Seminars in Arthritis and Rheumatism ▮ (2016) ▮▮▮–▮▮▮

Contents lists available at ScienceDirect

Seminars in Arthritis and Rheumatism

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

Erosive osteoarthritis: A systematic analysis of definitions used in the literature

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ARTICLE INFO

Keywords:
Osteoarthritis
Erosive osteoarthritis
Inflammatory osteoarthritis

ABSTRACT

Background: Erosive osteoarthritis (EOA) is a commonly invoked diagnosis representing an important variant of hand osteoarthritis (OA). There is increasing literature on the prevalence, risk factors, etiology, and management of EOA.
Methods: We systematically reviewed the literature to assess variability in the diagnostic definitions used to define EOA in these studies.
Results: We reviewed 336 articles and found 62 articles citing diagnostic definitions for EOA. Radiographic appearance was the most commonly used criterion, but there was little agreement on the details or extent of the radiographic changes. Overall, 56 of the 62 studies included clinical features in the diagnostic definitions, yet these features varied considerably. Exclusion criteria were mentioned in 43 of the studies.
Conclusion: Based on the widely disparate definitions of EOA, we urge caution in interpretation of this literature, and propose that further understanding of EOA will require consensus on its definition.

Introduction

The clinical syndrome known as erosive osteoarthritis (EOA) represents an important and clinically challenging type of hand osteoarthritis. The term erosive osteoarthritis (EOA) was first used in 1966 by Peter et al. [1]. Interestingly, many of this original cohort eventually developed rheumatoid arthritis. Synonyms at times used interchangeably in the literature include “inflammatory osteoarthritis” and “erosive osteoarthrosis.” Interest in this subset of OA has persisted and considerable literature on this topic exists. There is intriguing evidence that the epidemiology, clinical presentation, and even severity of symptoms differs from typical hand OA and yet management strategies are poorly defined and largely untested. Many unanswered questions have fostered a healthy debate about how EOA should be viewed by researchers and clinicians. In particular, controversy exists about whether it should be defined solely by radiographic findings or should include clinical criteria and, moreover, whether EOA should be considered a phase on a continuum of hand OA evolution.

In practice, EOA is often recognized by radiographic changes characterized by erosions and central cortical collapse. These may be accompanied by osteophytes, subchondral cyst formation, periarticular ossicles, and, less commonly, subluxations and ankyloses [2,3]. Clinical features attributed to EOA include an abrupt onset of severe hand pain with variable degrees of stiffness, erythema, joint swelling, esthetic concerns, and deformities [4,5]. Some authors suggest EOA patients may be younger than those with typical hand OA though a lack of an established EOA definition makes the epidemiology difficult to interpret [6].

Data from the Framingham Offspring and Community cohorts estimate the prevalence of EOA in the general population to be 3% among men and 10% among women though prevalence estimates are likely to vary significantly based on the specific population studied [7]. Other studies assessing progression of hand OA cite 40% of patients with classical osteoarthritis were “complicated by manifest erosive changes” [8]. Thus, EOA may comprise a significant number of patients with hand OA.

The diagnosis of EOA is currently challenging. Disease mimics include common inflammatory arthritides such as psoriatic arthritis and rheumatoid arthritis. Sjogren's syndrome has been associated with a very destructive arthritis involving the PIP joints [9]. Crystal-induced arthropathies including gout, calcium pyrophosphate deposition disease, and basic calcium phosphate–induced

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http://dx.doi.org/10.1016/j.semarthrit.2016.08.013
0049-0172/

periarthritis can also produce similar symptoms. It remains unclear how EOA relates to typical hand OA, it may be a subtype of hand OA rather than a unique disease entity.

In reviewing the EOA literature, we noted considerable variation in the disease definition. Inconsistent disease definition precludes a full understanding of many of the key aspects of EOA and complicates diagnostic strategies. In addition, interpretation of newly identified biomarkers, improved imaging technology including ultrasonography, and advanced genetic analyses requires a precise disease definition. Perhaps most importantly, the lack of diagnostic consensus on EOA seriously weakens the impact of clinical studies of therapies for this painful osteoarthritis.

We undertook a systematic review of the body of literature on EOA with an objective of assessing the variability of published definitions of EOA.

Patients and methods

Literature search

We performed an electronic literature search of PubMed and Ovid/Medline using search terms “erosive osteoarthritis” and “erosive OA” for articles published between 1962 and August 2015.

Inclusion and exclusion criteria

Studies were included for analysis if they met the following criteria: English language, human subjects, greater than or equal to 3 patients studied, a stated definition of EOA, and focus on hand OA. All identified review articles, case reports, letters to the editor, and opinion pieces were excluded.

Results

The Figure represents a flow sheet of the study selection process. Search term “erosive osteoarthritis” (search 1) identified 329 articles while use of “erosive OA” (search 2) identified 109 articles. Only 7 of the 109 articles found with search 2 were not found with search 1. Therefore, after reviewing 336 studies, 62 met our inclusion criteria and are represented in the Table.

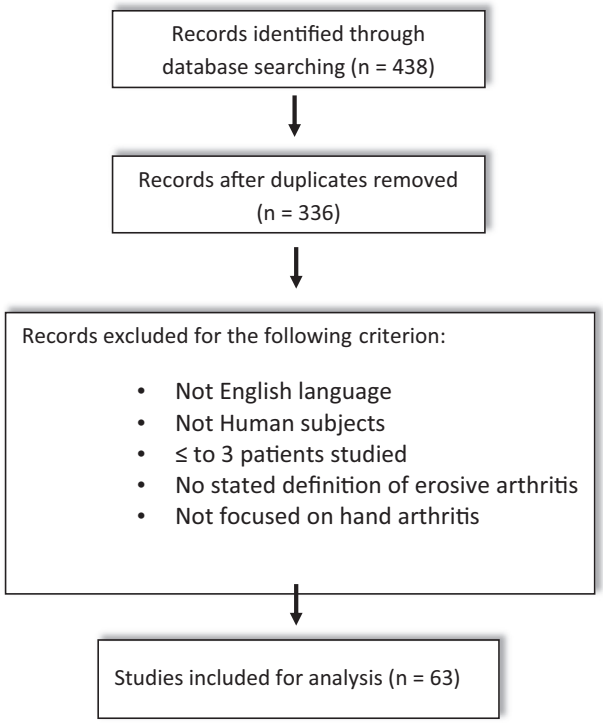

Fig. Flow diagram of study selection process.

The sizes of the studies varied among the 62 studies included for analysis with patient numbers ranging from 3 to 355. Defining clinical definition as information obtainable by history or physical exam, 55 of the 62 studies used a definition that included some combination of both clinical and radiographic parameters. Overall, 37 studies used the 1990 ACR criteria for hand OA as a clinical criterion [10]. One study used the EULAR task force evidence-based recommendations for hand OA diagnosis published in 2008 [11]. Six studies used no clinical inclusion. In all, 18 of the 62 studies employed unique clinical criteria based on features such as the number of involved joints, pain levels on VAS, presence of visible or palpable nodes, duration and frequency of joint pain, swelling, and stiffness.

Radiological definitions were included in all studies except one and remain the major parameter for the definition of EOA. The single study not including a radiographic criterion was a magnetic resonance imaging study (54). In all, 17 of the 62 studies used a named OA grading or scoring system such as Kellgren and Lawrence [2], Verbruggen and Veys [12], or Kallman [3].The majority of studies (64%) outlining individual radiographic definitions for EOA often included common terms such as central articular erosions, subchondral erosions, ankyloses, or “gull wing” or “saw tooth” deformities. Five studies refer to “typical” EOA radiographic findings as a radiologic definition. Sixteen studies included images of radiographs depicting examples of EOA. Radiographic definitions included a threshold for the number of involved joints in 37 of the 62 studies identified. Of those 37 articles, 19 required ≥ 1 involved joint, 12 required ≥ 2 involved joints, and 6 required ≥ 3 involved joints. Four studies included the presence of MCP erosions as an exclusion criterion.

Overall, 40 of the 62 studies included an alternative diagnosis as an exclusion criterion. The presence of psoriasis, rheumatoid arthritis, a spondyloarthropathy, crystal arthropathy, a metabolic condition, and trauma are all sporadically mentioned as exclusion criteria. Twelve studies included the presence of a positive rheumatoid factor as an exclusion criterion. Four studies also included the presence of a positive ANA or elevated inflammatory markers as exclusion criteria. Interestingly, the presence of a family history of psoriasis was also infrequently mentioned as an exclusion criterion.

Discussion

It is not clear whether EOA is a subset of HOA to be placed on a spectrum of degenerative joint diseases or whether it represents a separate disease entity with a pathophysiology similar to arthropathies traditionally felt to represent inflammatory disease such as crystal arthritis, rheumatoid arthritis, or spondyloarthropathy. However, defining EOA remains critical in order to study the disease further with hopes of improved understanding of the pathogenesis and, ultimately improve accuracy of diagnosis and efficacy of treatment. The goal of this work was not to establish a set of diagnostic criteria but rather to carefully review the available literature and determine disparities and trends across studies regarding the definition of EOA.

This systematic review found remarkably little uniformity among studies regarding a definition of EOA. While the majority of studies (60%) used the 1990 ACR hand OA definition (which includes patient experiencing pain, aching, or stiffness along with hard tissue enlargement of 2 or more selected joints and fewer than 3 swollen MCP joints along with hard tissue enlargement of