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Original Article

Three dimensional versus standard miniplate fixation in the management of mandibular fractures: A meta-analysis of randomized controlled trials

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Abstract The aim of this meta-analysis is to evaluate the efficacy of the 3-dimensional miniplate system in comparison with the standard miniplate system for the treatment of mandibular fractures (MFs). A systematic review was conducted according to PRISMA guidelines, examining Medline-Ovid, Embase, and PubMed databases. The primary search objective was to identify all papers reporting the results of randomized control trials (RCTs) for the treatment of adults with mandibular fractures, with the aim of comparing the different techniques. The incidence of complications was evaluated; nine studies including 283 patients with different fracture sites were enrolled in the analysis. The results showed no significant differences in overall complications (odds ratio [OR], 0.92; 95% confidence interval [CI], 0.552–1.542; P = 0.81), postoperative infections (OR, 0.99; 95% CI, 0.40–2.48; P = 0.89), wound dehiscence (OR, 0.96; 95% CI, 0.13–7.37; P = 0.96), paresthesia (OR, 0.47; 95% CI, 0.20–1.07; P = 0.11), or malocclusion (OR, 1.8; 95% CI, 0.39–8.32; P = 0.47) between standard miniplates and 3-dimensional miniplates for treating mandibular fractures. Mandibular fractures treated with 3-dimensional miniplates and standard miniplates presented similar short-term complication rates, and the low postoperative

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maxillomandibular fixation rate of using standard miniplates also indicated that the standard miniplate has a promising application in the treatment of mandibular fractures.

Introduction

Mandibular fractures are frequent in facial trauma. With the increase in facial trauma in incidence due to automobile- and industrial-related accidents, the treatment of mandibular fractures has become important for the maxillofacial surgeon [1]. During past decades, various types of techniques have been developed to provide stable fixation for mandibular fractures and osteotomies. Miniplate osteosynthesis, first introduced by Michelet in 1973 [2] and further developed by Champy et al. [3] in 1975, has become the standard method for surgical treatment of mandibular fractures [4–6]. Unlike conventional rigid fixation that prevents micromotion of bony fragments, stable miniplates allow bone alignment and permit healing during use [7]. Currently, 2 different types of miniplate systems are available: 3-dimensional miniplates and standard miniplates. The ideal method of treatment of mandibular fractures should aim for perfect anatomic reduction, stable fixation, and painless mobilization of the injured region around its articulation [8]. The use of 3-dimensional (3D) strut plates is one of the methods of fixation that has emerged as a challenge to the Champy technique for the fixation of mandibular fractures and has been the topic of a growing number of clinical studies [9]. The 3D plates can be considered as a two-plate system, with two miniplates joined by interconnecting crossbars [10]. Their shape is based on the principle of a quadrilateral as a geometrically stable configuration for support [11]. Because the screws are arranged in the configuration of a box on both sides of the fracture, a broadband platform is created, increasing the resistance to twisting and bending the long axis of the plate. There is a simultaneous stabilization of the tension and compression over that of conventional miniplates [12]. Moreover, this system is simple to apply because of its malleability, low profile (reduced palpability), and ease of application (requiring little or no additional contouring) [12].

The treatment of MFs has evolved during the past several decades, especially with the application of different fixation techniques. The debate continues regarding the ideal treatment method; thus, the aim of this study is to answer the following question: What fixation

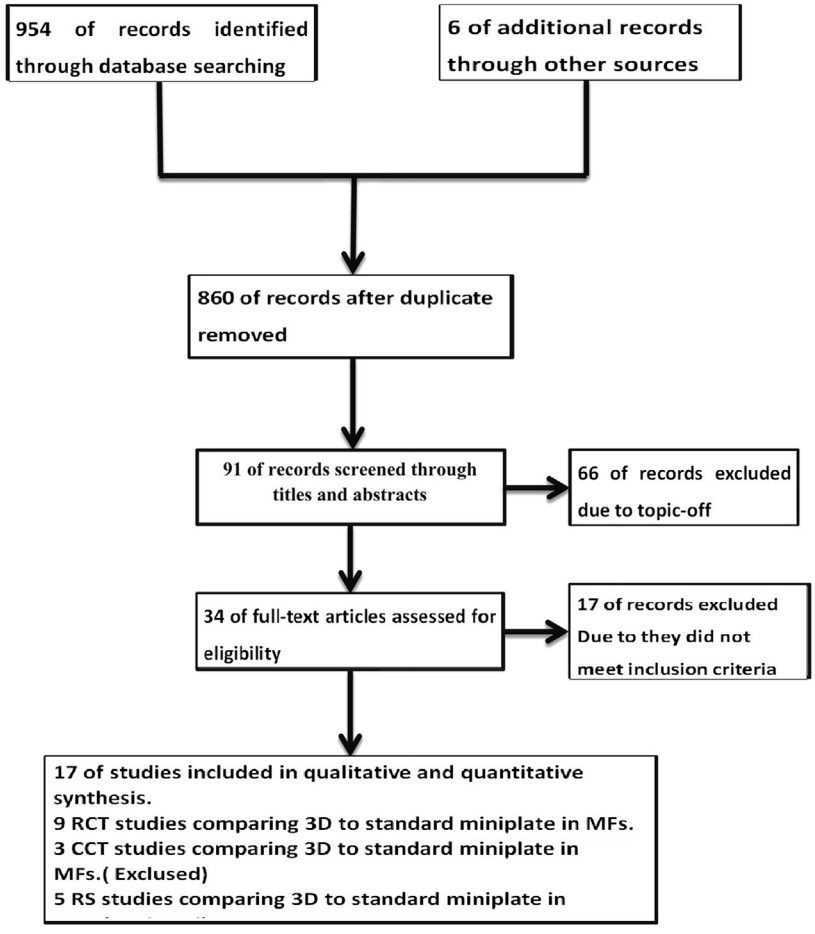

Fig. 1. Study screening process.