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Review Article

Thumb Arthrodesis in The Arthritis Cases: A Scoping Review

Ghifar Akbar Iftinan[1], Viskasari Pintoko Kalanjati[2], Teddy Heri Wardhana[3]

[1]Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia
[2]Department of Anatomy, Histology and Pharmacology, Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia
[3]Department of Orthopedics and Traumatology, Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia

Correspondence should be addressed to Viskasari Pintoko Kalanjati, Department of Anatomy, Histology, and Pharmacology, Faculty of Medicine, Universitas Airlangga, Jl. Prof. Dr. Moestopo No.47, Pacar Kembang, Surabaya 60132, Indonesia, email: viskasari-p-k@fk.unair.ac.id

ABSTRACT

Background: Osteoarthritis in the thumb is a common condition affecting men and women, especially postmenopausal women, causing pain, swelling, and reduced hand function. Arthrodesis is a treatment option for thumb arthritis, increasingly accessible in medical practice, though coverage remains limited. This article aims to review recent case reports on thumb arthrodesis in older people over the last three years, depicting the method's use and outcomes.
Methods: After filtering per PRISMA-Sc guidelines on PubMed and the Journal of Hand Surgery (2020-2023), with additional manual filtering, four articles were found and analyzed using the JBI Critical Appraisal Checklist for Case Reports before inclusion.
Result: Four case reports related to pollex arthrodesis in the last three years were published in PubMed. These include rare cases of bilateral thumb psoriatic arthritis, a novel surgical approach for nonunion after arthrodesis, and successful fusion using a vascularized bone graft. The limited number of articles may be attributed to the research cycle, shifting focus, and alternative treatments. With increased healthcare access and osteoarthritis prevalence, more people will seek treatment, potentially leading to increased arthrodesis procedures. Opportunities for new research include evaluating surgical techniques, biomaterials, and growth factors to enhance bone healing. Long-term follow-up studies remain crucial for identifying risk factors and improving patient outcomes in thumb arthrodesis.
Conclusion: Despite limited research published in the last three years, arthrodesis remains a relevant treatment option for pollex conditions, with rising demand due to increasing osteoarthritis prevalence and healthcare access. Further research on surgical innovations and long-term outcomes is crucial.

Keywords: Neglected disease; Joint reconstruction; Degenerative disease

INTRODUCTION

Osteoarthritis in the thumb is a common condition that affects one in three postmenopausal women.[1] It is less common in men compared to women.[2] This disease can cause various symptoms, including pain, swelling, changes in shape, instability, decreased movement, and reduced strength.[3] One of the treatments for thumb osteoarthritis is arthrodesis, which can be opted to reduce pain with an acceptable range of movement to conduct daily activity. With advancements in medical technology and increased accessibility to healthcare, arthrodesis is becoming a more common treatment option for thumb osteoarthritis.[1–3]

This article aims to review all case reports published within the past three years in PubMed and the Journal of Hand Surgery (JHS) regarding thumb arthrodesis in elderly patients. The review seeks to elucidate the utilization and effectiveness of this technique in reducing morbidity rates.

METHODS

This scoping review follows protocol (Figure 1) from PRISMA for Scoping Review.[4] In this scoping review, we analyze articles published on PubMed official website (https://pubmed.ncbi.nlm.nih.gov) and the JHS search engine. The search terms used for this research were “thumb” AND “arthrodesis”.

Utilizing the website's filtering tools, we excluded all articles published before 2020. Therefore, only articles published between January 1, 2020, and September 6, 2023, are included in this review. Using the same filtering tool, we excluded any publication not categorized as a case report. Subsequently, we manually screened the remaining publications to exclude articles in any language other than English and Bahasa Indonesia and only to include case reports on male and female human adults (over 18 years old).

After filtering out articles that do not pertain to the subject, all remaining articles will undergo manual screening to determine which ones can be retrieved fully. Finally, the articles will be appraised using the "JBI Critical Appraisal Checklist for Case Reports"[5] to ensure their quality and minimize potential bias in the scoping review.

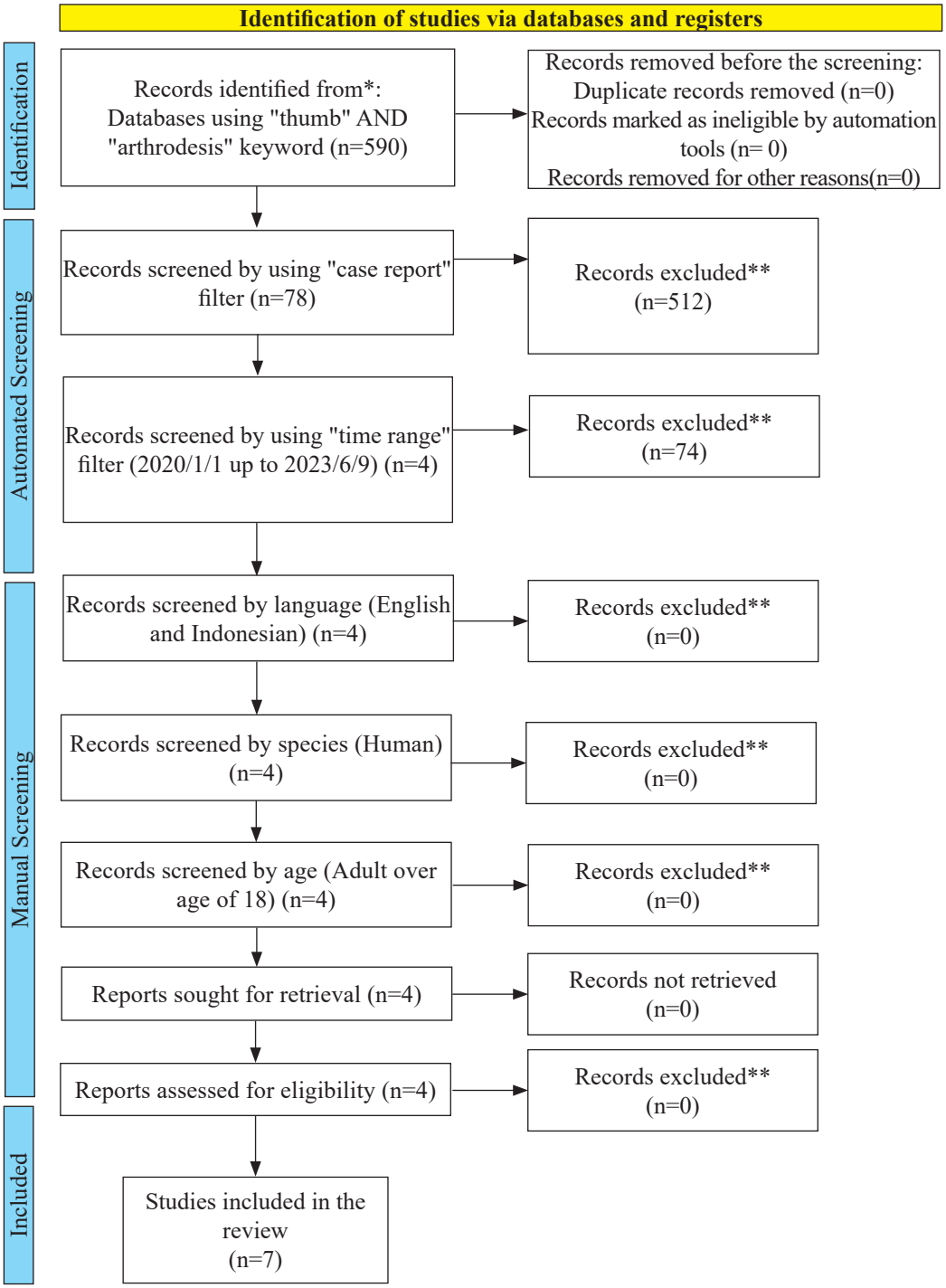

Figure 1. PRISMA Paper identification flow chart of this scoping review, with the final four included articles.

RESULTS

Four articles were selected for review after an initial screening of 590 papers. These four articles were assessed using the "JBI Critical Appraisal Checklist for Case Reports". All four articles met the inclusion criteria and were deemed eligible for the review. The appraisal sheets are included in the supplementary file 1.

The four articles reported a rare case of bilateral thumb psoriatic arthritis, a new surgical approach, and two nonunion cases. Each of the articles can be summarized as follows:

Trapeziectomy and suspension ligamentoplasty for surgical revision of trapeziometacarpal joint arthrodesis failure: two cases.

Trapeziectomy is one of the options for treating osteoarthritis-related problems on the base of the thumb. This article tries to show how trapeziectomy, besides its usual role as the basic treatment for trapeziometacarpal osteoarthritis, can also be an effective solution for nonunion cases after an arthrodesis surgery.[6]

First dorsal metacarpal artery-pedicled second metacarpal vascularized bone graft for nonunion after thumb Carpometacarpal Arthrodesis

Unlike the previous article, this one presents a solution that aims to achieve successful fusion in a nonunion case. It showcases a successful fusion following an artery graft procedure performed on a previously failed fusion between the carpal and metacarpal bones of the thumb. The surgery involved two small incisions to access the first metacarpal artery and the intended fusion site. During the procedure, the deep artery of the first metacarpal was redirected into the fusion site. Simultaneously, the role of the deep artery at the donor site was replaced by the redirected superficial artery.[7]

Rare presentation of bilateral thumb psoriatic arthritis treated with arthrodesis: a case report

With the increased use of disease-modifying anti-rheumatic drugs, it is increasingly rare to find a severe case of psoriatic arthritis (PsA) to the point where the patient is experiencing severe pain, instability, dislocation, and loss of function at the site of PsA. Arthrodesis can be one of the solutions for such a case, as proven to be effective in the case shown in this article. The 47-year-old patient was satisfied with the outcome of the surgery and decided to undergo the same surgery for the contralateral side.[8]

Percutaneous trapeziometacarpal arthrodesis in thumb carpometacarpal joint arthritis: a new surgical approach

A minimally surgical approach to perform arthrodesis between the trapezius and metacarpal of the thumb is believed to achieve a satisfactory outcome for the patient. The technique utilized a tapered burr and Shannon bur (long and short), included in the MIS foot instrument set, to debride the joint. This is followed by fixation using K wire. In the case presented in this article, the patient was able to return to normal activity after three months of recovery. After two years, X-ray control showed a complete fusion between the trapezium and metacarpal.[9]

DISCUSSION

PubMed has published four case reports relating to pollex arthrodesis in the past three years. None of these were published in JHS. These four case reports showcase rare cases of bilateral thumb psoriatic arthritis, a new surgical approach, and nonunion cases. Arthrodesis might not be the first choice of treatment for joint diseases, but it can be considered when chronic pain is hindering a patient's daily activities. With an acceptable angle to produce the necessary range of movement, arthrodesis of the thumb, either in the metacarpophalangeal joint, carpometacarpal joint, or interphalangeal joint, can be a treatment option for conditions such as chronic osteoarthritis of the thumb.[10–12]

Within the last few decades, there has been a significant increase in access to healthcare. Com-

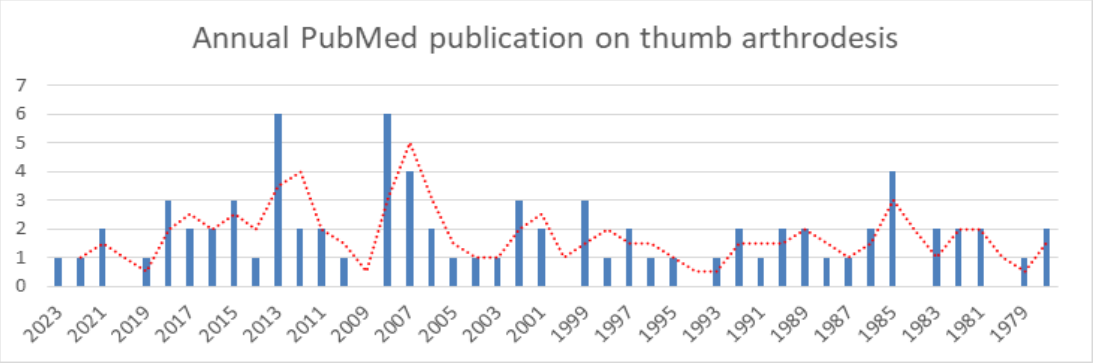

Figure 2. Graphic showing thumb arthrodesis publication timeline by year.[10]

bined with the rising prevalence of osteoarthritis, arthrodesis has become a more frequent treatment option. As a result, more individuals seek medical attention for arthritis-related issues in the thumb joint. Healthcare providers may turn to arthrodesis as a viable solution to alleviate pain and restore hand function.[13–15]

Nonunion is a very common type of failure following thumb arthrodesis, occurring in nearly half of all arthrodesis cases. This high prevalence underscores the need for further research and investigation to elucidate the underlying factors contributing to this outcome and to explore strategies that can improve fusion rates and overall surgical success.[16]

The increasing demand for arthrodesis and the importance of addressing nonunion in thumb arthrodesis present various opportunities for new research on this technique. Various aspects of this issue, such as evaluating different surgical techniques, exploring the use of novel or repurposing available biomaterials (such as bone glue, cement, etc.) and bone grafts (as been shown in one of the aforementioned articles), and investigating the role of growth factors (such as PDGF, transforming growth factor-β, VEGF, and FGF) in promoting bone healing might be a possible solution for this problem going forward. Long-term follow-up studies to assess the efficacy of specific treatment approaches and identify potential risk factors for nonunion will also provide useful data to solve this problem. These research topics, by shedding light on the complexities of nonunion and exploring potential solutions, can drive advancements in thumb arthrodesis, leading to improved patient outcomes and a higher success rate for this surgical procedure.[13–17]

There are several possible reasons why there are only four articles published on thumb arthrodesis in the last three years. The first one is because of the research cycle. This might be the case as, based on the graphic shown in PubMed after applying the filter, we are at the end of one of these cycles (Figure 2). However, in the last decades, the research number on the topic stayed within eight research reports per year. The second possible cause is a shift in research focus. However, this does not seem to be the case, considering the number of research on this topic or in the topic of arthrodesis is at an all-time high in the last five years and only having around 1.1%-1.2% decrease in 2021 and 2022 compared to the year 2020. The third possible reason why there are only four publications on this topic is because this topic is highly specific, and four publications in three years are normal. This reason can also be shown in the table below (Figure 2) as the highest number of publications in a year happened in 2007 and 2013 at six publications a year.[13–15]

Treatment alternatives to arthrodesis, such as artificial joints[11], micro debridement[12], and trapeziectomy[14], could reduce the number of resources allocated to arthrodesis research, indirectly lowering the number of studies on thumb arthrodesis.

Publication bias might also play a role in this result. Physicians, for various reasons, might not publish their findings or might choose to publish them in journals other than PubMed. Consequently,

the presence of only four relevant articles in PubMed over the past three years may not accurately reflect the total number of articles published across all journals.

There are several limitations to this analysis. Firstly, the study only examined a single journal search engine (PubMed) and a single journal (Journal of Hand Surgery). Therefore, any articles not indexed in either of these sources would be missed. Secondly, the search filters may have overlooked articles that met the inclusion criteria but were not titled or tagged appropriately.

CONCLUSION

In the past three years, four case reports on pollex arthrodesis have been documented in the medical literature, including PubMed and JHS. These reports highlight innovative treatments for rare conditions and surgical complications, though none have been published specifically in JHS. This limited publication record can be attributed to several factors, including the research cycle, shifting research focus, and the availability of alternative treatment options. However, the rising prevalence of osteoarthritis and increased access to healthcare suggest a growing demand for arthrodesis. This underscores the need for further research on surgical innovations and long-term patient outcomes in this area.

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