Pain Management After Elective Foot and Ankle Surgery: A Systematic Review of Literature

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Introduction

Inadequate postoperative pain control can cause:

- Prolonged recuperation in the post anesthesia care unit,
- Delayed discharge to home,
- Unanticipated hospital admission from an outpatient surgical facility,
- Prolonged hospital stay, and
- Delayed return to normal daily activities.

We conducted a systematic review to assess the effectiveness of analgesic interventions for pain management after foot and ankle surgery.

Methods

Potentially relevant abstracts identified and screened for retrieval based on inclusion criteria: **n = 953**

- English language, 1946-Feburary 2013
- Assessed analgesic interventions in foot and ankle surgery in adults
- Reported pain on a linear analogue, verbal, or numerical rating scale
- Databases: Ovid MEDLINE, Cochrane Database of Systematic Reviews, Database of Abstracts of Reviews of Effects (DARE), Cochrane Central Register of Controlled Trials (CENTRAL)

Articles excluded based on title review: **n = 812**

Articles retrieved for more detailed evaluation: **n= 141**

Articles excluded based on abstract evaluation: **n = 91**

- Not RCT
- Not evaluating post-operative pain or supplemental analgesic use
- Other non-foot/ankle surgeries
- Non-pharmacological interventions
- Lack of a defined subgroup or analysis

RCTs included in qualitative systematic review: **n = 50**

Figure 1: Flow chart of literature search (PRISMA diagram). Literature search conducted according to the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) guidelines. RCT = randomized controlled trial.

Results

Table 1: Analgesia Techniques and Jadad Scores.

Analgesic Technique	n (Jadad Scores)
Systemic Analgesics:	**16 (2-5)**
Acetaminophen	1 (2)
NSAIDs: oral	5 (3-5)
COX-2 Inhibitors: oral	3 (4-5)
COX-2 Inhibitors: intravenous	2 (3-4)
Opioids	4 (3-5)
Steroids	1 (5)
Regional Analgesics:	**8 (2-5)**
Intra-articular	3 (3-5)
Wound Infiltration	3 (2-5)
Wound Instillation	1 (5)
IV Regional	1 (4)
Peripheral Nerve Blocks:	**26(2-5)**
Gluteal Sciatic ± Femoral Nerve Blocks	11 (2-5)
Popliteal Sciatic Nerve Blocks	10 (2-5)
Ankle Nerve Blocks	5 (4-5)
Total	**50**

Acetaminophen (n=1)		
propacetamol IV vs. paracetamol oral	▼pain in IV group	NS adverse events
NSAIDs: oral (n=5)		
niflumic acid; flurbiprofen; diclofenac; naproxen	▼pain, ▼supplemental analgesia vs. placebo	NS adverse events
COX-2 inhibitors: oral (n=3)		
rofecoxib; valdecoxib; etoricoxib	▼pain, ▼supplemental analgesia vs. placebo	NS adverse events
COX-2 inhibitors: Intravenous (n=2)		
parecoxib 40mg vs. 20mg	**NS** pain	NS adverse events
Opioids (n=4)		
MoxDuo (morphine and oxycodone) vs. morphine vs. oxycodone	▼pain with MoxDuo vs. morphine and oxycodone	▼severe nausea, vomiting with MoxDuo
morphine intranasal (IN) vs. morphine IV	▼pain with high dose morphine IN and IV vs. low dose IN	▲dysgeusia, nasal congestion, throat irritation, sneezing with IN ▲oxygen desaturation with high dose IN and IV
tapentadol vs. oxycodone	▼pain with tapentadol	▲GI tolerability with tapentadol
Steroids (n=1)		
dexamethasone oral	▼pain on Day 1 and **NS** subsequently, ▼supplemental analgesia vs. placebo	▼nausea with dexamethasone

Table 2: Systemic Analgesics (n=16). IV = intravenous; NS = not significant; NSAID = Non-steroidal anti-inflammatory drug; COX-2 = Cyclooxygenase-2; IN = intranasal.

Intra-articular (n=3)		
pethidine vs. prilocaine	▼pain with pethidine	NS adverse events
bupivicaine; bupivicaine+morphine+ methylprednisolone	▼pain vs. placebo	▼days until pain-free, joint effusions in treatment group
Wound Infiltration (n=3)		
dexamethasone; Depofoam® bupivicaine; ropivacaine+morphine+ ketorolac+epinephrine	▼pain, ▼supplemental analgesia vs. placebo	▼adverse events in treatment group
Wound Instillation (n=1)		
bupivacaine	▼pain 0-8 hours and **NS** subsequently vs. placebo	NS adverse events
IV Regional (n=1)		
diamorphine	▲pain with diamorphine	NS adverse events

Table 3: Regional Analgesics (n=8). NS = not significant.

Gluteal Sciatic ± Femoral Nerve Blocks (n=11)		
ropivacaine; bupivacaine; mepivacaine; levobupivacaine; ropivacaine+additives	▼pain with nerve blocks vs. placebo ▼pain with ropivacaine and bupivacaine vs. mepivacaine; **NS** pain with levobupivacaine vs. ropivacaine or bupivacaine; ▼pain with higher dose; **NS** pain ± additives	NS adverse events
Popliteal Sciatic Nerve Blocks (n=10)		
bupivacaine block vs. wound infiltration	▼pain in block group	NS adverse events
popliteal vs. ankle block vs. combined	▼pain with both, ▼pain with popliteal vs. ankle	NS adverse events
ropivicaine; mepivacaine;	▼pain vs. placebo; ▼pain with ropivacaine vs. mepivacaine	NS adverse events
stimulating vs. non-stimulating catheter	▼pain with stimulating catheter	▲foot weakness with stimulating catheter
continuous infusion vs. bolus only	▼pain with continuous infusion	NS adverse events
Ankle Nerve Blocks (n=5)		
ropivicaine	▼pain with conventional dose vs. low dose	NS adverse events
bupivicaine (n=2)	▼pain (n=1); **NS** pain (n=1) vs. placebo	NS adverse events
lidocaine+additives vs. lidocaine	▼pain, ▼supplemental analgesia with lidocaine+ketoralac block and lidocaine + ketoralac IV vs. other additives and lidocaine only	NS adverse events

Table 4: Peripheral Nerve Blocks (n=26). NS = not significant.

Conclusions

Most of the studies looked only at unimodal analgesic techniques. However, the best analgesia would be obtained from a multimodal analgesic technique:

1) Acetaminophen ± conventional NSAIDs or COX-2 specific inhibitors preoperatively (oral) or intraoperatively (IV), if there are no contraindications.
   - While NSAIDs and COX-2 inhibitors provide equivalent pain relief, NSAIDs have the potential of increased surgical bleeding.
2) Local/regional analgesic:
   - Popliteal sciatic nerve block (single injection or continuous perineural infusion) may be appropriate for extensive surgical procedures with the anticipation of **severe** postoperative foot and ankle pain.
   - Ankle block ± surgical incision wound infiltration with local anesthetic may be appropriate for less extensive and minimally invasive surgical procedures.
3) Dexamethasone after induction of general anesthesia.
4) Oral acetaminophen ± NSAID or COX-2 specific inhibitor, with supplemental opioids for breakthrough pain, postoperatively.
5) Intra-articular analgesia and IV regional analgesia are not recommended due to insufficient evidence.
6) Further research is needed to assess optimal multimodal analgesic techniques for patients undergoing foot and ankle surgery.

References

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