Clinical Neurology and Neurosurgery 173 (2018) 130–139

Contents lists available at ScienceDirect

Clinical Neurology and Neurosurgery

journal homepage: www.elsevier.com/locate/clineuro

Immobilisation in occipital condyle fractures: A systematic review

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ARTICLE INFO

Keywords:
Fractures
Spine
Occipital
Condyle
Collar

ABSTRACT

Objectives: The objectives of this review are to determine the level of evidence for the management of OCF, compare outcomes of different immobilisation, and to review the prognosis.
Patients and methods: A literature search was conducted using 3 databases (MEDLINE, PubMed and EMBASE). All papers between 1940 and July 2017 were screened using PRISMA guidelines. Inclusion criteria were patients with a confirmed diagnosis of occipital condyle fracture(s) on CT managed with any form of immobilisation with no age restriction. Primary outcome was clinical improvement in symptoms or Neck Disability Index. MINORS and OCEBM level was assigned to each study.
Results: 25 studies met the inclusion criteria. Most studies used a single form of C-spine immobilisation support (58%) with a semi rigid collar and halo device being the most common. From these studies, the average length of time for immobilisation was 11.7 weeks, 9 weeks and 8.3 weeks for halo, semi-rigid and rigid cervical collars respectively. Neuro deficit was found in 20.3% of patients. OCEBM level of evidence and MINORS score was low.
Conclusion: Management of OCF is associated with low level of evidence. Further studies are needed to determine optimal management of these under-diagnosed fractures.

1. Introduction

Occipital condyles are oval shapedprojections located to the anterior half of the foramen magnum. Fractures of the occipital condyle (OCF) are uncommon traumatic injuries and often associated with significant neurovascular complications [1,2] with nearly one third of patients presenting with lower cranial nerve palsy [3]. Whilst epidemiological data is sparse, the incidence of occipital condyle fractures in blunt trauma injured patients is estimated at nearly 16% [4].

Furthermore, recent changes to spinal trauma imaging protocols resulting in complete spinal series imaging as opposed to targeted scanning has incidentally led towards an increased reporting of OCF [5]. With an all-cause mortality estimated at 16.1% [6], and the importance of the occipitoatlantoaxial joint complex anatomy [7], there is a greater demand for evidence based optimal management.

Management of occipital condyle fractures is controversial. Current treatment is based on the American Association of Neurological Surgeons in the Agency for Healthcare Research and Quality (AHRQ) recommendations for management of OCF [8]:

- External cervical immobilisation for all types of OCF
- Halo vest device for bilateral OCF
- Halo vest immobilisation or secondary fixation-fusion for unstable atlanto-axial OCF pertaining to ligamentous injury

Using a PICO approach, the participants and exposure were all studies reporting any outcomes on adult participants with occipital condyle fractures. All primary outcomes reported in studies on occipital condyle fractures were analysed and extracted data included.

The aim of this systematic review was to identify the available studies and assess the level of evidence on management of OCF using PRISMA guidelines.

2. Materials and methods

2.1. Search strategy and eligibility criteria

A comprehensive literature search was conducted using 3 databases (MEDLINE, PubMed and EMBASE). Search methodology was performed with the assistance of a trained librarian. The search terms ((“OCF” OR

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https://doi.org/10.1016/j.clineuro.2018.08.013
Received 23 April 2018; Received in revised form 3 August 2018; Accepted 7 August 2018
Available online 09 August 2018

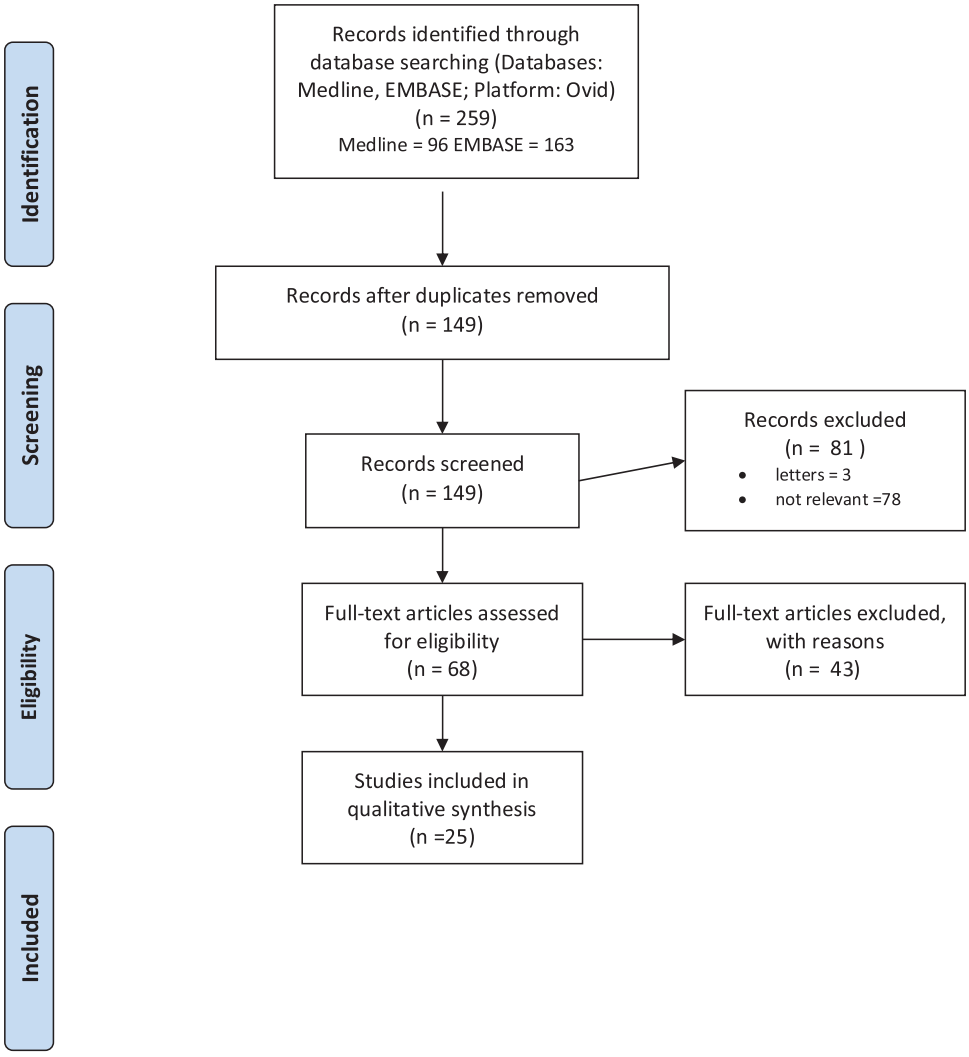

Fig. 1. PRISMA 2009 Flow Diagram.

"Occipital Condyle adj3 fracture*") OR [exp Occipital Bone [MESH Heading] AND "fracture*"]) AND (exp Orthopedic Fixation Devices [MESH Heading] OR exp Surgical Fixation Devices [MESH Heading] OR ["collar" OR "halo OR {"immobili?* AND "surgery"}).

Inclusion criteria were patients with a confirmed diagnosis of a unilateral or bilateral occipital condyle fracture(s) on CT managed with any form of immobilisation with no age restriction.

Primary outcome was any evidence of clinical improvement with neck pain or freedom of movement either subjective or objective parameters using functional outcome scores such as Neck Disability Index(NDI) or health related quality of life outcome measure. The secondary outcome assessed was evidence of radiographic healing. All papers between 1940 and July 2017 were screened with no language restriction. Exclusion criteria was any OCF that was surgically managed or immobilised for less than one week. Eligibility of studies and data extraction was assessed by two reviewers (OM and AK), any ambiguity and disagreement was resolved by a third reviewer. Further details of study selection are detailed in a flowchart (Fig.1).

For those studies, which weren't written in the English language, the results from the studies were only interpreted from an English transcript of the article provided in the same journal. Any studies without an English transcript were excluded.

2.2. Data collection

From each study, information was extracted regarding study design, the number of included patients, age, criteria for initial diagnosis, the classification system used to categorise occipital condyle fracture type, mechanismof injury, other injuries, method and details of immobilisation, follow-up times, complications and evidence for primary and secondary outcomes.

2.3. Analysis of data

The 'Preferred Reporting Items for Systematic reviews and Meta-Analyses' (PRISMA) guidelines was used as a guidance for planning and performing this systematic review. Outcome statements for each type of outcome reported was generated. To assess for risk of bias in included studies, two reviewers independently used the Methodological Index for Non-Randomised Studies (MINORS) [9] criteria to critically appraise individual study methodology. To assess the level of evidence, an Oxford Centre for Evidence Based Medicine (OCEBM) [10] score was assigned to each study) (Table 1). Table 2 details the description of the acronyms used in the article