Bunions

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ABSTRACT

INTRODUCTION: Bunions are prominent and often inflamed metatarsal heads and overlying bursae, usually associated with hallux valgus, where the great toe moves towards the second toe. Hallux valgus is found in at least 2% of children aged 9 to 10 years, and almost half of adults, with greater prevalence in women. METHODS AND OUTCOMES: We conducted a systematic review and aimed to answer the following clinical questions: What are the effects of conservative treatments, surgery, and postoperative care for bunions? We searched: Medline, Embase, The Cochrane Library, and other important databases up to May 2008 (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). RESULTS: We found 21 systematic reviews, RCTs, or observational studies that met our inclusion criteria. We performed a GRADE evaluation of the quality of evidence for interventions. CONCLUSIONS: In this systematic review, we present information relating to the effectiveness and safety of the following interventions: arthrodesis (Lapidus procedure); bone fixation (absorbable pin fixation, percutaneous Kirschner-wire fixation, screw fixation plus early mobilisation [early weight-bearing], standard fixation, suture fixation plus immobilisation [delayed weight-bearing]); chevron osteotomy plus adductor tenotomy; distal metatarsal osteotomy; early weight-bearing; Keller's arthroplasty; Keller–Lelievre arthroplasty; night splints; orthoses (including antipronatory orthoses in children); phalangeal (Akin) osteotomy plus distal chevron osteotomy; proximal osteotomy, and slipper casts.

QUESTIONS

INTERVENTIONS

Key points

- Bunions are prominent and often inflamed metatarsal heads and overlying bursae, usually associated with hallux valgus, causing pain and problems with walking and wearing normal shoes.

  Hallux valgus (where the great toe moves towards the second toe) is found in at least 2% of children aged 9 to 10 years and almost half of adults, with greater prevalence in women.

  We don't know what role footwear plays in the development of hallux valgus or bunions.
- We don't know whether night splints or orthoses (in adults or children) prevent deterioration of hallux valgus.
- Distal chevron osteotomy may be more effective than orthoses or no treatment at reducing pain and improving function. However, there is insufficient evidence comparing its effectiveness with other surgical techniques.

We don't know whether other surgical procedures such as arthrodesis, Keller's arthroplasty, phalangeal osteotomy, proximal osteotomy, or bone fixation methods are beneficial in improving outcomes.

- We don't know whether early weight-bearing or slipper casts are effective in improving recovery and outcomes postoperatively.

DEFINITION

Hallux valgus is a deformity of the great toe, whereby the hallux (great toe) moves towards the second toe, overlying it in severe cases. This abduction (movement away from the midline of the body) is usually accompanied by some rotation of the toe so that the nail is facing the midline of the body (valgus rotation). With the deformity, the metatarsal head becomes more prominent, and the metatarsal is said to be in an adducted position as it moves towards the midline of the body. [1] Radiological criteria for hallux valgus vary, but a commonly accepted criterion is to measure the angle formed between the metatarsal and the abducted hallux. This is called the metatarsophalangeal joint angle or hallux abductus angle, and it is considered abnormal when it is greater than 14.5°. [2] **Bunion** is the lay term used to describe a prominent and often inflamed metatarsal head and overlying bursa. Symptoms include pain, limitation in walking, and problems with wearing normal shoes.

INCIDENCE/ PREVALENCE

The prevalence of hallux valgus varies in different populations. In a recent study of 6000 UK school children aged 9 to 10 years, 2.5% had clinical evidence of hallux valgus, and 2% met both clinical and radiological criteria for hallux valgus. An earlier study found hallux valgus in 48% of adults. [3] Differences in prevalence may result from different methods of measurement, varying age groups, or different diagnostic criteria (e.g., metatarsal joint angle more than 10° or 15°).

AETIOLOGY/ RISK FACTORS

Nearly all population studies have found that hallux valgus is more common in women. Footwear may contribute to the deformity, but studies comparing people who wear shoes with those who do not have found contradictory results. Hypermobility of the first ray and excessive foot pronation are associated with hallux valgus. [4]

PROGNOSIS

Prognosis seems uncertain. While progression of deformity and symptoms is rapid in some people, others remain asymptomatic. One study found that hallux valgus is often unilateral initially, but usually progresses to bilateral deformity. [2]

AIMS OF INTERVENTION

To reduce symptoms and deformity, with minimum adverse effects.

OUTCOMES

Pain; **improvement in joint angle** (hallux abductus/metatarsophalangeal joint angle; intermetatarsal joint angle); **functional assessment**; **range of movement** or motion of the first metatarsophalangeal joint (the total range of both dorsiflexion and plantar flexion); **general satisfaction**, including satisfaction with appearance (cosmetic); **need for special footwear** (requirement for specialist or extra-width footwear); **mobility** (proportion of people with mobility problems); **healing** (including time to healing); **transfer lesions**; **time taken to return to normal activities**; and **adverse effects** of treatment (including incidence of complications such as infection, re-operation, non-union, avascular necrosis).

METHODS

Clinical Evidence search and appraisal May 2008.The following databases were used to identify studies for this systematic review: Medline 1966 to May 2008, Embase 1980 to May 2008, and The Cochrane Database of Systematic Reviews and Cochrane Central Register of Controlled Clinical Trials 2008, Issue 2. Additional searches were carried out using this website: NHS Centre for Reviews and Dissemination (CRD) — for Database of Abstracts of Reviews of Effects (DARE) and Health Technology Assessment (HTA). 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. Selected studies were then sent to the contributor for additional assessment, using predetermined criteria to identify relevant studies. Study design criteria for inclusion in this review were: published systematic reviews of RCTs and RCTs in any language and containing more than 20 individuals of whom more than 80% were followed up. There was no minimum length of follow-up required to include studies. We included all studies described as "open", "open label", or not blinded. In addition, we use a regular surveillance protocol to capture harms alerts from organisations such as the FDA and the MHRA, which are added to the reviews as required. Furthermore, an electronic search using a strategy developed by the Cochrane Musculoskeletal Injuries Group was undertaken to October 2003 and a hand search of podiatry journals to January 2006. 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 RRs and ORs. We have performed a GRADE evaluation of the quality of evidence for interventions included in this review (see table, p 56). The categorisation of the quality of the evidence (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 What are the effects of conservative treatments for bunions?

OPTION NIGHT SPLINTS

- For GRADE evaluation of interventions for Bunions, see table, p 56 .
- We don't know whether night splints prevent deterioration of hallux valgus.
- We found no direct information from RCTs about the effects of night splints in the treatment of people with bunions.

Benefits and harms

Night splints:

We found one systematic review (search date 2003), which identified no RCTs that met *Clinical Evidence* inclusion criteria. [5]

Further information on studies

Comment: None.

OPTION ORTHOSES TO TREAT HALLUX VALGUS IN ADULTS

- For GRADE evaluation of interventions for Bunions, see table, p 56 .
- We don't know whether orthoses in adults prevent deterioration of hallux valgus.

Benefits and harms

Orthoses versus no treatment in adults:

We found one systematic review (search date 2003) comparing antipronatory orthoses versus no treatment, [5] which identified one RCT. [6]

Pain

Orthoses compared with no treatment in adults Orthoses may be more effective than no treatment at reducing pain intensity at 6 months in adults with bunions, but we don't know whether they are more effective at 1 year (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Pain					
[6] RCT **3-armed trial**	209 adults In review [5] The remaining arm evaluated distal chevron osteotomy	**Mean pain score (assessed on a visual analogue scale ranging from 0 [no pain] to 100 [unbearable pain]) , at 6 months** 36 with orthoses 45 with no treatment	Difference adjusted for baseline characteristics: –14 95% CI –22 to –6	○○○	orthoses

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
[6] RCT **3-armed trial**	209 adults In review [5] The remaining arm evaluated distal chevron osteotomy	**Mean pain score (assessed on a visual analogue scale ranging from 0 [no pain] to 100 [unbearable pain]) , at 1 year** 40 with orthoses 40 with no treatment	Difference adjusted for baseline characteristics: –6 95% CI –15 to +3	⟷	Not significant

Functional assessment

Orthoses compared with no treatment in adults Orthoses seem no more effective than no treatment at improving functional assessment scores (measured by AOFAS) at 1 year in adults with bunions (moderate-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Functional assessment					
[6] RCT **3-armed trial**	209 adults In review [5] The remaining arm evaluated distal chevron osteotomy	**Functional assessment scores (American Orthopaedic Foot and Ankle Scale [AOFAS]) , at 1 year** 64 with orthoses 66 with no treatment	Difference adjusted for baseline characteristics: 0 95% CI –4 to +5	⟷	Not significant

General satisfaction

Orthoses compared with no treatment in adults Orthoses may be more effective than no treatment at improving "global assessment" (not further defined) at 1 year in adults with bunions, but not at improving satisfaction scores or cosmetic disturbance (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Global satisfaction					
[6] RCT **3-armed trial**	209 adults In review [5] The remaining arm evaluated distal chevron osteotomy	**Proportion with improved "global assessment" (not further defined) , at 1 year** 46% with orthoses 24% with no treatment	RR adjusted for baseline characteristics: 0.38 95% CI 0.18 to 0.78	●●○	orthoses
[6] RCT **3-armed trial**	209 adults In review [5] The remaining arm evaluated distal chevron osteotomy	**Satisfaction (assessed on a visual analogue scale ranging from 0 [totally unsatisfied] to 100 [totally satisfied]) , at 1 year** 70 with orthoses 61 with no treatment	Difference adjusted for baseline characteristics: +9 95% CI –1 to +20	⟷	Not significant
Satisfaction with appearance					
[6] RCT **3-armed trial**	209 adults In review [5] The remaining arm evaluated distal chevron osteotomy	**Cosmetic disturbance (assessed on a 7-point scale ranging from 0 [no cosmetic disturbance] to 6 [maximal cosmetic disturbance]) , at 1 year** 2.6 with orthoses 2.8 with no treatment	Differences adjusted for baseline characteristics: +0.2 95% CI –0.4 to +0.8	⟷	Not significant

Time to return to normal activities

Orthoses compared with no treatment in adults We don't know whether orthoses are more effective than no treatment at improving ability to work (measured on a visual analogue scale) at 1 year in adults with bunions (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Ability to work					
[6] RCT **3-armed trial**	209 adults In review [5] The remaining arm evaluated distal chevron osteotomy	**Ability to work (assessed on a visual analogue scale ranging from 0 [total inability to work] to 100 [maximal working ability]) , at 1 year** 81 with orthoses 83 with no treatment	Difference adjusted for baseline differences: –2 95% CI –9 to +5	⟷	Not significant

Improvement in joint angle

No data from the following reference on this outcome. [5]

Range of movement

No data from the following reference on this outcome. [5]

Need for special footwear

No data from the following reference on this outcome. [5]

Mobility

No data from the following reference on this outcome. [5]

Healing

No data from the following reference on this outcome. [5]

Transfer lesions

No data from the following reference on this outcome. [5]

Adverse effects

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Adverse effects					
[6] RCT **3-armed trial**	209 adults In review [5] The remaining arm evaluated distal chevron osteotomy	**Complications** with orthoses with no treatment The RCT reported no complications with orthoses			

Orthoses versus distal chevron osteotomy:
See option on distal metatarsal osteotomy, p 19 .

Further information on studies

Comment: None.

OPTION ANTIPRONATORY ORTHOSES IN CHILDREN

- For GRADE evaluation of interventions for Bunions, see table, p 56 .
- We don't know whether antipronatory orthoses in children prevent deterioration of hallux valgus.

Benefits and harms

Antipronatory orthoses versus no treatment in children:

We found one systematic review (search date 2003) comparing antipronatory orthoses versus no treatment. [5] The review identified one RCT in children. [2]

Improvement in joint angle

Antipronatory orthoses compared with no treatment in children We don't know whether antipronatory orthoses are more effective than no treatment at reducing deterioration of metatarsophalangeal joint angles at 3 years in children aged 9 to 10 years with bunions (very low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Improvement in joint angle					
[2] RCT	122 children, aged 9–10 years, 13% boys, metatarsophalangeal joint angles >14.5° in 1 or both feet In review [5]	**Metatarsophalangeal joint angles , at 3 years** with antipronatory orthoses with no treatment Analysis not by intention to treat 29/122 (25%) children (mainly from the control group) were lost to follow-up Metatarsophalangeal joint angles deteriorated in both groups, and the deterioration was greater in children treated with orthoses, although the difference between groups was not significant	Reported as not significant P value not reported	⟷	Not significant

Pain

No data from the following reference on this outcome. [2] [5]

Functional assessment

No data from the following reference on this outcome. [2] [5]

Range of movement

No data from the following reference on this outcome. [2] [5]

General satisfaction

No data from the following reference on this outcome. [2] [5]

Need for special footwear

No data from the following reference on this outcome. [2] [5]

Mobility

No data from the following reference on this outcome. [2] [5]

Healing

No data from the following reference on this outcome. [2] [5]

Transfer lesions

No data from the following reference on this outcome. [2] [5]

Time to return to normal activities

No data from the following reference on this outcome. [2] [5]

Adverse effects

No data from the following reference on this outcome. [2] [5]

Further information on studies

Comment: **Clinical guide:**
The use of antipronatory orthoses in children is questionable, because earlier studies have found that hallux valgus in children is not related to pronation but arises from positional changes in the first ray. [7]

QUESTION What are the effects of surgery for bunions?

OPTION ARTHRODESIS (LAPIDUS PROCEDURE)

- For GRADE evaluation of interventions for Bunions, see table, p 56 .
- We don't know whether arthrodesis is beneficial in improving outcomes.
- We found no direct evidence from RCTs about whether arthrodesis is better than no active treatment.

Benefits and harms

Arthrodesis versus no treatment:

We found no systematic review or RCTs.

Arthrodesis versus distal osteotomy:

We found no systematic review but found one RCT [8] comparing the Lapidus procedure versus the Hohmann osteotomy.

Pain

Arthrodesis compared with distal osteotomy We don't know how arthrodesis (Lapidus procedure) and the Hohmann osteotomy compare at decreasing the proportion of people dissatisfied with pain at 2 years (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Pain					
[8] RCT	101 feet, 87 people	**Proportion remaining dissatisfied with pain , at 2 years** 9/50 (18%) with the Hohmann osteotomy 4/51 (8%) with the Lapidus procedure Both operations significantly improved outcomes compared with baseline	OR 2.58 95% CI 0.74 to 9.0	⟷	Not significant

Improvement in joint angle

Arthrodesis compared with distal osteotomy We don't know how arthrodesis (Lapidus procedure) and the Hohmann osteotomy compare at improving hallux abductus angle or intermetatarsal joint angle at 2 years (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Improvement in joint angle					
[8] RCT	101 feet, 87 people	**Postoperative hallux abductus angle , at 2 years** 9.9° with the Hohmann osteotomy 13.3° with the Lapidus procedure Both operations significantly improved outcomes compared with baseline	Mean difference: –3.4° 95% CI –7.01° to +0.21°	⟷	Not significant
[8] RCT	101 feet, 87 people	**Intermetatarsal joint angle , at 2 years** 4.9° with the Hohmann osteotomy 5.6° with the Lapidus procedure Both operations significantly improved outcomes compared with baseline	Mean difference: –0.70° 95% CI –2.03° to +0.63°	⟷	Not significant

Functional assessment

Arthrodesis compared with distal osteotomy We don't know how arthrodesis (Lapidus procedure) and the Hohmann osteotomy compare at improving functional assessment scores (measured by AOFAS) at 2 years (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Functional assessment					
[8] RCT	101 feet, 87 people	**American Orthopaedic Foot and Ankle Scale (AOFAS) score , at 2 years** 89.6 with the Hohmann osteotomy 88.6 with the Lapidus procedure Both operations significantly improved outcomes compared with baseline	Adjusted mean difference: +1.4 95% CI –2.5 to +5.2	⟷	Not significant

Range of movement

No data from the following reference on this outcome. [8]

General satisfaction

No data from the following reference on this outcome. [8]

Need for special footwear

No data from the following reference on this outcome. [8]

Mobility

No data from the following reference on this outcome. [8]

Healing

No data from the following reference on this outcome. [8]

Transfer lesions

No data from the following reference on this outcome. [8]

Time to return to normal activities

No data from the following reference on this outcome. [8]

Adverse effects

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Complications					
[8] RCT	101 feet, 87 people	**Total number of complications** 29 with the Hohmann osteotomy 22 with the Lapidus procedure	Significance not assessed		
Re-operation					
[8] RCT	101 feet, 87 people	**Cases of re-operation** 2 with the Hohmann osteotomy 1 with the Lapidus procedure	Significance not assessed		

Arthrodesis versus Keller's arthroplasty:
See option on Keller's arthroplasty, p 31 .

Further information on studies

[8] The RCT found that both operations significantly improved outcomes compared with baseline. Subgroup analyses in people with excessive movement (hypermobility) at the first tarsometatarsal joint, for whom the Lapidus

procedure is most often used, found no difference in any outcome between those with a hypermobile first tarsometatarsal joint and those with a non-hypermobile joint. Assessment of hypermobility is subjective.

Comment: **Clinical guide:**
The Lapidus procedure was associated with significantly less shortening and more plantar tilt of the first metatarsal compared with the Hohmann osteotomy. Shortening and dorsiflexion of the first metatarsal are generally associated with the occurrence of transfer metatarsalgia or transfer lesions.

OPTION DIFFERENT METHODS OF BONE FIXATION

- For GRADE evaluation of interventions for Bunions, see table, p 56 .
- We don't know whether different methods of bone fixation differ in effectiveness at improving outcomes.

Benefits and harms

Standard fixation versus absorbable pin fixation:

We found one systematic review comparing different methods of bone fixation (search date 2003), [5] which identified one RCT comparing standard versus absorbable pin fixation. [9]

Pain

Standard fixation compared with absorbable pin fixation We don't know how a standard method of fixation and absorbable pin fixation compare at reducing the proportion of people with pain on walking at 11 months after Mitchell's osteotomy (very low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Pain					
[5] Systematic review	28 people, 39 feet corrected by Mitchell's osteotomy Data from 1 RCT	**People remaining in pain on walking , mean follow-up of 11 months (range 2–24 months)** 1/17 (6%) with standard fixation 2/21 (10%) with absorbable pin fixation	P = 0.58 Validity of the results may be limited; people were used as the unit of randomisation and feet were used as the unit of statistical analysis		

Improvement in joint angle

Standard fixation compared with absorbable pin fixation We don't know how a standard method of fixation and absorbable pin fixation compare at improving hallux abductus and intermetatarsal angle at 11 months after Mitchell's osteotomy (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Improvement in joint angle					
[5] Systematic review	28 people, 39 feet corrected by Mitchell's osteotomy Data from 1 RCT	**Hallux abductus angle (radiological outcome) , mean follow-up of 11 months (range 2–24 months)** 15.8° with standard fixation 18.2° with absorbable pin fixation	Mean difference: +2.40° 95% CI –4.81° to +9.61° Validity of the results may be limited; people were used as the unit of randomisation and feet were used as the unit of statistical analysis	⟷	Not significant
[5] Systematic review	28 people, 39 feet corrected by Mitchell's osteotomy Data from 1 RCT	**Intermetatarsal angle (radiological outcome) , mean follow-up of 11 months (range 2–24 months)** 9.1° with standard fixation 9.4° with absorbable pin fixation	Mean difference: +0.3° 95% CI –1.77° to +2.37° Validity of the results may be limited; people were used as the unit of randomisation and feet were used as the unit of statistical analysis	⟷	Not significant

Range of movement

Standard fixation compared with absorbable pin fixation We don't know how a standard method of fixation and absorbable pin fixation compare at improving range of movement at 11 months after Mitchell's osteotomy (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Range of movement					
[5] Systematic review	28 people, 39 feet corrected by Mitchell's osteotomy Data from 1 RCT	**Range of movement , mean follow-up of 11 months (range 2–24 months)** 61.2° with standard fixation 69.2° with absorbable pin fixation	Mean difference: +8.0° 95% CI –7.3° to +23.6° Validity of the results may be limited; people were used as the unit of randomisation and feet were used as the unit of statistical analysis	⟷	Not significant

General satisfaction

Standard fixation compared with absorbable pin fixation We don't know how a standard method of fixation and absorbable pin fixation compare at reducing the proportion of people dissatisfied with cosmetic appearance at 11 months after Mitchell's osteotomy (very low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Satisfaction with appearance					
[5] Systematic review	28 people, 39 feet corrected by Mitchell's osteotomy Data from 1 RCT	**People dissatisfied with cosmetic appearance , mean follow-up of 11 months (range 2–24 months)** 1/17 (6%) with standard fixation 3/21 (14%) with absorbable pin fixation	P = 0.38 Validity of the results may be limited; people were used as the unit of randomisation and feet were used as the unit of statistical analysis	⟷	Not significant

Mobility

Standard fixation compared with absorbable pin fixation We don't know how a standard method of fixation and absorbable pin fixation compare at decreasing the proportion of people with walking limitation at 11 months after Mitchell's osteotomy (very low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Mobility					
[5] Systematic review	28 people, 39 feet corrected by Mitchell's osteotomy Data from 1 RCT	**People with marked walking limitation , mean follow-up of 11 months (range 2–24 months)** 1/17 (6%) with standard fixation 1/21 (5%) with absorbable pin fixation	P = 0.70 Validity of the results may be limited; people were used as the unit of randomisation and feet were used as the unit of statistical analysis	⟷	Not significant

Functional assessment

No data from the following reference on this outcome. [5]

Need for special footwear

No data from the following reference on this outcome. [5]

Healing

No data from the following reference on this outcome. [5]

Transfer lesions

No data from the following reference on this outcome. [5]

Time to return to normal activities

No data from the following reference on this outcome. [5]

Adverse effects

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Complications					
[5] Systematic review	28 people, 39 feet corrected by Mitchell's osteotomy Data from 1 RCT	**Complications (overall)** 14/17 (82%) feet with standard fixation 16/22 (73%) feet with absorbable pin fixation	RR 1.13 95% CI 0.81 to 1.59	⟷	Not significant
[5] Systematic review	28 people, 39 feet corrected by Mitchell's osteotomy Data from 1 RCT	**Recurrence of deformity** 3/17 (18%) feet with standard fixation 2/22 (9%) feet with absorbable pin fixation			
[5] Systematic review	28 people, 39 feet corrected by Mitchell's osteotomy Data from 1 RCT	**Complications primarily resulting in pain** 5/17 (29%) feet with standard fixation 6/22 (27%) feet with absorbable pin fixation			
[5] Systematic review	28 people, 39 feet corrected by Mitchell's osteotomy Data from 1 RCT	**Continued swelling** 3/17 (18%) feet with standard fixation 0/22 (0%) feet with absorbable pin fixation			

Screw fixation plus early mobilisation versus vicryl suture fixation plus immobilisation:

We found one systematic review comparing different methods of bone fixation (search date 2003), [5] which identified one RCT. [10]

Improvement in joint angle

Screw fixation plus early mobilisation compared with vicryl suture fixation plus immobilisation Screw fixation plus early mobilisation (early weight-bearing) in a plaster shoe and vicryl suture fixation followed by 6 weeks' immobilisation (non-weight-bearing) in a plaster boot seem equally effective at improving hallux abductus angle and intermetatarsal angle at 1 year (moderate-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Improvement in joint angle					
[10] RCT	30 people who had undergone Mitchell's osteotomy In review [5]	**Hallux abductus angle (radiological) , at 1 year** 10.8° with suture fixation plus 6 weeks' immobilisation in a plaster boot (non-weight-bearing) 12.0° with screw fixation plus early mobilisation (early weight-bearing)	Mean difference: +1.20° 95% CI –2.35° to +4.75°	⟷	Not significant
[10] RCT	30 people who had undergone Mitchell's osteotomy In review [5]	**Intermetatarsal angle , at 1 year** 9.1° with suture fixation plus 6 weeks' immobilisation in a plaster boot (non-weight-bearing) 10.7° with screw fixation plus early mobilisation (early weight-bearing)	Mean difference: +1.6° 95% CI –0.56° to +3.76°	⟷	Not significant

Time to return to normal activities

Screw fixation plus early mobilisation compared with vicryl suture fixation plus immobilisation Screw fixation plus early mobilisation (early weight-bearing) in a plaster shoe may be more effective than vicryl suture fixation plus 6 weeks' immobilisation (non-weight-bearing) in a plaster boot at reducing time taken to return to social activities and work (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Time taken to return to work					
[10] RCT	30 people who had undergone Mitchell's osteotomy In review [5]	**Return to work (mean) , at 1 year** 4.9 weeks with screw fixation plus early mobilisation (early weight-bearing) 8.7 weeks with suture fixation plus 6 weeks' immobilisation in a plaster boot (non-weight-bearing)	P <0.001	○○○	screw fixation plus early mobilisation
Time taken to return to social activities					
[10] RCT	30 people who had undergone Mitchell's osteotomy In review [5]	**Return to social activities (mean) , at 1 year** 2.9 weeks with screw fixation plus early mobilisation (early weight-bearing) 5.7 with suture fixation plus 6 weeks' immobilisation in a plaster boot (non-weight-bearing)	P <0.001	○○○	screw fixation plus early mobilisation

Pain

No data from the following reference on this outcome. [10]

Functional assessment

No data from the following reference on this outcome. [10]

Range of movement

No data from the following reference on this outcome. [10]

General satisfaction

No data from the following reference on this outcome. [10]

Need for special footwear

No data from the following reference on this outcome. [10]

Mobility

No data from the following reference on this outcome. [10]

Healing

No data from the following reference on this outcome. [10]

Transfer lesions

No data from the following reference on this outcome. [10]

Adverse effects

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Adverse effects					
[10] RCT	30 people who had undergone Mitchell's osteotomy In review [5]	**Metatarsophalangeal joint stiffness , at 3 months** with screw fixation plus early mobilisation (early weight-bearing)	Reported as significant P value not reported	○○○	suture fixation plus immobilisation

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
		with suture fixation plus 6 weeks' immobilisation in a plaster boot (non-weight-bearing)			
[10] RCT	30 people who had undergone Mitchell's osteotomy In review [5]	**Metatarsophalangeal joint stiffness , at 1 year** with screw fixation plus early mobilisation (early weight-bearing) with suture fixation plus 6 weeks' immobilisation in a plaster boot (non-weight-bearing)	Reported as significant P value not reported	○○○	suture fixation plus immobilisation
[10] RCT	30 people who had undergone Mitchell's osteotomy In review [5]	**Superficial infection** 2/15 (13%) with screw fixation plus early mobilisation (early weight-bearing) 1/15 (7%) with suture fixation plus 6 weeks' immobilisation in a plaster boot (non-weight-bearing)	Significance not assessed		
[10] RCT	30 people who had undergone Mitchell's osteotomy In review [5]	**Pain associated with fixation** with screw fixation plus early mobilisation (early weight-bearing) with suture fixation plus 6 weeks' immobilisation in a plaster boot (non-weight-bearing) 2/15 (13%) people had the screw removed because of pain			

Percutaneous Kirschner-wire fixation compared with internal screw fixation:

We found one RCT that compared 1.8 mm percutaneous Kirschner-wire fixation with 2.7 mm internal screw fixation, following distal chevron osteotomy. [11]

Pain

Percutaneous Kirschner-wire fixation compared with internal screw fixation We don't know how percutaneous Kirschner-wire fixation and internal screw fixation compare at decreasing the proportion of people with any pain at 6 months after distal chevron osteotomy (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Pain					
[11] RCT	22 people (all women), 22 feet corrected by distal chevron osteotomy	**Proportion of people experiencing any pain (data incorporated in total American Orthopaedic Foot and Ankle Scale [AOFAS] score) , at 6 months** 3/11 (27%) with percutaneous Kirschner-wire fixation (1.8 mm) 3/11 (27%) with internal screw fixation (2.7 mm)	Significance not assessed		

Functional assessment

Percutaneous Kirschner-wire fixation compared with internal screw fixation Percutaneous Kirschner-wire fixation and internal screw fixation seem equally effective at improving functional assessment scores (measured by AOFAS) at 6 months after distal chevron osteotomy (moderate-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Functional assessment					
[11] RCT	22 people (all women), 22 feet corrected by distal chevron osteotomy	**Functional assessment score (American Orthopaedic Foot and Ankle Scale [AOFAS]; change in AOFAS score from baseline) , at 6 months** from 53.5 to 94.09 with percutaneous Kirschner-wire fixation (1.8 mm) from 54.25 to 94.45 with internal screw fixation (2.7 mm)	P >0.05	⟷	Not significant

Improvement in joint angle

Percutaneous Kirschner-wire fixation compared with internal screw fixation We don't know how percutaneous Kirschner-wire fixation and internal screw fixation compare at improving metatarsophalangeal angle or intermetatarsal angle at 6 months after distal chevron osteotomy (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Improvement in joint angle					
[11] RCT	22 people (all women), 22 feet corrected by distal chevron osteotomy	**Improvements in the metatarsophalangeal angle (average correction) , at 6 months** 7.9° with percutaneous Kirschner-wire fixation (1.8 mm) 8.8° with internal screw fixation (2.7 mm)	Significance not assessed		
[11] RCT	22 people (all women), 22 feet corrected by distal chevron osteotomy	**Improvements in the intermetatarsal angle (average correction) , at 6 months** 3.3° with percutaneous Kirschner-wire fixation (1.8 mm) 2.1° with internal screw fixation (2.7 mm)	Significance not assessed		

Range of movement

Percutaneous Kirschner-wire fixation compared with internal screw fixation We don't know how percutaneous Kirschner-wire fixation and internal screw fixation compare at improving metatarsophalangeal joint movement at 6 months after distal chevron osteotomy (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Range of movement					
[11] RCT	22 people (all women), 22 feet corrected by distal chevron osteotomy	**Greater than 75° improvement in metatarsophalangeal joint movement (data incorporated in total American Orthopaedic Foot and Ankle Scale [AOFAS] score) , at 6 months** 8/11 (73%) with percutaneous Kirschner-wire fixation (1.8 mm) 11/11 (100%) with internal screw fixation (2.7 mm)	Significance not assessed		

General satisfaction

No data from the following reference on this outcome. [11]

Need for special footwear

No data from the following reference on this outcome. [11]

Mobility

No data from the following reference on this outcome. [11]

Healing

No data from the following reference on this outcome. [11]

Transfer lesions

No data from the following reference on this outcome. [11]

Time to return to normal activities

No data from the following reference on this outcome. [11]

Adverse effects

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Adverse effects					
[11] RCT	22 people (all women), 22 feet corrected by distal chevron osteotomy	**Infection** with percutaneous Kirschner-wire fixation (1.8 mm) with internal screw fixation (2.7 mm) The RCT reported no cases of infection			
[11] RCT	22 people (all women), 22 feet corrected by distal chevron osteotomy	**Algodystrophy** with percutaneous Kirschner-wire fixation (1.8 mm) with internal screw fixation (2.7 mm) There was one case of algodystrophy (excessive pain and vascular changes that can lead to dystrophic changes in local tissues			

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
		including bone) in the Kirschner-wire group			

Further information on studies

Comment: All the RCTs were small and may have lacked power to detect clinically significant differences between treatments.

OPTION DISTAL METATARSAL OSTEOTOMY

- For GRADE evaluation of interventions for Bunions, see table, p 56 .
- Distal chevron osteotomy may be more effective than orthoses or no treatment at reducing pain and improving function. However, there is insufficient evidence comparing its effectiveness with other surgical techniques.

Benefits and harms

Distal chevron osteotomy versus no treatment:

We found one systematic review (search date 2003), [5] which identified one RCT. [6]

Pain

Distal chevron osteotomy compared with no treatment Distal chevron osteotomy seems more effective than no treatment at reducing mean pain intensity at 1 year (moderate-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Pain					
[6] RCT **3-armed trial**	209 people In review [5] The remaining arm evaluated orthoses	**Mean pain intensity (assessed on a visual analogue scale ranging from 0 [no pain] to 100 [unbearable pain]) , at 1 year** 23 with distal chevron osteotomy 40 with no treatment	Difference adjusted for baseline characteristics: –19 for distal chevron osteotomy *v* no treatment 95% CI –28 to –10	○○○	distal chevron osteotomy

Functional assessment

Distal chevron osteotomy compared with no treatment Distal chevron osteotomy seems more effective than no treatment at improving functional assessment scores (measured by AOFAS) at 1 year (moderate-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Functional assessment					
[6] RCT **3-armed trial**	209 people In review [5] The remaining arm evaluated orthoses	**Mean functional status (assessed using American Orthopaedic Foot and Ankle Scale [AOFAS]) , at 1 year** 75 with distal chevron osteotomy 66 with no treatment	Difference adjusted for baseline characteristics: 11 for distal chevron osteotomy *v* no treatment 95% CI 7 to 16	○○○	distal chevron osteotomy

General satisfaction

Distal chevron osteotomy compared with no treatment Distal chevron osteotomy may be more effective than no treatment at improving cosmetic appearance (measured on a 7-point scale) at 1 year (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Satisfaction with appearance					
[6] RCT **3-armed trial**	209 people In review [5] The remaining arm evaluated orthoses	**Mean cosmetic appearance (assessed on a 7-point scale ranging from 0 [no cosmetic disturbance] to 6 [maximal cosmetic disturbance]) , at 1 year** 1.9 with distal chevron osteotomy 2.8 with no treatment	Difference adjusted for baseline characteristics: –1.2 for distal chevron osteotomy *v* no treatment 95% CI –1.8 to –0.6	○○○	distal chevron osteotomy

Time to return to normal activities

Distal chevron osteotomy compared with no treatment We don't know whether distal chevron osteotomy is more effective than no treatment at improving the ability to work (measured on a visual analogue scale) at 1 year (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Ability to work					
[6] RCT **3-armed trial**	209 people In review [5] The remaining arm evaluated orthoses	**Ability to work (assessed on a visual analogue scale ranging from 0 [total inability to work] to 100 [maximal working ability]) , at 1 year** 89 with distal chevron osteotomy 83 with no treatment	Difference adjusted for baseline characteristics: +6 for distal chevron osteotomy *v* no treatment 95% CI –3 to +11	⟷	Not significant

Improvement in joint angle

No data from the following reference on this outcome. [5] [6]

Range of movement

No data from the following reference on this outcome. [5] [6]

Need for special footwear

No data from the following reference on this outcome. [5] [6]

Mobility

No data from the following reference on this outcome. [5] [6]

Healing

No data from the following reference on this outcome. [5] [6]

Transfer lesions

No data from the following reference on this outcome. [5] [6]

Adverse effects

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Adverse effects					
[6] RCT **3-armed trial**	209 people In review [5] The remaining arm evaluated orthoses	**Complications** with distal chevron osteotomy with no treatment Complications occurred in 4/71 (6%) people having distal chevron osteotomy: 1 wound infection, 1 stress fracture, 1 episode of nerve damage, and 1 recurrence of deformity			

Distal chevron osteotomy versus orthoses:

We found one systematic review (search date 2003), [5] which identified one RCT. [6]

Pain

Distal chevron osteotomy compared with orthoses Distal chevron osteotomy seems more effective than orthoses at reducing mean pain intensity (measured by VAS) at 1 year (moderate-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Pain					
[6] RCT **3-armed trial**	209 people In review [5] The remaining arm evaluated no treatment	**Pain intensity (assessed on a visual analogue score ranging from 0 [no pain] to 100 [unbearable pain]) , at 1 year** 23 with distal chevron osteotomy 40 with orthoses	Difference adjusted for baseline characteristics: –14 for distal chevron osteotomy *v* orthoses 95% CI –22 to –5	○○○	distal chevron osteotomy

Functional assessment

Distal chevron osteotomy compared with orthoses Distal chevron osteotomy seems more effective than orthoses at improving functional assessment scores (measured by AOFAS) at 1 year (moderate-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Functional assessment					
[6] RCT	209 people In review [5]	**Functional status (American Orthopaedic Foot and Ankle Scale [AOFAS] score) , at 1 year** 75 with distal chevron osteotomy 64 with orthoses	Difference adjusted for baseline characteristics: 11 for distal chevron osteotomy *v* orthoses 95% CI 7 to 15	○○○	distal chevron osteotomy

General satisfaction

Distal chevron osteotomy compared with orthoses Distal chevron osteotomy may be more effective than orthoses at improving cosmetic appearance (measured on a 7-point scale) at 1 year (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Satisfaction with appearance					
[6] RCT **3-armed trial**	209 people In review [5] The remaining arm evaluated no treatment	**Cosmetic appearance (assessed on a 7-point scale ranging from 0 [no cosmetic disturbance] to 6 [maximal cosmetic disturbance]) , at 1 year** 1.9 with distal chevron osteotomy 2.6 with orthoses	Difference adjusted for baseline characteristics: –1.4 for distal chevron osteotomy *v* orthoses 95% CI –2.1 to –0.8	○○○	distal chevron osteotomy

Time to return to normal activities

Distal chevron osteotomy compared with orthoses We don't know how distal chevron osteotomy and orthoses compare at improving the ability to work (measured by VAS) at 1 year (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Return to work or normal activities					
[6] RCT **3-armed trial**	209 people In review [5] The remaining arm evaluated no treatment	**Ability to work (assessed on a visual analogue scale ranging from 0 [total inability to work] to 100 [maximal working ability]) , at 1 year** 89 with distal chevron osteotomy 81 with orthoses	Difference adjusted for baseline characteristics: 6 for distal chevron osteotomy *v* orthoses 95% CI 0 to 13	⟷	Not significant

Improvement in joint angle

No data from the following reference on this outcome. [5] [6]

Range of movement

No data from the following reference on this outcome. [5] [6]

Need for special footwear

No data from the following reference on this outcome. [5] [6]

Mobility

No data from the following reference on this outcome. [5] [6]

Healing

No data from the following reference on this outcome. [5] [6]

Transfer lesions

No data from the following reference on this outcome. [5] [6]

Adverse effects

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Adverse effects					
[6] RCT **3-armed trial**	209 people In review [5] The remaining arm evaluated no treatment	**Complications** with distal chevron osteotomy with orthoses The RCT reported no complications associated with orthoses Of those undergoing distal chevron osteotomy, 4/71 (6%) people had adverse effects: 1 wound infection, 1 stress fracture, 1 episode of nerve damage, and 1 recurrence of deformity			

Distal chevron osteotomy versus other types of distal osteotomy:

We found one systematic review (search date 2003), [5] which identified one RCT, [12] and we found two subsequent RCTs. [13] [14]

Improvement in joint angle

Distal chevron osteotomy compared with other types of distal osteotomy Distal chevron osteotomy may be less effective than Wilson's osteotomy at improving hallux abductus angle at 38 months, and at improving the intermetatarsal angle at 1 year compared with Lindgren osteotomy. Lindgren osteotomy may lower the hallux valgus angle at 1 and 4.7 years compared with distal chevron osteotomy. We don't know how distal chevron osteotomy and scarf osteotomy compare at improving hallux valgus angle or intermetatarsal angle at 2 years (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Improvement in joint angle					
[12] RCT	51 people In review [5]	**Hallux abductus angle , at 38 months** 25.7° with distal chevron osteotomy 13.3° with Wilson's osteotomy	Difference: +12.4° 95% CI +7.5° to +17.5°	○○○	Wilson's osteotomy
[13] RCT	100 people (94 women, 6 men), 100 feet	**Hallux valgus angle (change from baseline) , at 1 year** from 29° to 15° with Lindgren osteotomy from 30° to 17° with distal chevron osteotomy	P = 0.01	○○○	Lindgren osteotomy
[13] RCT	100 people (94 women, 6 men), 100 feet	**Hallux valgus angle , 3–6 years (mean 4.7 years)** 17° with Lindgren osteotomy 21° with distal chevron osteotomy	P = 0.01	○○○	Lindgren osteotomy
[13] RCT	100 people (94 women, 6 men), 100 feet	**Intermetatarsal angle (change from baseline) , at 1 year** from 14° to 8° with Lindgren osteotomy from 14° to 10° with distal chevron osteotomy	P = 0.01	○○○	Lindgren osteotomy
[13] RCT	100 people (94 women, 6 men), 100 feet	**Intermetatarsal angle , 3–6 years** 8° with Lindgren osteotomy 10° with distal chevron osteotomy	P = 0.04	○○○	Lindgren osteotomy
[14] RCT	96 people, 108 feet	**Hallux abductus angle (change from baseline) , at 2 years** from 30.4° to 17.2° with chevron osteotomy from 28.9° to 18.1° with scarf osteotomy	P = 0.13	⟷	Not significant
[14] RCT	96 people, 108 feet	**Intermetatarsal angle (change from baseline) , at 2 years** from 13.4° to 10.3° with chevron osteotomy from 12.8° to 9.9° with scarf osteotomy	P = 0.97	⟷	Not significant

Functional assessment

Distal chevron osteotomy compared with other types of distal osteotomy We don't know how distal chevron osteotomy compares with Lindgren osteotomy or scarf osteotomy at improving functional assessment scores (measured by AOFAS) at 1 to 2 years (very low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Functional assessment					
[13] RCT	100 people (94 women, 6 men), 100 feet	**Functional assessment scores (American Orthopaedic Foot and Ankle Scale [AOFAS]; change from baseline) , at 1 year**	Significance not assessed		

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
		from 42 to 85 with Lindgren osteotomy from 47 to 85 with distal chevron osteotomy			
[14] RCT	96 people, 108 feet	**AOFAS total score change from baseline , at 2 years** from 48.4 to 89.0 with distal chevron osteotomy from 47.4 to 91.2 with scarf osteotomy	P = 0.43	⟷	Not significant

No data from the following reference on this outcome. [5] [12]

Need for special footwear

Distal chevron osteotomy compared with other types of distal osteotomy We don't know how distal chevron osteotomy and Wilson's osteotomy compare at reducing the need for special footwear (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Need for special footwear					
[12] RCT	51 people In review [5]	**Need for special footwear** 3/26 (12%) with distal chevron osteotomy 8/24 (33%) with Wilson's osteotomy	OR 3.85 95% CI 0.87 to 16.67	⟷	Not significant

No data from the following reference on this outcome. [5] [12] [13] [14]

Range of movement

Distal chevron osteotomy compared with other types of distal osteotomy We don't know how distal chevron osteotomy and Lindgren osteotomy compare at increasing the proportion of people with good range of movement at the metatarsophalangeal joint at 1 year (very low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Range of motion					
[13] RCT	100 people (94 women, 6 men), 100 feet	**Proportion of people with good range of motion of the metatarsophalangeal joint (>30° extension and 15° flexion; change from baseline) , at 1 year** from 88% to 82% with Lindgren osteotomy from 94% to 88% with distal chevron osteotomy	Significance not assessed		

No data from the following reference on this outcome. [5] [12] [14]

General satisfaction

Distal chevron osteotomy compared with other types of distal osteotomy We don't know how distal chevron osteotomy and Lindgren osteotomy compare at decreasing the proportion of people dissatisfied with cosmetic results at 1 year (very low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Satisfaction with appearance					
[13] RCT	100 people (94 women, 6 men), 100 feet	**Dissatisfied with cosmetic result , at 1 year** 5/50 (10%) with Lindgren osteotomy 5/49 (10.2%) with distal chevron osteotomy	Significance not assessed		

No data from the following reference on this outcome. [5] [12] [14]

Mobility

Distal chevron osteotomy compared with other types of distal osteotomy We don't know how distal chevron osteotomy and Wilson's osteotomy compare at improving mobility at 38 months (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Mobility					
[12] RCT	51 people In review [5]	**Limited walking , at 38 months** 5/24 (21%) with distal chevron osteotomy 4/26 (15%) with Wilson's osteotomy	OR 1.45 95% CI 0.34 to 6.25	⟷	Not significant

No data from the following reference on this outcome. [13] [14]

Transfer lesions

Distal chevron osteotomy compared with other types of distal osteotomy We don't know how distal chevron osteotomy and Lindgren osteotomy compare at decreasing transfer lesions (very low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Transfer lesions					
[13] RCT	100 people (94 women, 6 men), 100 feet	**Transfer lesions** 8% with Lindgren osteotomy 10% with distal chevron osteotomy	Significance not assessed		

No data from the following reference on this outcome. [5] [12] [14]

Pain

No data from the following reference on this outcome. [5] [12] [13] [14]

Healing

No data from the following reference on this outcome. [5] [12] [13] [14]

Time to return to normal activities

No data from the following reference on this outcome. [5] [12] [13] [14]

Adverse effects

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Adverse effects					
[12] RCT	51 people In review [5]	**Proportion of people with complications** 11/26 (42%) with Wilson's osteotomy 9/24 (38%) with distal chevron osteotomy Complications included swelling, over-correction, slow healing, and recurrence of bunion	RR 1.30 95% CI 0.57 to 2.24	⟷	Not significant
[12] RCT	51 people In review [5]	**Shortened metatarsal** with Wilson's osteotomy with distal chevron osteotomy Metatarsal dorsiflexion occurred in 20% of people The RCT found that the change in position did not correlate with development of new corns, calluses, or pain	P = 0.02	○○○	distal chevron osteotomy
[13] RCT	100 people (94 women, 6 men), 100 feet	**Metatarsalgia** 12% with Lindgren osteotomy 10% with distal chevron osteotomy	Significance not assessed		
[13] RCT	100 people (94 women, 6 men), 100 feet	**Re-operation** 0/50 (0%) with Lindgren osteotomy 1/49 (2%) with distal chevron osteotomy	Significance not assessed		
[13] RCT	100 people (94 women, 6 men), 100 feet	**Avascular necrosis or non-union** 0/50 (0%) with Lindgren osteotomy 0/49 (0%) with distal chevron osteotomy	Significance not assessed		
[14] RCT	96 people, 108 feet	**Avascular necrosis** 3 cases with distal chevron osteotomy 0 cases with scarf osteotomy	Significance not assessed		
[14] RCT	96 people, 108 feet	**Grade I complex regional pain syndrome** 1 case with distal chevron osteotomy 4 cases with scarf osteotomy	Significance not assessed		

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
[14] RCT	96 people, 108 feet	**Superficial infection** 2 cases with distal chevron osteotomy 0 cases with scarf osteotomy	Significance not assessed		

Distal chevron osteotomy plus phalangeal osteotomy:
See option on phalangeal (Akin) osteotomy, p 41 .

Distal chevron osteotomy versus Lapidus procedure:
See option on arthrodesis (Lapidus procedure), p 8 .

Distal chevron osteotomy versus Keller's arthroplasty:
See option on Keller's arthroplasty, p 31 .

Further information on studies

Comment: Only one study to date has considered long-term follow-up after distal osteotomy. [13] The study undertook long-term follow-up of radiographic changes at 3 to 6 years, and found that only the hallux abductus angle had changed over the longer review period. Although the authors comment that the hallux abductus angle had deteriorated significantly in both groups, the deterioration was only a mean of 2° (Lindgren osteotomy) and 4° (chevron osteotomy), and this could be clinically insignificant. Patient-centred outcome measurements were not collected at 3 to 6 years. The occurrence of complex regional pain syndrome is a recognised complication in orthopaedic/podiatric surgery. The authors of the scarf osteotomy versus chevron osteotomy study [14] comment that the high incidence of complex regional pain syndrome seen in the scarf group has not previously been reported with this operation.

OPTION CHEVRON OSTEOTOMY PLUS ADDUCTOR TENOTOMY VERSUS CHEVRON OSTEOTOMY ALONE

- For GRADE evaluation of interventions for Bunions, see table, p 56 .
- We found insufficient evidence comparing Chevron osteotomy versus Chevron osteotomy plus adductor tenotomy.

Benefits and harms

Distal chevron osteotomy plus adductor tenotomy compared with distal chevron osteotomy alone:
We found one systematic review (search date 2003), [5] which identified one RCT. [15]

Pain

Distal chevron osteotomy plus adductor tenotomy compared with distal chevron osteotomy alone We don't know how distal chevron osteotomy plus adductor tenotomy and distal osteotomy alone compare at reducing the proportion of people with pain (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Pain					
[5] Systematic review	84 people Data from 1 RCT	**People remaining in pain** 8/38 (21%) with distal chevron osteotomy plus adductor tenotomy 6/46 (13%) with distal chevron osteotomy alone	OR 1.78 95% CI 0.56 to 5.67	⟷	Not significant

Improvement in joint angle

Distal chevron osteotomy plus adductor tenotomy compared with distal chevron osteotomy alone We don't know how distal chevron osteotomy plus adductor tenotomy and distal osteotomy alone compare at improving the final hallux abductus angle (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Improvement in joint angle					
[5] Systematic review	84 people Data from 1 RCT	**Final hallux abductus angle** 20.2° with distal chevron osteotomy plus adductor tenotomy 23.5° with distal chevron osteotomy alone	Mean difference: –3.3° 95% CI –8.63° to +2.03°	⟷	Not significant

Range of movement

Distal chevron osteotomy plus adductor tenotomy compared with distal chevron osteotomy alone We don't know how distal chevron osteotomy plus adductor tenotomy and distal osteotomy alone compare at increasing the range of motion (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Range of movement					
[5] Systematic review	84 people Data from 1 RCT	**Range of motion** 69° with distal chevron osteotomy plus adductor tenotomy 67° with distal chevron osteotomy alone	Mean difference: –2.0° 95% CI +2.7° to –6.73°	⟷	Not significant

General satisfaction

Distal chevron osteotomy plus adductor tenotomy compared with distal chevron osteotomy alone We don't know how distal chevron osteotomy plus adductor tenotomy and distal osteotomy alone compare at reducing the proportion of people remaining dissatisfied (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
General satisfaction					
[5] Systematic review	84 people Data from 1 RCT	**People remaining dissatisfied** 10/38 (26%) with chevron osteotomy plus adductor tenotomy 7/46 (15%) with chevron osteotomy alone	OR 1.99 95% CI 0.68 to 5.87	⟷	Not significant

Need for special footwear

Distal chevron osteotomy plus adductor tenotomy compared with distal chevron osteotomy alone We don't know how distal chevron osteotomy plus adductor tenotomy and distal osteotomy alone compare at reducing the proportion of people requiring special footwear (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Need for special footwear					
[5] Systematic review	84 people Data from 1 RCT	**People requiring special footwear** 2/38 (5%) with chevron osteotomy plus adductor tenotomy 7/46 (15%) with chevron osteotomy alone	OR 0.31 95% CI 0.06 to 1.59	⟷	Not significant

Mobility

Distal chevron osteotomy plus adductor tenotomy compared with distal chevron osteotomy alone We don't know how distal chevron osteotomy plus adductor tenotomy and distal osteotomy alone compare at reducing the proportion of people with reduced mobility (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Mobility					
[5] Systematic review	84 people Data from 1 RCT	**People with reduced mobility** 1/38 (3%) with chevron osteotomy plus adductor tenotomy 1/46 (2%) with chevron osteotomy alone	OR 1.22 95% CI 0.07 to 20.12	⟷	Not significant

Functional assessment

No data from the following reference on this outcome. [5] [15]

Healing

No data from the following reference on this outcome. [5] [15]

Transfer lesions

No data from the following reference on this outcome. [5] [15]

Time to return to normal activities

No data from the following reference on this outcome. [5] [15]

Adverse effects

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Adverse effects					
[5] Systematic review	84 people Data from 1 RCT	**Complications** 4 with chevron osteotomy plus adductor tenotomy 3 with chevron osteotomy alone See further information on studies for full details of complications	Significance not assessed		

Further information on studies

[15] The RCT reported that complications included: one reoperation because of medial dislocation of the first metatarsal head; one neuroma requiring re-operation; a case of intractable plantar keratosis under the first metatarsal head; one case of inexplicable pain at the great toe nail in the group with chevron osteotomy plus adductor tenotomy; and three reoperations because of inadequate correction in the group with chevron osteotomy alone.

Comment: The RCT did not include long-term follow-up. In the RCT, about 25% of both groups remained dissatisfied during follow-up. [5] This may be related to greater postoperative reduction in the circumference of the ball of the foot; the RCT found that the ball circumference of dissatisfied people was significantly greater than that of satisfied people (P = 0.005). [15]

OPTION KELLER'S ARTHROPLASTY

- For GRADE evaluation of interventions for Bunions, see table, p 56 .
- We don’t know whether Keller's arthroplasty is beneficial in improving outcomes.
- We found no direct information from RCTs comparing Keller's arthroplasty versus no treatment.

Benefits and harms

Keller's arthroplasty versus no treatment:

We found no systematic review or RCTs.

Keller's arthroplasty versus distal osteotomy:

We found one systematic review (search date 2003), [5] which identified one RCT. [16]

Pain

Keller's arthroplasty compared with distal osteotomy We don't know how Keller's arthroplasty and distal metatarsal osteotomy compare at reducing the proportion of people with unresolved pain at 3 years (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Pain					
[16] RCT	33 people In review [5]	**Proportion of people with unresolved pain , at 3 years** 4/14 (29%) with Keller's arthroplasty 4/15 (27%) with distal metatarsal osteotomy	OR 0.91 95% CI 0.18 to 4.64 RCT had weak methods; see further information on studies for full details	⟷	Not significant

Improvement in joint angle

Compared with distal osteotomy Keller's arthroplasty may be less effective than distal metatarsal osteotomy at improving the intermetatarsal angle at 3 years (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Improvement in joint angle					
[16] RCT	33 people In review [5]	**Intermetatarsal angle , at 3 years** 12.0° with Keller's arthroplasty 7.0° with distal metatarsal osteotomy	Difference: –5.0° 95% CI –8.9° to –1.1° RCT had weak methods; see further information on studies for full details	○○○	distal metatarsal osteotomy

Range of movement

Keller's arthroplasty compared with distal osteotomy Keller's arthroplasty may be less effective than distal metatarsal osteotomy at improving the range of movement at 3 years (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Range of movement					
[16] RCT	33 people In review [5] Data from 1 RCT	**Reduction in range of movement , at 3 years** 14.0° with Keller's arthroplasty 1.0° with distal metatarsal osteotomy	Difference: 13.0° 95% CI 5.0° to 21.1° RCT had weak methods; see further information on studies for full details	○○○	distal metatarsal osteotomy

General satisfaction

Keller's arthroplasty compared with distal osteotomy We don't know how Keller's arthroplasty and distal metatarsal osteotomy compare at reducing the proportion of people who are dissatisfied at 3 years (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
General satisfaction					
[16] RCT	33 people In review [5]	**Proportion of people dissatisfied , at 3 years** 4/14 (29%) with Keller's arthroplasty 4/15 (27%) with distal metatarsal osteotomy	OR 0.91 95% CI 0.18 to 4.64 RCT had weak methods; see further information on studies for full details	⟷	Not significant

Functional assessment

No data from the following reference on this outcome. [5] [16]

Need for special footwear

No data from the following reference on this outcome. [5] [16]

Mobility

No data from the following reference on this outcome. [5] [16]

Healing

No data from the following reference on this outcome. [5] [16]

Transfer lesions

No data from the following reference on this outcome. [5] [16]

Time to return to normal activities

No data from the following reference on this outcome. [5] [16]

Adverse effects

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Infection					
[16] RCT	33 people In review [5]	**Postoperative superficial wound infections** 3/14 (21%) with Keller's arthroplasty 1/15 (7%) with distal metatarsal osteotomy	OR 3.85 95% CI 0.35 to 50.00 RCT had weak methods; see further information on studies for full details	⟷	Not significant

Keller's arthroplasty versus arthrodesis:

We found one systematic review (search date 2003) comparing Keller's arthroplasty versus arthrodesis, [5] which included one RCT. [17]

Pain

Keller's arthroplasty compared with arthrodesis We don't know how Keller's arthroplasty and arthrodesis compare at reducing the proportion of people with unresolved pain at 2 years (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Pain					
[17] RCT	100 people In review [5]	**Proportion of people with unresolved pain , at 2 years** 5/44 (11%) with Keller's arthroplasty 4/37 (11%) with arthrodesis	OR 1.05 95% CI 0.26 to 4.35 RCT had weak methods; see further information on studies for full details	⟷	Not significant

General satisfaction

Keller's arthroplasty compared with arthrodesis We don't know how Keller's arthroplasty and arthrodesis compare at reducing the proportion of people who are dissatisfied at 2 years (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
General satisfaction					
[17] RCT	100 people In review [5]	**Proportion of people dissatisfied , at 2 years** 11/44 (25%) with Keller's arthroplasty 10/37 (27%) with arthrodesis	OR 0.90 95% CI 0.33 to 2.44 RCT had weak methods; see further information on studies for full details	⟷	Not significant

Mobility

Keller's arthroplasty compared with arthrodesis Keller's arthroplasty may be more effective than arthrodesis at reducing the proportion of people with reduced mobility at 2 years (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Mobility					
[17] RCT	100 people In review [5]	**Proportion with reduced mobility , at 2 years** 4/44 (9%) with Keller's arthroplasty 11/37 (30%) with arthrodesis	OR 0.24 95% CI 0.07 to 0.82 RCT had weak methods; see further information on studies for full details	●●○	Keller's arthroplasty

Improvement in joint angle

No data from the following reference on this outcome. [5] [17]

Functional assessment

No data from the following reference on this outcome. [5] [17]

Range of movement

No data from the following reference on this outcome. [5] [17]

Need for special footwear

No data from the following reference on this outcome. [5] [17]

Healing

No data from the following reference on this outcome. [5] [17]

Transfer lesions

No data from the following reference on this outcome. [5] [17]

Time to return to normal activities

No data from the following reference on this outcome. [5] [17]

Adverse effects

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Adverse effects					
[17] RCT	100 people In review [5]	**Cock-up deformity** 25/44 (57%) with Keller's arthroplasty 11/37 (30%) with arthrodesis	Reported as not significant P value not reported	⟷	Not significant

Keller's arthroplasty plus joint distraction versus Keller's arthroplasty alone:
We found one systematic review (search date 2003), [5] which identified one RCT. [18]

Pain

Keller's arthroplasty plus joint distraction compared with Keller's arthroplasty alone Keller's arthroplasty plus a Kirschner wire to produce joint distraction during healing may be more effective than Keller's arthroplasty alone at improving subjective assessment scores (including pain; not further defined) at a minimum of 1 year, but we don't know about hallux abductus pain (very low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Pain					
[18] RCT	35 people In review [5]	**Subjective assessment scores (assessment scale ranging from 1 [constant pain] to 4 [no symptoms]) , after a minimum of 1 year** with Keller's arthroplasty plus joint distraction	P <0.05 RCT had weak methods; see further information on studies for full details	○○○	Keller's arthroplasty plus joint distraction

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
		with Keller's arthroplasty alone Absolute numbers not reported A Kirschner wire was used to produce joint distraction during healing			
[18] RCT	35 people In review [5]	**Hallux abductus pain , after a minimum of 1 year** with Keller's arthroplasty plus joint distraction with Keller's arthroplasty alone Absolute numbers not reported A Kirschner wire was used to produce joint distraction during healing	Reported as no significant difference RCT had weak methods; see further information on studies for full details	⟷	Not significant

Improvement in joint angle

Keller's arthroplasty plus joint distraction compared with Keller's arthroplasty alone We don't know how Keller's arthroplasty plus a Kirschner wire to produce joint distraction during healing and Keller's arthroplasty alone compare at improving hallux abductus angle at a minimum of 1 year (very low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Improvement in joint angle					
[18] RCT	35 people In review [5]	**Hallux valgus angle , after a minimum of 1 year** 21° with Keller's arthroplasty plus joint distraction 21° with Keller's arthroplasty alone A Kirschner wire was used to produce joint distraction during healing	Reported as not significant P value not reported RCT had weak methods; see further information on studies for full details	⟷	Not significant

Range of movement

Keller's arthroplasty plus joint distraction compared with Keller's arthroplasty alone We don't know how Keller's arthroplasty plus a Kirschner wire to produce joint distraction during healing and Keller's arthroplasty alone compare at improving range of movement at a minimum of 1 year (very low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Range of movement					
[18] RCT	35 people In review [5]	**Hallux abductus movement , after a minimum of 1 year** with Keller's arthroplasty plus joint distraction with Keller's arthroplasty alone Absolute numbers not reported A Kirschner wire was used to produce joint distraction during healing	Reported as not significant RCT had weak methods; see further information on studies for full details	⟷	Not significant

Functional assessment

No data from the following reference on this outcome. [18] [5]

General satisfaction

No data from the following reference on this outcome. [18] [5]

Need for special footwear

No data from the following reference on this outcome. [18] [5]

Mobility

No data from the following reference on this outcome. [18] [5]

Healing

No data from the following reference on this outcome. [18] [5]

Transfer lesions

No data from the following reference on this outcome. [18] [5]

Time to return to normal activities

No data from the following reference on this outcome. [18] [5]

Adverse effects

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Adverse effects					
[18] RCT	35 people In review [5]	**Delayed wound healing** 1 person with Keller's arthroplasty plus joint distraction 1 person with Keller's arthroplasty alone			

Further information on studies

[5] [16] [18]

Methodological limitations The RCT comparing Keller's arthroplasty versus arthrodesis and the RCT looking at the effects of joint distraction both included people with hallux rigidus. Most of the people included in the review who had surgery were under 50 years of age, and were followed up for no more than 3 years. Longer-term outcomes remain unclear. The RCTs reported results for numbers of feet, and did not always report standard deviations of the results. The systematic review analysed the results by numbers of people.

Comment: Reduced toe function has been described after Keller's procedure. [5] The systematic review reported high levels of patient dissatisfaction (up to 29%) in most trials. [5]

OPTION KELLER–LELIEVRE ARTHROPLASTY

- For GRADE evaluation of interventions for Bunions, see table, p 56 .
- We don't know whether Keller–Lelievre arthroplasty is beneficial in improving outcomes.
- We found no direct evidence from RCTs comparing Keller–Lelievre arthroplasty versus no treatment.

Benefits and harms

Keller–Lelievre arthroplasty versus no treatment:

We found no systematic review or RCTs.

Keller–Lelievre arthroplasty versus modified procedure:

We found one systematic review (search date 2003), [5] which identified one RCT. [19]

Pain

Keller–Lelievre arthroplasty compared with modified procedure We don't know whether Keller–Lelievre arthroplasty is more effective than a modified procedure (involving detaching the extensor hallucis brevis tendon from the proximal phalanx, and reattaching it on the medial sesamoid) at decreasing the proportion of people with metatarsalgia (very low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Disappearance of metatarsalgia					
[19] RCT	35 people In review [5]	**Disappearance of metatarsalgia** 11/16 (69%) with modified procedure 6/15 (40%) with Keller–Lelievre arthroplasty Modified procedure involved detaching the extensor hallucis brevis tendon from the proximal phalanx, and reattaching it on the medial sesamoid See further information on studies for details on radiographic outcomes	Significance not assessed The RCT is likely to have been too small to detect a significant difference between groups		

Improvement in joint angle

Keller–Lelievre arthroplasty compared with modified procedure We don't know whether Keller–Lelievre arthroplasty is more effective than a modified procedure (involving detaching the extensor hallucis brevis tendon from the proximal phalanx, and reattaching it on the medial sesamoid) at improving hallux abductus angle (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Improvement in joint angle					
[19] RCT	35 people In review [5]	**Hallux abductus angle** 12.3° with modified procedure 13.6° with Keller–Lelievre arthroplasty Modified procedure involved detaching the extensor hallucis brevis tendon from the proximal phalanx, and reattaching it on the medial sesamoid See further information on studies for details on radiographic outcomes	P = 0.05	⟷	Not significant

Need for special footwear

Keller–Lelievre arthroplasty compared with modified procedure Keller–Lelievre arthroplasty may be less effective than a modified procedure (involving detaching the extensor hallucis brevis tendon from the proximal phalanx, and reattaching it on the medial sesamoid) at increasing the proportion of people wearing normal shoes (very low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Need for special footwear					
[19] RCT	35 people In review [5]	**Proportion wearing normal shoes** 13/16 (81%) with modified procedure 11/15 (73%) with Keller–Lelievre arthroplasty Modified procedure involved detaching the extensor hallucis brevis tendon from the proximal phalanx, and reattaching it on the medial sesamoid See further information on studies for details on radiographic outcomes	P = 0.03	○○○	modified procedure

Functional assessment

No data from the following reference on this outcome. [5] [19]

Range of movement

No data from the following reference on this outcome. [5] [19]

General satisfaction

No data from the following reference on this outcome. [5] [19]

Mobility

No data from the following reference on this outcome. [5] [19]

Healing

No data from the following reference on this outcome. [5] [19]

Transfer lesions

No data from the following reference on this outcome. [5] [19]

Time to return to normal activities

No data from the following reference on this outcome. [5] [19]

Adverse effects

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Adverse effects					
[19] RCT	35 people In review [5]	**Complications** with modified procedure with Keller–Lelievre arthroplasty The RCT found that complications occurred only in those treated with the modified procedure (2 cases of superficial infection, 1 case of reflex sympathetic dystrophy, and 1 recurrence of hallux valgus deformity) Modified procedure involved detaching the extensor hallucis brevis tendon from the proximal phalanx, and reattaching it on the medial sesamoid			

Further information on studies

[19] The RCT reported that some radiographic outcomes were improved by the modified technique (distance between metatarsal heads: 7.7 cm with modified procedure *v* 9.2 cm with Keller–Lelievre arthroplasty; P = 0.02; number with sesamoid bones in their anatomical position: 13/16 [81%] with modified procedure *v* 10/15 [67%] with Keller–Lelievre arthroplasty; P = 0.01). The RCT did not perform an intention-to-treat analysis.

Comment: None.

OPTION PHALANGEAL (AKIN) OSTEOTOMY

- For GRADE evaluation of interventions for Bunions, see table, p 56 .
- We don't know whether phalangeal osteotomy is beneficial in improving outcomes.

Benefits and harms

Phalangeal osteotomy plus distal chevron osteotomy versus phalangeal osteotomy plus distal soft-tissue reconstruction:

We found one systematic review (search date 2003), [5] which identified one RCT. [20]

Improvement in joint angle

Phalangeal (Akin) osteotomy plus distal chevron osteotomy compared with Akin osteotomy plus distal soft-tissue reconstruction We don't know how phalangeal (Akin) osteotomy plus distal chevron osteotomy and Akin osteotomy plus distal soft-tissue reconstruction compare at improving hallux abductus angle and intermetatarsal angle at 1 year (very low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Improvement in joint angle					
[20] RCT	23 people In review [5]	**Hallux abductus angle , at least 1 year** 12.5° with Akin osteotomy plus distal chevron osteotomy 17° with Akin osteotomy plus distal soft tissue reconstruction	Mean difference: +4.5° 95% CI –5.77° to +14.72° The RCT may have been underpowered to detect a clinically important significant difference. The RCT also had weak methods (see further information on studies for full details)	⟷	Not significant
[20] RCT	23 people In review [5]	**Intermetatarsal angle , at least 1 year** 7° with Akin osteotomy plus distal chevron osteotomy 10° with Akin osteotomy plus distal soft tissue reconstruction	Mean difference: +3° 95% CI –1.45° to +7.45° The RCT may have been underpowered to detect a clinically important significant difference. The RCT also had weak methods (see further information on studies for full details)	⟷	Not significant

Range of movement

Phalangeal (Akin) osteotomy plus distal chevron osteotomy compared with Akin osteotomy plus distal soft-tissue reconstruction We don't know how phalangeal (Akin) osteotomy plus distal chevron osteotomy and Akin osteotomy plus distal soft-tissue reconstruction compare at improving joint mobility at 1 year (very low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Range of movement					
[20] RCT	23 people In review [5]	**Range of toe motion , at least 1 year** with Akin osteotomy plus distal chevron osteotomy with Akin osteotomy plus distal soft tissue reconstruction	Mean difference: –3° 95% CI –12.07° to +6.07° The RCT may have been underpowered to detect a clinically important significant difference. The RCT also had weak methods (see further information on studies for full details)	⟷	Not significant

Pain

No data from the following reference on this outcome. [20]

Functional assessment

No data from the following reference on this outcome. [20]

General satisfaction

No data from the following reference on this outcome. [20]

Need for special footwear

No data from the following reference on this outcome. [20]

Mobility

No data from the following reference on this outcome. [20]

Healing

No data from the following reference on this outcome. [20]

Transfer lesions

No data from the following reference on this outcome. [20]

Time to return to normal activities

No data from the following reference on this outcome. [20]

Adverse effects

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Adverse effects					
[20] RCT	23 people In review [5]	**Complications** with Akin osteotomy plus distal chevron osteotomy			

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
		with Akin osteotomy plus distal soft tissue reconstruction The RCT reported two complications with Akin osteotomy plus chevron osteotomy (1 non-union and 1 transfer lesion developed, resulting in further surgery) The RCT reported 1 complication with Akin osteotomy plus distal soft-tissue reconstruction (nerve damage in the great toe)			

Further information on studies

[20] The RCT was poorly randomised, and seems to consist of a subset of data from a larger RCT. It did not include long-term follow-up.

Comment: None.

OPTION PROXIMAL METATARSAL OSTEOTOMY

- For GRADE evaluation of interventions for Bunions, see table, p 56 .
- We don't know whether proximal osteotomy is beneficial in improving outcomes.

Benefits and harms

Proximal chevron osteotomy versus other types of proximal osteotomy:

We found one systematic review (search date 2003), [5] which identified one RCT. [21]

Improvement in joint angle

Proximal chevron osteotomy compared with proximal crescentic osteotomy We don't know how proximal chevron osteotomy and proximal crescentic osteotomy compare at improving hallux abductus angle or intermetatarsal angle at 22 months (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Improvement in joint angle					
[21] RCT	66 people In review [5]	**Hallux abductus angle , at 22 months** 12.6° with proximal chevron osteotomy 10.1° with proximal crescentic osteotomy	Mean difference: –2.5° 95% CI –8.53° to +3.53° The RCT did not include longer-term follow-up	⟷	Not significant
[21] RCT	66 people In review [5]	**Intermetatarsal angle , at 22 months** 6.6° with proximal chevron osteotomy 6.6° with proximal crescentic osteotomy	Mean difference: 0° 95% CI –2.62° to +2.62° The RCT did not include longer-term follow-up	⟷	Not significant

Functional assessment

Proximal chevron osteotomy compared with proximal crescentic osteotomy We don't know how proximal chevron osteotomy and proximal crescentic osteotomy compare at improving functional assessment scores (measured by AOFAS) at 22 months (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Functional assessment					
[21] RCT	66 people In review [5]	**American Orthopaedic Foot and Ankle Scale (AOFAS) total score , at 22 months** 90 with proximal chevron osteotomy 92 with proximal crescentic osteotomy	Mean difference: +2.00 95% CI –4.32 to +8.32 The RCT did not include longer-term follow-up	⟷	Not significant

Healing

Proximal chevron osteotomy compared with proximal crescentic osteotomy Proximal chevron osteotomy may be more effective than proximal crescentic osteotomy at reducing healing time (very low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Healing time					
[21] RCT	66 people In review [5]	**Healing time** with proximal chevron osteotomy with proximal crescentic osteotomy	P <0.001 The RCT did not include longer-term follow-up	○○○	proximal chevron osteotomy

Transfer lesions

Proximal chevron osteotomy compared with proximal crescentic osteotomy We don't know how proximal chevron osteotomy and proximal crescentic osteotomy compare at resolving transfer lesions at 22 months (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Development of transfer lesions					
[21] RCT	66 people In review [5]	**Transfer lesions , at 22 months** 17 resolved with proximal chevron osteotomy 10 resolved with proximal crescentic osteotomy The RCT found 1 new case of transfer lesion in the proximal chevron group and 2 cases in the proximal crescentic group	P = 0.08 The RCT did not include longer-term follow-up	⟷	Not significant

Pain

No data from the following reference on this outcome. [5] [21]

Range of movement

No data from the following reference on this outcome. [5] [21]

General satisfaction

No data from the following reference on this outcome. [5] [21]

Need for special footwear

No data from the following reference on this outcome. [5] [21]

Mobility

No data from the following reference on this outcome. [5] [21]

Time to return to normal activities

No data from the following reference on this outcome. [5] [21]

Adverse effects

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Malunion at healed site					
[21] RCT	66 people In review [5]	**Incidence of postoperative dorsiflexion malunion at the healed site** with proximal chevron osteotomy with proximal crescentic osteotomy	P = 0.005	○○○	proximal chevron osteotomy
Delayed wound healing					
[21] RCT	66 people In review [5]	**Delayed wound healing** 1 case with proximal chevron osteotomy 2 cases with proximal crescentic osteotomy	Significance not assessed		

Further information on studies

Comment: None.

OPTION PROXIMAL OSTEOTOMY VERSUS DISTAL CHEVRON OSTEOTOMY

- For GRADE evaluation of interventions for Bunions, see table, p 56 .
- We found insufficient evidence on the effects of proximal osteotomy versus distal chevron osteotomy.

Benefits and harms

Proximal osteotomy versus distal chevron osteotomy:

We found one systematic review (search date 2003), [5] which identified one RCT. [22]

Pain

Proximal osteotomy compared with distal chevron osteotomy We don't know how proximal closing wedge osteotomy and distal chevron osteotomy compare at reducing the proportion of people with pain at 2 years (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Pain					
[5] Systematic review	68 people, 80 feet Data from 1 RCT	**People remaining in pain , at 2 years** with proximal closing wedge osteotomy with distal chevron osteotomy Absolute results not reported	OR 0.55 95% CI 0.13 to 2.42	⟷	Not significant

Improvement in joint angle

Proximal osteotomy compared with distal osteotomy Proximal closing wedge osteotomy may be more effective than distal chevron osteotomy at improving hallux abductus angle and intermetatarsal angle at 2 years (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Improvement in joint angle					
[5] Systematic review	68 people, 80 feet Data from 1 RCT	**Hallux abductus angle , at 2 years** 20.0° with proximal closing wedge osteotomy 25.0° with distal chevron osteotomy	Difference 5.0° 95% CI 0.5° to 9.5°	○○○	proximal closing wedge osteotomy
[5] Systematic review	68 people, 80 feet Data from 1 RCT	**Intermetatarsal angle , at 2 years** 10.0° with proximal closing wedge osteotomy 13.0° with distal chevron osteotomy	Difference: 3.0° 95% CI 1.0° to 5.0°	○○○	proximal closing wedge osteotomy

General satisfaction

Proximal osteotomy compared with distal osteotomy We don't know how proximal closing wedge osteotomy and distal chevron osteotomy compare at decreasing the proportion of people with dissatisfaction with outcome at 2 years (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Dissatisfaction					
[5] Systematic review	68 people, 80 feet Data from 1 RCT	**AR for dissatisfaction with outcome , at 2 years** 33% with proximal closing wedge osteotomy 33% with distal chevron osteotomy	OR 0.99 95% CI 0.36 to 2.75	⟷	Not significant

Need for special footwear

Proximal osteotomy compared with distal chevron osteotomy We don't know how proximal closing wedge osteotomy and distal chevron osteotomy compare at reducing the need for special footwear at 2 years (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Need for special footwear					
[5] Systematic review	68 people, 80 feet Data from 1 RCT	**Need for specialist footwear , at 2 years** with proximal closing wedge osteotomy with distal chevron osteotomy	OR 0.38 95% CI 0.04 to 3.83	⟷	Not significant

Mobility

Proximal osteotomy compared with distal chevron osteotomy We don't know how proximal closing wedge osteotomy and distal chevron osteotomy compare at improving mobility at 2 years (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Mobility					
[5] Systematic review	68 people, 80 feet Data from 1 RCT	**Reduced mobility , at 2 years** with proximal closing wedge osteotomy with distal chevron osteotomy Absolute results not reported	OR 0.38 95% CI 0.04 to 3.83	⟷	Not significant

Functional assessment

No data from the following reference on this outcome. [5] [22]

Range of movement

No data from the following reference on this outcome. [5] [22]

Healing

No data from the following reference on this outcome. [5] [22]

Transfer lesions

No data from the following reference on this outcome. [5] [22]

Time to return to normal activities

No data from the following reference on this outcome. [5] [22]

Adverse effects

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Adverse effects					
[5] Systematic review	68 people, 80 feet Data from 1 RCT	**Complications** with proximal closing wedge osteotomy with distal chevron osteotomy The RCT found 1 wound infection and 2 stress fractures in people having chevron osteotomy, and 11 complications in people having proximal osteotomy, consisting mostly of pain in other areas of the forefoot (metatarsalgia)			

Further information on studies

Comment: None.

QUESTION What are the effects of postoperative care for bunions?

OPTION EARLY WEIGHT-BEARING

- For GRADE evaluation of interventions for Bunions, see table, p 56 .
- We don’t know whether early weight-bearing is effective in improving recovery and outcomes postoperatively.

Benefits and harms

Early weight-bearing compared with late weight-bearing:

We found one systematic review (search date 2003), [5] which identified one RCT. [23]

Healing

Early weight-bearing compared with late weight-bearing We don't know how early weight-bearing (in a cast from 2–4 days postoperatively) and late weight-bearing (4 weeks postoperatively) compare in their effectiveness at preventing non-union at the site of arthrodesis (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Non-union at site of arthrodesis					
[23] RCT	56 people In review [5]	**Non-union at the site of arthrodesis** 1/29 (3%) with early weight-bearing (initial weight-bearing in a cast from 2–4 days postoperatively) 2/27 (7%) with late weight-bearing (initial weight-bearing 4 weeks postoperatively)	RR 0.46 95% CI 0.05 to 4.85	⟷	Not significant

Pain

No data from the following reference on this outcome. [5] [23]

Improvement in joint angle

No data from the following reference on this outcome. [5] [23]

Functional assessment

No data from the following reference on this outcome. [5] [23]

Range of movement

No data from the following reference on this outcome. [5] [23]

General satisfaction

No data from the following reference on this outcome. [5] [23]

Need for special footwear

No data from the following reference on this outcome. [5] [23]

Mobility

No data from the following reference on this outcome. [5] [23]

Transfer lesions

No data from the following reference on this outcome. [5] [23]

Time to return to normal activities

No data from the following reference on this outcome. [5] [23]

Adverse effects

No data from the following reference on this outcome. [23]

Further information on studies

Comment: None.

OPTION SLIPPER CASTS

- For GRADE evaluation of interventions for Bunions, see table, p 56 .
- We don't know whether slipper casts are effective in improving recovery and outcomes postoperatively.

Benefits and harms

Slipper cast versus crepe bandage:

We found one systematic review comparing a plaster slipper cast versus a crepe bandage (search date 2003, 2 RCTs, 106 people). [5] The review did not pool data, and so we report results from the individual RCTs. [24] [25]

Pain

Slipper cast compared with crepe bandage We don't know how plaster slipper casts and crepe bandage compare at reducing pain at 6 weeks to 3 months after either a Wilson's osteotomy or a first metatarsophalangeal joint fusion (very low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Pain					
[24] RCT	54 feet corrected by Wilson's osteotomy In review [5]	**Pain (measured on a visual analogue scale [scale end-points not reported; higher score = more painful, lower score = less painful]) , at 3 months** 1.5 with plaster slipper cast 1.6 with crepe bandage Cast and dressings were changed 12 days after surgery and kept on for a further 4 weeks	Reported as not significant P value not reported The RCT is small and may have lacked power to detect a clinically significant difference between groups	⟷	Not significant

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
[25] RCT	52 feet after first metatarsopha-langeal joint fusion In review [5]	**Pain score (measured on visual analogue scale) , at 6 weeks** 2.1 with plaster slipper cast 1.1 with crepe bandage Casts and dressings were changed 12 days after surgery and kept on for a further 4 weeks	P >0.07 The RCT is small and may have lacked power to detect a clinically significant difference between groups	⟷	Not significant

Improvement in joint angle

Slipper cast compared with crepe bandage We don't know how plaster slipper casts and crepe bandage compare at improving hallux valgus angle at 6 weeks postoperatively after a first metatarsophalangeal joint fusion (very low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Improvement in joint angle					
[25] RCT	52 feet after first metatarsopha-langeal joint fusion In review [5]	**Mean change in hallux valgus angle , at 6 weeks** –13.4° with plaster slipper cast –12.8° with crepe bandage Casts and dressings were changed 12 days after surgery and kept on for a further 4 weeks	Reported as not significant P value not reported The RCT is small and may have lacked power to detect a clinically significant difference between groups	⟷	Not significant

No data from the following reference on this outcome. [24]

General satisfaction

Slipper cast compared with crepe bandage Plaster slipper casts may be less effective than crepe bandage at improving patients' overall assessment scores (not further defined) at 6 weeks postoperatively after a first metatarsophalangeal joint fusion (very low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
General satisfaction					
[25] RCT	52 feet after first metatarsopha-langeal joint fusion In review [5]	**Overall assessment score , at 6 weeks** 7.3 with plaster slipper cast 8.3 with crepe bandage Casts and dressings were changed 12 days after surgery and kept on for a further 4 weeks	P <0.02 The RCT is small and may have lacked power to detect a clinically significant difference between groups	○○○	crepe bandage

No data from the following reference on this outcome. [24]

Time to return to normal activities

Slipper cast compared with crepe bandage We don't know how plaster slipper casts and crepe bandage compare at reducing the time taken to return to normal activities (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Time taken to return to work					
[25] RCT	52 feet after first metatarsopha-langeal joint fusion In review [5]	**Return to work** 7.0 weeks with plaster slipper cast 5.8 weeks with crepe bandage Casts and dressings were changed 12 days after surgery and kept on for a further 4 weeks	P <0.02 The RCT is small and may have lacked power to detect a clinically significant difference between groups	○○○	crepe bandage
Time taken to return to normal activities					
[24] RCT	54 feet corrected by Wilson's osteoto-my In review [5]	**Time to return to normal activi-ties** 6.2 weeks with plaster slipper cast 6.6 weeks with crepe bandage Cast and dressings were changed 12 days after surgery and kept on for a further 4 weeks	Reported as not significant P value not reported The RCT is small and may have lacked power to detect a clinically significant difference between groups	⟷	Not significant

Functional assessment

No data from the following reference on this outcome. [5] [24] [25]

Range of movement

No data from the following reference on this outcome. [5] [24] [25]

Need for special footwear

No data from the following reference on this outcome. [5] [24] [25]

Mobility

No data from the following reference on this outcome. [5] [24] [25]

Healing

No data from the following reference on this outcome. [5] [24] [25]

Transfer lesions

No data from the following reference on this outcome. [5] [24] [25]

Adverse effects

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Adverse effects					
[24] RCT	54 feet corrected by Wilson's osteotomy In review [5]	**Adverse effects** with plaster slipper cast with crepe bandage The RCT found 1 failed correction with crepe bandaging, and 2 people with slipper casts developed superficial wound infections			
[25] RCT	52 feet after first metatarsophalangeal joint fusion In review [5]	**Adverse effects** with plaster slipper cast with crepe bandage The RCT found 3 failed corrections, 4 non-unions, and 2 wound infections in the plaster slipper group, and 1 failed correction, 1 non-union, and 2 wound infections in the crepe bandage group			

Further information on studies

Comment: None.

GLOSSARY

Lindgren osteotomy A modified Wilson's osteotomy involving a transverse cut in the distal metatarsal shaft, with the distal fragment being realigned laterally and slightly plantarly.

Scarf osteotomy A form of osteotomy in which a long Z-shaped cut is made in the metatarsal, with the bone fragments being fixed with screws after realignment.

First ray The first metatarsal and medial cuneiform function as a single unit called the first ray.

Keller's arthroplasty A procedure involving removal of the medial side of the metatarsal head and straight resection of the base of the proximal phalanx.

Lapidus procedure An arthrodesis at the first tarsometatarsal joint whereby the base of the first metatarsal is fused with the medial cuneiform. A soft tissue procedure is carried out at the first metatarsophalangeal joint as part of the procedure.

Arthrodesis Surgical removal of the joint between adjoining bones, performed by fusing the bone ends together. No movement can then occur at the joint.

Cock-up deformity Inability to place pulp of the great toe on the ground with the foot bearing weight.

Hohmann osteotomy A form of distal metatarsal osteotomy involving the removal of a wedge-shaped piece of bone from the metatarsal, and fixation of the bone ends with a Kirschner wire.

Keller–Lelievre arthroplasty An arthroplasty of the first metatarsophalangeal joint involving a more curved resection of the base of the proximal phalanx than occurs with the Keller's arthroplasty.

Kirschner wire A thin but rigid wire that is used to fix bone fragments. It is passed through drilled channels in the bone. (Sometimes called a K-wire.)

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.

Mitchell's osteotomy A form of distal metatarsal osteotomy whereby an incomplete osteotomy is performed perpendicular to the long axis of the bone. The distal portion is moved laterally and fixed in position. This results in shortening of the bone.

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

Transfer lesions Areas of corns or callus that develop when the weight-bearing forces are transferred from one area of the foot to another.

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

Wilson's osteotomy A form of osteotomy in which a double oblique cut is made in the distal portion of the metatarsal shaft and the metatarsal head is slid into a corrected position.

SUBSTANTIVE CHANGES

Different methods of bone fixation One RCT added [11] comparing percutaneous Kirschner-wire fixation with internal screw fixation following distal chevron osteotomy. The RCT found no significant differences between groups in functional status or radiological findings at 6 months' follow-up. [11] Categorisation unchanged (Unknown effectiveness).

Distal metatarsal osteotomy Two subsequent RCTs added. [13] [14] One RCT, comparing Lindgren osteotomy with distal chevron osteotomy, found significant improvements in radiological outcomes with Lindgren osteotomy compared with distal chevron osteotomy after 1 year and 3 to 6 years' follow-up. [13] The second RCT, comparing scarf osteotomy with distal chevron osteotomy, found no significant difference in functional status or radiological outcomes between groups at 2 years' follow-up. [14] Categorisation unchanged (Likely to be beneficial).

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GRADE **Evaluation of interventions for Bunions.**

Important outcomes	, Functional assessment, General satisfaction, Healing, Improvement in joint angle, Mobility, Need for special footwear, Pain, Range of movement, Time to return to normal activities, Transfer lesions								
Studies (Participants)	**Outcome**	**Comparison**	**Type of evidence**	**Quality**	**Consistency**	**Directness**	**Effect size**	**GRADE**	**Comment**
What are the effects of conservative treatments for bunions?									
1 (209) [6]	Pain	Orthoses versus no treatment in adults	4	–1	–1	0	0	Low	Quality point deducted for incomplete reporting of results. Consistency point deducted for different results at different endpoints
1 (209) [6]	Functional assessment	Orthoses versus no treatment in adults	4	–1	0	0	0	Moderate	Quality point deducted for incomplete reporting of results
1 (209) [6]	General satisfaction	Orthoses versus no treatment in adults	4	–1	0	–1	0	Low	Quality point deducted for incomplete reporting of results. Directness point deducted for unclear outcome
1 (209) [6]	Time to return to normal activities	Orthoses versus no treatment in adults	4	–1	0	–1	0	Low	Quality point deducted for incomplete reporting of results. Directness point deducted for unclear outcome
1 (122) [2]	Improvement in joint angle	Antipronatory orthoses versus no treatment in children	4	–2	0	–1	0	Very low	Quality points deducted for sparse data and incomplete reporting of results. Directness point deducted for high loss to follow-up
What are the effects of surgery for bunions?									
1 (87) [8]	Pain	Arthrodesis versus distal osteotomy	4	–2	0	0	0	Low	Quality points deducted for sparse data and incomplete reporting of results
1 (87) [8]	Improvement in joint angle	Arthrodesis versus distal osteotomy	4	–2	0	0	0	Low	Quality points deducted for sparse data and incomplete reporting of results
1 (87) [8]	Functional assessment	Arthrodesis versus distal osteotomy	4	–2	0	0	0	Low	Quality points deducted for sparse data and incomplete reporting of results
1 (28) [5]	Pain	Standard fixation versus absorbable pin fixation	4	–2	0	–1	0	Very low	Quality points deducted for sparse data and for weak methods. Directness point deducted for small number of events
1 (28) [5]	Improvement in joint angle	Standard fixation versus absorbable pin fixation	4	–2	0	0	0	Low	Quality points deducted for sparse data and for weak methods
1 (28) [5]	Range of movement	Standard fixation versus absorbable pin fixation	4	–2	0	0	0	Low	Quality points deducted for sparse data and for weak methods
1 (28) [5]	General satisfaction	Standard fixation versus absorbable pin fixation	4	–2	0	–1	0	Very low	Quality points deducted for sparse data and for weak methods. Directness point deducted for small number of events
1 (28) [5]	Mobility	Standard fixation versus absorbable pin fixation	4	–2	0	–1	0	Very low	Quality points deducted for sparse data and for weak methods. Directness point deducted for small number of events
1 (30) [10]	Improvement in joint angle	Screw fixation plus early mobilisation versus vicryl suture fixation plus immobilisation	4	–1	0	0	0	Moderate	Quality point deducted for sparse data
1 (30) [10]	Time to return to normal activities	Screw fixation plus early mobilisation versus vicryl suture fixation plus immobilisation	4	–1	0	–1	0	Low	Quality point deducted for sparse data. Directness point deducted for use of subjective outcome

Important outcomes	, Functional assessment, General satisfaction, Healing, Improvement in joint angle, Mobility, Need for special footwear, Pain, Range of movement, Time to return to normal activities, Transfer lesions								
Studies (Participants)	Outcome	Comparison	Type of evidence	Quality	Consistency	Directness	Effect size	GRADE	Comment
1 (22) [11]	Pain	Percutaneous Kirschner-wire fixation compared with internal screw fixation	4	–1	0	–1	0	Low	Quality point deducted for sparse data. Directness point deducted for no direct comparison between groups
1 (22) [11]	Functional assessment	Percutaneous Kirschner-wire fixation compared with internal screw fixation	4	–1	0	0	0	Moderate	Quality point deducted for sparse data
1 (22) [11]	Improvement in joint angle	Percutaneous Kirschner-wire fixation compared with internal screw fixation	4	–1	0	–1	0	Low	Quality point deducted for sparse data. Directness point deducted for no direct comparison between groups
1 (22) [11]	Range of movement	Percutaneous Kirschner-wire fixation compared with internal screw fixation	4	–1	0	–1	0	Low	Quality point deducted for sparse data. Directness point deducted for no direct comparison between groups
1 (209) [6]	Pain	Distal chevron osteotomy versus no treatment	4	–1	0	0	0	Moderate	Quality point deducted for incomplete reporting of results
1 (209) [6]	Functional assessment	Distal chevron osteotomy versus no treatment	4	–1	0	0	0	Moderate	Quality point deducted for incomplete reporting of results
1 (209) [6]	General satisfaction	Distal chevron osteotomy versus no treatment	4	–1	0	–1	0	Low	Quality point deducted for incomplete reporting of results. Directness point deducted for unclear outcome
1 (209) [6]	Time to return to normal activities	Distal chevron osteotomy versus no treatment	4	–1	0	–1	0	Low	Quality point deducted for incomplete reporting of results. Directness point deducted for subjective outcome
1 (209) [6]	Pain	Distal chevron osteotomy versus orthoses	4	–1	0	0	0	Moderate	Quality point deducted for incomplete reporting of results
1 (209) [6]	Functional assessment	Distal chevron osteotomy versus orthoses	4	–1	0	0	0	Moderate	Quality point deducted for incomplete reporting of results
1 (209) [6]	General satisfaction	Distal chevron osteotomy versus orthoses	4	–1	0	–1	0	Low	Quality point deducted for incomplete reporting of results. Directness point deducted for unclear outcome
1 (209) [6]	Time to return to normal activities	Distal chevron osteotomy versus orthoses	4	–1	0	–1	0	Low	Quality point deducted for incomplete reporting of results. Directness point deducted for subjective outcome
3 (241) [12] [13] [14]	Improvement in joint angle	Distal chevron osteotomy versus other types of distal osteotomy	4	–1	–1	0	0	Low	Quality point deducted for incomplete reporting of results. Consistency point deducted for conflicting results
2 (196) [13] [14]	Functional assessment	Distal chevron osteotomy versus other types of distal osteotomy	4	–2	0	–1	0	Very low	Quality points deducted for sparse data and for incomplete reporting of results. Directness point deducted for no statistical comparison between groups in 1 RCT
1 (51) [12]	Need for special footwear	Distal chevron osteotomy versus other types of distal osteotomy	4	–1	0	–1	0	Low	Quality point deducted for sparse data. Directness point deducted for limited number of comparisons
1 (96) [13]	Range of movement	Distal chevron osteotomy versus other types of distal osteotomy	4	–2	0	–1	0	Very low	Quality points deducted for sparse data and for incomplete reporting of results. Directness point deducted for no statistical comparison between groups
1 (96) [13]	General satisfaction	Distal chevron osteotomy versus other types of distal osteotomy	4	–2	0	–1	0	Very low	Quality points deducted for sparse data and for incomplete reporting of results. Directness point deducted for no statistical comparison between groups
1 (51) [12]	Mobility	Distal chevron osteotomy versus other types of distal osteotomy	4	–1	0	–1	0	Low	Quality point deducted for sparse data. Directness point deducted for unclear subjective outcome
1 (96) [13]	Transfer lesions	Distal chevron osteotomy versus other types of distal osteotomy	4	–2	0	–1	0	Very low	Quality points deducted for sparse data and for incomplete reporting of results. Directness point deducted for no statistical comparison between groups

Important outcomes	, Functional assessment, General satisfaction, Healing, Improvement in joint angle, Mobility, Need for special footwear, Pain, Range of movement, Time to return to normal activities, Transfer lesions								
Studies (Participants)	**Outcome**	**Comparison**	**Type of evidence**	**Quality**	**Consistency**	**Directness**	**Effect size**	**GRADE**	**Comment**
1 (84) [5]	Pain	Distal chevron osteotomy plus adductor tenotomy compared with distal chevron osteotomy alone	4	–2	0	0	0	Low	Quality points deducted for sparse data and short (unspecified) follow-up
1 (84) [5]	Improvement in joint angle	Distal chevron osteotomy plus adductor tenotomy compared with distal chevron osteotomy alone	4	–2	0	0	0	Low	Quality points deducted for sparse data and short (unspecified) follow-up
1 (84) [5]	Range of movement	Distal chevron osteotomy plus adductor tenotomy compared with distal chevron osteotomy alone	4	–2	0	0	0	Low	Quality points deducted for sparse data and short (unspecified) follow-up
1 (84) [5]	General satisfaction	Distal chevron osteotomy plus adductor tenotomy compared with distal chevron osteotomy alone	4	–2	0	0	0	Low	Quality points deducted for sparse data and short (unspecified) follow-up
1 (84) [5]	Need for special footwear	Distal chevron osteotomy plus adductor tenotomy compared with distal chevron osteotomy alone	4	–2	0	0	0	Low	Quality points deducted for sparse data and short (unspecified) follow-up
1 (84) [5]	Mobility	Distal chevron osteotomy plus adductor tenotomy compared with distal chevron osteotomy alone	4	–2	0	0	0	Low	Quality points deducted for sparse data and short (unspecified) follow-up
1 (33) [5]	Pain	Keller's arthroplasty versus distal osteotomy	4	–2	0	0	0	Low	Quality points deducted for sparse data and weak methods
1 (33) [5]	Improvement in joint angle	Keller's arthroplasty versus distal osteotomy	4	–2	0	0	0	Low	Quality points deducted for sparse data and weak methods
1 (33) [5]	Range of movement	Keller's arthroplasty versus distal osteotomy	4	–2	0	0	0	Low	Quality points deducted for sparse data and weak methods
1 (33) [5]	General satisfaction	Keller's arthroplasty versus distal osteotomy	4	–2	0	0	0	Low	Quality points deducted for sparse data and weak methods
1 (100) [17]	Pain	Keller's arthroplasty versus arthrodesis	4	–2	0	0	0	Low	Quality points deducted for sparse data and weak methods
1 (100) [17]	General satisfaction	Keller's arthroplasty versus arthrodesis	4	–2	0	0	0	Low	Quality points deducted for sparse data and weak methods
1 (100) [17]	Mobility	Keller's arthroplasty versus arthrodesis	4	–2	0	0	0	Low	Quality points deducted for sparse data and weak methods
1 (35) [18]	Pain	Keller's arthroplasty plus joint distraction versus Keller's arthroplasty alone	4	–3	0	0	0	Very low	Quality points deducted for sparse data, unclear subjective assessment of outcomes, incomplete reporting of results, and weak methods
1 (35) [18]	Improvement in joint angle	Keller's arthroplasty plus joint distraction versus Keller's arthroplasty alone	4	–3	0	0	0	Very low	Quality points deducted for sparse data, incomplete reporting of results, and weak methods
1 (35) [18]	Range of movement	Keller's arthroplasty plus joint distraction versus Keller's arthroplasty alone	4	–3	0	0	0	Very low	Quality points deducted for sparse data, unclear assessment of outcomes, incomplete reporting of results, and weak methods

Important outcomes	, Functional assessment, General satisfaction, Healing, Improvement in joint angle, Mobility, Need for special footwear, Pain, Range of movement, Time to return to normal activities, Transfer lesions								
Studies (Participants)	**Outcome**	**Comparison**	**Type of evidence**	**Quality**	**Consistency**	**Directness**	**Effect size**	**GRADE**	**Comment**
1 (35) [19]	Pain	Keller–Lelievre arthroplasty versus modified procedure	4	–3	0	–1	0	Very low	Quality points deducted for sparse data, incomplete reporting of results, and unclear outcome measurement. Directness point deducted for no statistical analysis between groups
1 (35) [19]	Improvement in joint angle	Keller–Lelievre arthroplasty versus modified procedure	4	–2	0	0	0	Low	Quality points deducted for sparse data and incomplete reporting of results
1 (35) [19]	Need for special footwear	Keller–Lelievre arthroplasty versus modified procedure	4	–3	0	0	0	Very low	Quality points deducted for sparse data, unclear outcome measurement, and incomplete reporting of results
1 (23) [20]	Improvement in joint angle	Phalangeal osteotomy plus distal chevron osteotomy versus phalangeal osteotomy plus distal soft-tissue reconstruction	4	–3	0	0	0	Very low	Quality points deducted for sparse data, unclear randomisation, and for possibly being a subset of data from a larger RCT
1 (23) [20]	Range of movement	Phalangeal osteotomy plus distal chevron osteotomy versus phalangeal osteotomy plus distal soft-tissue reconstruction	4	–3	0	0	0	Very low	Quality points deducted for sparse data, unclear randomisation, and for possibly being a subset of data from a larger RCT
1 (66) [21]	Improvement in joint angle	Proximal chevron osteotomy versus other types of proximal osteotomy	4	–1	0	–1	0	Low	Quality point deducted for sparse data. Directness point deducted for no longer-term follow-up
1 (66) [21]	Functional assessment	Proximal chevron osteotomy versus other types of proximal osteotomy	4	–1	0	–1	0	Low	Quality point deducted for sparse data. Directness point deducted for no longer-term follow-up
1 (66) [21]	Healing	Proximal chevron osteotomy versus other types of proximal osteotomy	4	–2	0	–1	0	Very low	Quality points deducted for sparse data and incomplete reporting of results. Directness point deducted for no longer-term follow-up
1 (66) [21]	Transfer lesions	Proximal chevron osteotomy versus other types of proximal osteotomy	4	–1	0	–1	0	Low	Quality point deducted for sparse data. Directness point deducted for no longer-term follow-up
1 (68) [5]	Pain	Proximal osteotomy versus distal chevron osteotomy	4	–2	0	0	0	Low	Quality points deducted for sparse data and incomplete reporting of results
1 (68) [5]	Improvement in joint angle	Proximal osteotomy versus distal chevron osteotomy	4	–2	0	0	0	Low	Quality points deducted for sparse data and incomplete reporting of results
1 (68) [5]	General satisfaction	Proximal osteotomy versus distal chevron osteotomy	4	–2	0	0	0	Low	Quality points deducted for sparse data and incomplete reporting of results
1 (68) [5]	Need for special footwear	Proximal osteotomy versus distal chevron osteotomy	4	–2	0	0	0	Low	Quality points deducted for sparse data and incomplete reporting of results
1 (68) [5]	Mobility	Proximal osteotomy versus distal chevron osteotomy	4	–2	0	0	0	Low	Quality points deducted for sparse data and incomplete reporting of results
What are the effects of postoperative care for bunions?									
1 (56) [23]	Healing	Early weight-bearing compared with late weight-bearing	4	–1	0	–1	0	Low	Quality point deducted for sparse data. Directness point deducted for small number of events
2 (106) [25] [24]	Pain	Slipper cast versus crepe bandage	4	–2	0	–1	0	Very low	Quality points deducted for sparse data and incomplete reporting of results. Directness point deducted for short follow-up

Important outcomes	, Functional assessment, General satisfaction, Healing, Improvement in joint angle, Mobility, Need for special footwear, Pain, Range of movement, Time to return to normal activities, Transfer lesions								
Studies (Participants)	Outcome	Comparison	Type of evidence	Quality	Consistency	Directness	Effect size	GRADE	Comment
1 (54) [24]	Improvement in joint angle	Slipper cast versus crepe bandage	4	–2	0	–1	0	Very low	Quality points deducted for sparse data and incomplete reporting of results. Directness point deducted for short follow-up
1 (54) [24]	General satisfaction	Slipper cast versus crepe bandage	4	–2	0	–1	0	Very low	Quality points deducted for sparse data, unclear outcome, and incomplete reporting of results. Directness point deducted for short follow-up
2 (106) [25] [24]	Time to return to normal activities	Slipper cast versus crepe bandage	4	–2	0	0	0	Low	Quality points deducted for sparse data and incomplete reporting of results

We initially allocate 4 points to evidence from RCTs, and 2 points to evidence from observational studies. To attain the final GRADE score for a given comparison, points are deducted or added from this initial score based on preset criteria relating to the categories of quality, directness, consistency, and effect size. Quality: based on issues affecting methodological rigour (e.g., incomplete reporting of results, quasi-randomisation, sparse data [<200 people in the analysis]). Consistency: based on similarity of results across studies. Directness: based on generalisability of population or outcomes. Effect size: based on magnitude of effect as measured by statistics such as relative risk, odds ratio, or hazard ratio.