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Clinical Reviews

THE TOOTH, THE WHOLE TOOTH, AND NOTHING BUT THE TOOTH: CAN DENTAL PAIN EVER BE THE SOLE PRESENTING SYMPTOM OF A MYOCARDIAL INFARCTION? A SYSTEMATIC REVIEW

Nima Jalali, BS,* Gary M. Vilke, MD,*† Melissa Korenevsky, BS,* Edward M. Castillo, PHD, MPH,*† and Michael P. Wilson, MD, PHD*†

*Department of Emergency Medicine Behavioral Emergencies Research Lab and †Department of Emergency Medicine, UC San Diego Health System, San Diego, California

Reprint Address: Michael P. Wilson, MD, PHD, Department of Emergency Medicine, UC San Diego Health System, 200 West Arbor Drive, San Diego, CA 92103

□ **Abstract—Background: Pain symptoms related to cardiac ischemia can vary greatly from patient to patient. However, should emergency physicians consider the possibility of myocardial infarction in patients who present solely with dental pain? Objective: This is a systematic review of the literature investigating the incidence of jaw, tooth, or facial pain as the sole symptom of cardiac ischemia. Methods: Studies investigating jaw, tooth, or facial pain of cardiac origin were identified using the PubMed database. All English studies in which cardiac pain originated in the face, teeth, or jaw were screened for inclusion. Data were abstracted from each study utilizing a structured review process, and rated for methodological quality. Results: Eighteen studies met study criteria: 16 were case reports, and the remaining 2 were prospective cohort studies. After quality assessment and categorization, nine reports were categorized as weak, eight moderate, and one strong methodological quality. Conclusion: Cardiac ischemia may present in no anatomic location other than face or jaw. However, despite frequent claims in the literature to the contrary, the lack of methodological quality of the studies investigated impedes a firm conclusion of face, jaw, or tooth pain as the only symptom of cardiac insufficiency.** © 2014 Elsevier Inc.

□ **Keywords—jaw pain; tooth pain; facial pain; myocardial infarction; cardiac ischemia**

INTRODUCTION

Cardiovascular disease accounts for 29.3% of all deaths annually, and approximately 2–3% of acute myocardial infarctions are missed in the emergency department (1,2). Symptoms of pain resulting from cardiac ischemia often have varying presentations, which include chest pain, shoulder pain, arm pain, face pain, or jaw pain. Craniofacial pain is thought to result from afferent fibers of the vagus nerve, which transmit nociceptive information to cervical neuron cells (3). Therefore, whereas cardiac disease often manifests as crushing substernal chest pain or anginal equivalents, classic teaching is that cardiac ischemia can present with tooth, jaw, or facial pain as its chief or sole symptom. However, a proposed mechanism for referred cardiac pain does not trump clinical findings. In this study, we seek to conduct a systematic review of the available literature regarding the prevalence of facial, tooth, or jaw pain as the sole presenting symptom of cardiac ischemia.

OBJECTIVES

This systematic review seeks to evaluate and analyze all existing literature on the incidence of jaw, tooth, or facial

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pain as the sole presenting symptom of cardiac insufficiency. A comprehensive database search and analysis of screened studies was conducted.

METHODS

This review followed published criteria for conducting systematic reviews (4). The PubMed database was searched for all years through June 15, 2012 utilizing the following search terms: "Jaw pain AND (heart attack OR cardiac ischemia OR coronary heart disease OR acute coronary syndrome)," "Jaw pain of cardiac origin," "Tooth pain AND (heart attack OR cardiac ischemia OR coronary heart disease OR acute coronary syndrome)," "Tooth pain of cardiac origin," "Orofacial pain AND (heart attack OR cardiac ischemia OR coronary heart disease OR acute coronary syndrome)," "Orofacial pain of cardiac origin," "Temporomandibular pain AND (heart attack OR cardiac ischemia OR coronary heart disease OR acute coronary syndrome)," "Temporomandibular pain of cardiac origin," and "Nonodontogenic tooth pain." All abstracts that were acquired with these search terms were then manually inspected for studies that fit the inclusion and exclusion criteria.

Inclusion/Exclusion Criteria

All studies in which cardiac pain originated in the face, teeth, or jaw in human subjects were included. All review papers and non-English articles were excluded. However, the references of selected articles and review papers during the same time period were also analyzed to include all relevant literature.

Data Analysis

Data abstracted from the studies included the number of participants and funding sources. The main conclusions were analyzed in a descriptive manner. Each included study was then assessed for bias and methodological rigor by the first author using a previously validated Methodologic Quality Instrument by Cho and Bero (reprinted in the Appendix) (5). The instrument grades the studies based on 24 different points, including study design, subject selection, and statistical methods. Two points were given if the item was contained in the article, 1 point if the item was not completely reported, and 0 points if the item was not present. Based on the score received divided by the possible score for the study, a number between 0 and 1 was given to determine its methodological quality. The highest possible quality study would receive a score of 1 and the lowest, a score of 0. The quality score was then utilized to label the studies as exhibiting weak (0.00–0.33), moderate (0.34–0.66), or strong (0.67–1.00) methodological quality.

RESULTS

The search terms returned a total of 247 studies (Figure 1), which were subsequently manually reviewed. Nineteen studies ranging from the years 1963 to 2011 met all inclusion and exclusion criteria (6–24). One study by Sandler et al. was a review article with an associated case report (24). However, this case report did not present a case in which cardiac problems were the cause of the dental pain and was therefore excluded. The review of reference lists from included articles did not yield any additional studies. The 18 remaining manuscripts subsequently underwent detailed analysis and grading.

Overview of Studies

Of the 18 included studies, 16 were case reports (6–15,18–23). The other two studies were prospective cohort studies (16,17). The case reports all reported on an individual patient except for one, in which three cases were presented (23). The prospective cohort studies had 186 and 474 participants (16,17). The studies varied in methodology and number of participants (Table 1). Additionally, funding sources and affiliations of authors are reprinted in Table 2 to disclose any possible sources of bias. There was no clear correlation between funding and conclusions presented in any of the studies.

Case Reports

All case reports scored < 0.50 on the methodological quality scale. Only seven manuscripts attained a methodological score > 0.33, indicating that most were of weak methodological quality.

Prospective Cohort Studies

The two prospective cohort studies were scored higher than any of the case reports. Kreiner et al. (2007) scored a 0.49 methodology score, classifying it as moderate methodological quality (16). Kreiner et al. (2010) scored a 0.69 methodology score, classifying it as strong methodological quality (17). Kreiner et al. (2007) indicated that 6% of cardiac ischemia patients reported craniofacial pain as their only symptom (16). The results of Kreiner et al. (2010) showed that 6% of patients with pain of cardiac origin had jaw or face pain as their only symptom, but all of these patients except one described the pain as "pressure" or "burning" (17). Patients with pain of