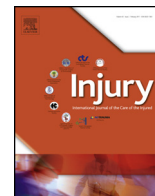




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Review

Evaluation and quantification of geographical differences in wound complication rates following the extended lateral approach in displaced intra-articular calcaneal fractures – A systematic review of the literature

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ABSTRACT

Introduction: Calcaneal fracture surgery is often performed via the extended lateral approach (ELA). Large differences are reported in literature on wound complication rates. Aim was to perform a systematic review on reported postoperative wound complication (POWC) and postoperative wound infection (POWI) rates following the ELA and evaluate and quantify geographical differences.
Methods: A literature search was conducted in the MEDLINE and EMBASE databases and Cochrane Library. Studies before 2000, with <10 patients, biomechanical studies and reviews were excluded. No restrictions regarding language were applied.
Results: 3068 articles were identified of which 123 were included, with 8584 calcaneal fractures in 28 different countries. The average total number of POWC was 14.3%, with 3.8% of superficial and 2.2% of deep infections. The highest POWI rate was found in Europe (12.1%) and the lowest in North America (2.8%). A significant difference in incidence of deep POWI between continents was detected (median 0–3.8%). No differences were found in incidence of POWC and POWI between retro- and prospective studies (respectively $p=0.970$, $p=0.748$) or studies with <10 or ≥ 10 operations per year (respectively $p=0.326$, $p=0.378$). However, lower rates of POWI were found in studies with a follow up of >3 months ($p=0.01$).
Conclusion: Large differences were detected in incidence of POWC and POWI following calcaneal fracture surgery with the ELA between countries and continents. We did not find a lower POWC or POWI rate in retrospective studies compared to prospective studies, larger studies or in studies in which more patients were treated annually. However, the rate of POWI was significantly lower in studies with a follow up of >3 months. We advise the use of a reliable postoperative complication registration system and uniformity in the use of standardized definitions of wound complications for calcaneal fracture surgery.
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Introduction

Patients with a displaced intra-articular calcaneal fracture (DIACF) are often treated surgically [1–5]. Goals of surgery are restoration of articular surfaces, calcaneal height, width and length

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and correction of axis. Since the 1990s, the extended lateral approach (ELA) has been considered the standard approach for performing open reduction and internal fixation (ORIF) of DIACF's [6]. In the ELA, a full-thickness sub-periosteal flap is retracted, with the use of no touch technique, to facilitate operative exposure [6–9].

The ELA is associated with high postoperative wound complication rates and several reasons have been identified as cause. The vascular distribution of the lateral foot is now known to be dependent upon the lateral calcaneal branch of the peroneal artery, which can be compromised by the ELA. Lower wound complication rates are found when the lateral calcaneal branch of the peroneal artery is patent [10]. Patient characteristics that are associated with the occurrence of a postoperative wound infection (POWI) are a higher body mass index (BMI), smoking, diabetes and drug abuse [11–13]. Surgical characteristics associated with POWI are outpatient management, surgery after more than five days or two weeks following trauma, surgical experience, a single layer closure technique and no placement of a closed suction drain [11,13–18].

We noticed large differences in the literature with the incidence of postoperative wound complications following the ELA in operative treatment of patients with calcaneal fractures. As the ELA is an approach that is still used frequently worldwide, our aim in this study was to perform a systematic review of the literature on wound complication rates following the ELA for DIACF's and evaluate and quantify geographical differences.

Methods

This systematic review was performed using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. A computerized literature search was conducted on the 17th of April 2017 in the databases of MEDLINE (Pubmed), EMBASE (Ovid) and the Cochrane Library [19]. Search terms were: Calcaneus, Calcaneal, Fractures, Bone, Fracture*, Surgical Procedures, Operative, Surgical, Operat*. There was no language restriction and only papers after Jan 1st 2000 were included. Any article in a foreign language in which none of the authors was proficient was translated. All titles and abstracts were reviewed by three independent readers (MB, TS, KS) using Covidence [20]. Based on the title and abstract, a list of full text articles was created. Full texts were assessed using the following inclusion criteria: (I) publication after Jan 1st 2000 (II) inclusion of adults (III) inclusion of >10 patients with ELA and (IV) data available on wound complications following the ELA. Publications that were excluded were (V) biomechanical studies (VI) reviews and (VII) studies with the same patient cohort as an already included full text and (VIII) no availability of full text. In case of a disagreement, the full text was discussed and consensus was reached after discussion.

The number of calcaneal fractures surgically approached with the ELA and number of wound complications following the ELA were extracted from each study that was included for the

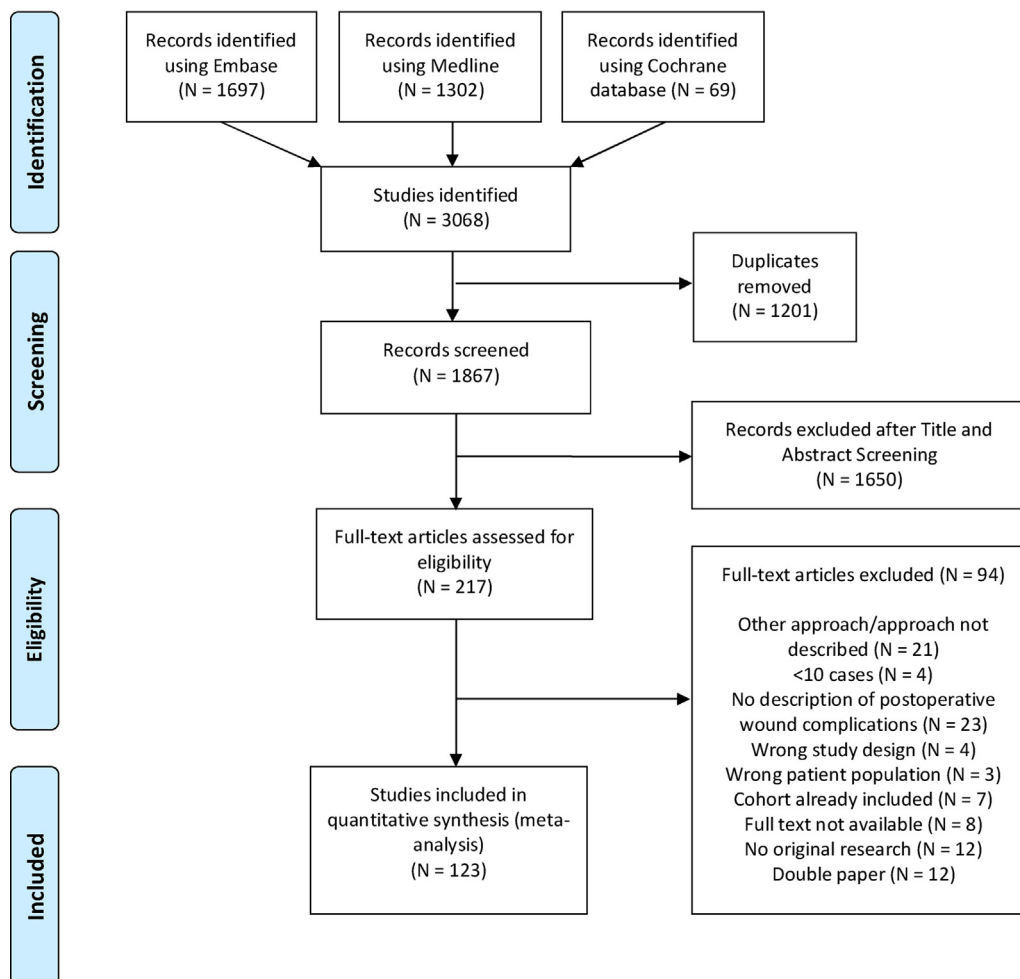


Fig. 1. Flowchart literature search according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses 2009 guidelines.

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