at 7 days difference between groups was of borderline significance (24 hours: 2.0 with bur v 2.5 with lingual split v 2.4 with simplified split bone; P < 0.05; 48 hours: 1.5 with bur v 1.9 with lingual split v 1.8 with simplified split bone; P = 0.02; 7 days: 1.0 with bur v 1.1 with lingual split v 1.0 with simplified split bone; P = 0.05)</p> <p>Swelling Borderline significant difference in swelling (measured on a VAS 0–3; meaning of score not specified) among the 3 groups at 24 hours but no significant difference at 48 hours or 7 days (24 hours: 1.9 with bur v 1.7 with lingual split v 1.5 with simplified split bone; P = 0.05; 48 hours: 1.3 with bur v 1.2 with lingual split v 1.2 with simplified split bone; P = 0.06; 7 days: 0.3 with bur v 0.2 with lingual split v 0.1 with simplified split bone; P = 0.10)</p> <p>Labial sensation No significant difference in labial sensation (measured on a VAS 0–3; meaning of score not specified) among the 3 groups at 24 hours, 48 hours, and 7 days (24 hours: 3.0 with bur v 2.9 with lingual split v 3.0 with simplified split bone; P = 0.36; 48 hours: 3.2 with bur v 3.0 with lingual split v 3.0 with simplified split bone; P = 1.00; 7 days: 3.0 with bur v 3.0 with lingual split v 3.0 with simplified split bone; P = 1.00)</p> <p>Lingual sensation Significant difference in lingual sensation (measured on a VAS 0–3; meaning of score not specified) among the 3 groups at 24 hours, but not at 48 hours and 7 days (24 hours: 2.9 with bur v 2.6 with lingual split v 2.9 with simplified split bone; P = 0.004; 48 hours: 3.0 with bur v 2.8 with lingual split v 3.0 with simplified split bone; P = 0.08; 7 days: 3.0 with bur v 2.9 with lingual split v 3.0 with simplified split bone; P = 0.36)</p> <p>Statistical results for direct comparisons between any 2 groups were not reported</p> <p>Delayed wound healing More people with the lingual-split technique had delayed wound healing compared with the simplified bone technique or the surgical bur technique (2/30 [7%] with lingual split v 0/30 [0%] with simplified bone v 0/30 [0%] with surgical bur; significance not assessed)</p>	Method of randomisation not specified. Blinding unclear (likely single-blinded)
[42]	60 people	Modified triangular flap v classic envelope flap	<p>Wound dehiscence Modified triangular flap significantly reduced wound dehiscence compared with envelope flap (17/30 [57%] with envelope v 3/30 [10%] with triangular; RR 5.67, 95% CI 1.9 to 12.3) Other outcomes such as pain not reported</p>	Method of randomisation not described. Level of blinding not reported. Three experienced oral surgeons did all operations
Different soft-tissue flap designs versus each other				

Reference	Population	Comparison	Results	Comment
[43]	35 people (32 completed), bilateral operations, one side with buccal envelope flap, the other side with modified triangular flap	Buccal envelope flap v modified triangular flap	<p>Mouth opening No significant difference between groups in mouth opening (interincisal distance) at 7 days (4.29 cm with envelope v 4.24 cm with modified flap; P greater than 0.5)</p> <p>Pain No significant difference between groups in pain (measured on a validated 10-cm VAS, where 0 = no pain and 10 = worst pain imaginable) at 24 hours, 48 hours, and 72 hours after surgery (24 hours: 1.54 with envelope v 1.50 with modified flap; 48 hours: 1.45 with envelope v 1.20 with modified flap; 72 hours: 1.08 with envelope v 1.28 with modified flap; P greater than 0.5 for all time frames)</p> <p>Swelling Envelope flap significantly reduced buccal cheek swelling at 2 weeks compared with modified flap (1.66 cm² with envelope v 2.42 cm² with modified flap; P <0.5)</p> <p>Alveolar osteitis No significant difference between groups in the proportion of people with alveolar osteitis (time frame not clear; 7/32 [22%] with envelope v 2/32 [6%] with modified flap; P greater than 0.5)</p> <p>No reports of impaired sensation</p>	Method of randomisation not specified. All patients treated by the same operator. Unclear who performed the postoperative evaluation
[44]	27 people who had 2 lower and 2 upper impacted third molars, bilateral operations, one side of jaw marginal flap, the other side paramarginal flap	Marginal v paramarginal flap	<p>Pain, maximum mouth opening, swelling, and periodontal pocket depth No significant difference at 5 days, 10 days, and 3 months between groups in pain, maximum mouth opening, swelling, or periodontal pocket depth of adjacent second molar (all reported as not significant, absolute numbers and P values not reported)</p> <p>Wound dehiscence Marginal flap significantly decreased wound dehiscence at 5 days compared with paramarginal flap: 8/54 (15%) with paramarginal v 0/54 (0%) with marginal; reported as significant, P value not reported</p>	Method of randomisation not described. Level of blinding not reported. All people treated by the same surgeon. Small RCT
Lingual nerve protection versus no lingual nerve protection or standard retractor				
[37]	771 people	Buccal approach with lingual retractor v buccal approach without lingual retractor	<p>Lingual nerve temporary injury 26/378 [7%] procedures with buccal approach with lingual retractor v 3/393 [1%] procedures with buccal approach without lingual retractor</p> <p>Lingual nerve permanent injury 3/378 [0.8%] procedures with buccal approach with lingual retractor v 1/393 [0.3%] procedures with buccal approach without lingual retractor</p> <p>Statistical analysis between groups in the RCT not reported by the review</p>	Systematic review included 7 prospective clinical series and 1 RCT. Only the RCT reported here. Nerve injury considered permanent at 3 to 4 months if no sign of recovery. Assessed by "sensory testing" (not further defined by review). Several surgeons of varying experience. Review did not report method of randomisation or level of blinding in the RCT
[45]	55 people, bilateral operations, one side with retraction, the other without retraction	Operation with lingual flap retraction technique v operation with no lingual flap retraction	<p>Lingual nerve sensory disturbance No retraction significantly reduced lingual nerve sensory disturbance assessed at 24 hours and 7 days compared with retraction (5/55 [9%] with retraction v 0/55 [0%] with no retraction; P <0.001). All cases classed as temporary: all recovered sensation by 3 months post operation</p>	Method of randomisation not described. Blinded pin-prick test used to confirm sensory disturbance. All procedures performed by the same operator
[46]	300 people	Lingual nerve protection by retractor v no protection	<p>Lingual nerve sensitivity disturbance No significant difference between groups in lingual nerve sensitivity disturbances at day 7 post surgery (3/142 [2%] with retraction v 1/158 [1%] without retraction; reported as not significant, P value not reported)</p> <p>No permanent disturbances found (cases resolved 21–60 days post surgery)</p>	Method of randomisation not described. Level of blinding not reported. Sensory disturbance assessed by questionnaire and clinical assessment. All operations performed by 2 senior surgeons

Reference	Population	Comparison	Results	Comment
[47]	150 people, bilateral operations, one side standard retractor, the other side broad retractor	Standard retractor v broad retractor	<p>Altered lingual sensation Broad retractor significantly reduced the incidence of altered lingual sensation compared with standard retractor at 4 weeks (1/150 [1%] with broad retractor v 12/150 [8%] with standard retractor; P <0.05) No results reported beyond 4 weeks</p>	Method of randomisation not described. Level of blinding not reported. Operators of varying experience, from senior house officer to consultant, undertook surgery. Same operator did both sides. Sensory disturbance assessed by verbal questioning by nurse and oral surgeon. No clinical test reported
Different wound irrigation regimens versus each other				
[48]	103 people, bilateral operations, one side manually irrigated, the other side mechanically irrigated	Manual irrigation using 50 mL syringe (to total of 350 mL) v mechanical irrigation (to total of 350 mL)	<p>Localised osteitis 0/103 (0%) with mechanical irrigation v 1/103 (1%) with conventional irrigation Postoperative infection 1/103 (1%) with mechanical irrigation v 2/103 (2%) with conventional irrigation Statistical analysis between groups not reported</p>	Randomisation by use of random sampling numbers. Observer blinded. Three surgeons did all operations, with the same person operating on both sides
[49]	211 people, bilateral operations, one side lavage with smaller volume, the other side larger volume	Manual lavage with 25 mL v 175 mL	<p>Localised osteitis The higher volume lavage significantly reduced localised osteitis compared with the lower volume (12/211 [6%] with higher volume v 23/211 [11%] with lower volume; P <0.025) Postoperative infection No significant difference between groups in postoperative infection (1/211 [0.5%] with higher volume v 6/211 [3%] with lower volume; reported as not significant, P value not reported)</p>	Method of randomisation not described. Level of blinding not reported. Most lavage done by hand syringe. In 32 cases, a mechanical device was used in the higher-volume group, which may have affected the results
Drain versus no drain				
[50]	23 people, bilateral operations, one side with drain, the other side with no drain	Drain v no drain	<p>Facial swelling Surgical drain significantly reduced mean percentage of facial swelling compared with no drain at 3 and 7 days (measured between set points on mandible, ear lobe, and eyes: 3rd day: 3% with drain v 7% with no drain; 7th day: 0.2% with drain v 3% with no drain; P <0.01 for both comparisons) Pain No significant difference between groups in pain at day 3 or days 4 to 7 (reported as not significant, P value not reported) Mouth opening Surgical drain significantly improved mean mouth opening compared with no drain at 7 days (43 mm with drain v 39.1 mm with no drain, P <0.05)</p>	Method of randomisation not described. Level of blinding not reported. Same surgeon operated on both sides. Small RCT
[51]	21 people	Drain v no drain	<p>Pain No significant difference between groups at 2 days and 7 days in pain (2 days: P = 0.53; 7 days: P = 0.78) Swelling No significant difference between groups at 2 and 7 days in swelling (2 days: P = 0.75; 7 days: P = 0.32) Mouth opening No significant difference between groups at 2 and 7 days in mouth opening (2 days: P = 0.89; 7 days: P = 0.55) No significant difference between groups in alveolar osteitis</p>	Method of randomisation not described. Operator blinded until time of surgical closure. All cases performed by the same operator. Small RCT

Reference	Population	Comparison	Results	Comment
[52]	100 people, bilateral operations, one side with drain, the other side with no drain	Penrose rubber drain placement for 72 hours postoperatively v no rubber drain placement	<p>Pain No significant difference between groups in pain (measured on a 10-cm VAS) at 24 hours (6.5 cm with drain v 6.5 cm with no drain; reported as not significant; P value not reported). At 72 hours, the drain significantly increased pain compared with no drain (3.5 cm with drain v 2.5 with no drain; P <0.05), but at 5 days, the drain significantly decreased pain compared with no drain (1.5 cm with drain v 2.0 with no drain; P <0.05 cm)</p> <p>Buccal cheek swelling Drain significantly reduced the percentage of buccal cheek swelling compared with no drain at 24 hours, 72 hours, and 5 days (24 hours: 7% with drain v 13% with no drain; 72 hours: 3.7% with drain v 4.5% with no drain; 5 days: 1% with drain v 3% with no drain; P <0.05 for all time frames). Percentage change in swelling calculated by [postoperative value – preoperative value]/preoperative value x 100</p> <p>Mouth opening Drain significantly increased the mean mouth opening compared with no drain at 24 hours, 72 hours, and 5 days (24 hours: 1.78 cm with drain v 1.39 cm with no drain; 72 hours: 2.5 cm with drain v 1.87 cm with no drain; 5 days: 3.82 cm with drain v 3.45 cm with no drain; P <0.05 for all time frames)</p>	All procedures performed by the same surgeon. Unclear who did the postoperative evaluation. Single-blinded study. Method of randomisation unclear
[53]	53 people, bilateral operations, one side with drain, the other side with no drain	Silicon tube drain placement for 4 days postoperatively v no drain	<p>Pain No significant difference between groups in the proportion of people with pain (measured on a 10-mm VAS) at 24 hours, 72 hours, 7 days, and 15 days (24 hours: 23/53 [43%] with drain v 21/53 [40%] with no drain; P = 0.70; 72 hours: 14/53 [26%] with drain v 20/53 [38%] with no drain; P = 0.22; 7 days: 7/53 [13%] with drain v 8/53 [15%] with no drain; P = 0.74; 15 days: 1/53 [2%] with drain v 1/53 [2%] with no drain; P = 1.00)</p> <p>Buccal swelling Drain significantly reduced the percentage of buccal swelling compared with no drain at 24 and 72 hours (24 hours: 8% with drain v 11% with no drain; P <0.001; 72 hours: 8% with drain v 10% with no drain; P <0.001); however, there was no significant difference between groups at 7 days and 15 days (7 days: 1% with drain v 2% with no drain; P = 0.60; 15 days: 0% with drain v 0.1% with no drain; P = 0.62). Percentage change in swelling calculated by [postoperative value – preoperative value]/preoperative value x 100</p> <p>Mouth opening No significant differences between groups in mean mouth opening at 24 hours, 72 hours, 7 days, and 15 days (24 hours: 1.28 cm with drain v 1.26 cm with no drain; P = 0.52; 72 hours: 1.45 cm with drain v 1.43 cm with no drain; P = 0.78; 7 days: 2.12 cm with drain v 2.02 cm with no drain; P = 0.36; 15 days: 3.07 cm with drain v 2.98 cm with no drain; P = 0.27)</p>	Method of randomisation not specified. All procedures performed by same surgeon. Implied but unclear whether surgeon performed postoperative assessment

Reference	Population	Comparison	Results	Comment
[54]	20 people, bilateral operations, one side with no suture of the oblique vestibular incision, the other side with suture of the oblique vestibular incision	No suture of the oblique vestibular incision (passive drainage) v suture of the oblique vestibular incision (no passive drainage)	<p>Pain A higher proportion of people with suture had pain (measured on a 10-cm VAS) compared with no suture at 48 hours (11/20 [55%] with no suture v 15/20 [75%] with suture; significance not assessed). At 72 hours, 7 days, and 15 days there were similar rates of pain in both groups (72 hours: 2/20 [10%] with no suture v 2/20 [10%] with suture; 7 days: 0/20 [0%] with no suture v 0/20 [0%] with suture; 15 days: 0/20 [0%] with no suture v 0/20 [0%] with suture; significance not assessed for any time point)</p> <p>Swelling No significant difference between groups in the percentage of swelling at 72 hours, 7 days, and 15 days (72 hours: 10.53% with no suture v 10.56% with suture; P = 0.73; 7 days: 10.36% with no suture v 10.30% with suture; P = 0.24; 15 days: 10.22 with no suture v 10.16 with suture; P = 0.22). Percentage change in swelling calculated by [(postoperative value – preoperative value)/preoperative value x 100</p> <p>Mouth opening No significant difference between groups in mouth opening (mean interincisal distance) at 72 hours (33.25 cm with no suture v 29.85 cm with suture; P = 0.18); however, no sutures significantly increased mouth opening compared with suture at 7 days and 15 days (7 days: 46.40 cm with no suture v 38.65 cm with suture; P less than 0.001; 15 days: 51.6 cm with no suture v 48.8 cm with suture; P = 0.04)</p>	Method of randomisation unclear. Small RCT
[55]	128 people judged at high risk of injury to inferior alveolar nerve, 196 procedures	Complete removal v coronectomy	<p>Signs of injury to inferior alveolar nerve 19/102 (19%) with complete removal v 3/36 (8%) with failed coronectomy v 0/58 (0%) with successful coronectomy; P = 0.01</p> <p>Incidence of dry socket 10/102 [10%] with complete removal v 7/58 [12%] with successful coronectomy v 4/36 [11%] with failed coronectomy; statistical analysis between groups not reported</p> <p>Infection rates 1/102 (1%) with complete removal v 3/58 (5.2%) with successful coronectomy v 0/36 (0%) with failed coronectomy; statistical analysis between groups not reported</p>	Teeth to be removed were randomised by table of random numbers. Level of blinding not reported. Operation done by 3 surgeons. Of 94 coronectomies, 58 were successful and 36 failed. Results presented separately for successful and failed groups. No intention-to-treat analysis. Follow-up about 2 years (may not be sufficient, as delayed eruption of the root fragments may continue for up to 10 years)

VAS, visual analogue scale

TABLE GRADE evaluation of interventions for impacted wisdom teeth

Important outcomes	Dental disease and complications or adverse effects of extraction								GRADE	Comment
	Number of studies (participants)	Outcome	Comparison	Type of evidence	Quality	Consistency	Directness	Effect size		
Should asymptomatic and disease-free impacted wisdom teeth be removed prophylactically?										
2 (216) ^[17] ^[18]	Dental disease	Extraction v no extraction	4	-2	0	-1	0	Very low	Quality points deducted for incomplete reporting of results and poor follow-up. Directness point deducted for narrowness of population (children only)	
1 (52) ^[18]	Complications or adverse effects of extraction	Extraction v no extraction	4	-2	0	-1	0	Very low	Quality points deducted for sparse data and incomplete reporting of results. Directness point deducted for narrowness of population (children only)	
What are the effects of different surgical methods of removing impacted wisdom teeth?										
4 (204) ^[38] ^[39] ^[40] ^[41]	Complications or adverse effects of extraction	Different bone removal techniques v each other	4	-2	0	0	0	Low	Quality points deducted for incomplete reporting of results and weak methods	
3 (119) ^[42] ^[43] ^[44]	Complications or adverse effects of extraction	Different soft-tissue flap designs v each other	4	-3	0	0	0	Very low	Quality points deducted for sparse data, incomplete reporting of results, and weak methods measured in one RCT	
4 (1276) ^[37] ^[45] ^[46] ^[47]	Complications or adverse effects of extraction	Lingual nerve protection v no lingual nerve protection or standard retractor	4	-3	0	0	0	Very low	Quality points deducted for incomplete reporting of results, no long-term results, and weak methods	
2 (314) ^[48] ^[49]	Complications or adverse effects of extraction	Different wound irrigation techniques v each other	4	-2	0	-1	0	Very low	Quality points deducted for incomplete reporting of results and weak methods. Directness point deducted for inclusion of co-intervention	
5 (217) ^[50] ^[51] ^[52] ^[53] ^[54]	Complications or adverse effects of extraction	Drain v no drain	4	-2	-1	0	0	Very low	Quality points deducted for incomplete reporting of results, and weak methods. Consistency point deducted for conflicting results	
1 (128) ^[55]	Complications or adverse effects of extraction	Complete removal of wisdom tooth v coronectomy	4	-3	0	-2	0	Very low	Quality points deducted for sparse data, incomplete reporting of results, and weak methods. Directness points deducted for uncertainty about generalisability of results as high failure rate and longer follow-up needed	

Type of evidence: 4 = RCT; 2 = Observational. Consistency: similarity of results across studies
 Directness: generalisability of population or outcomes
 Effect size: based on relative risk or odds ratio