

Variability and Delay in Diagnosis and Treatment of Juvenile Osteochondritis Dissecans (JOCD): A Retrospective Analysis and Call for Evidence-Based Guidelines

Rohan Raikar^{*1}, Michael Newcome^{*1}, Marc Tompkins^{1,2}, Bradley Nelson^{1,2}, Karsten Knutsen¹, Takashi Takahashi¹, Abdul Wahed Kajabi¹, Jutta Ellermann¹

¹University of Minnesota, Minneapolis, MN, ²TRIA Orthopedic Center, Bloomington

**These authors contributed equally*

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INTRODUCTION: Juvenile Osteochondritis Dissecans (JOCD) is a prevalent knee condition in children and young adults. The disease, resulting in loose bodies within the joint, can progress to premature osteoarthritis. The exact etiology of JOCD remains elusive, although current research points to biological effects, including genetic and/or mechanical origins¹. Unfortunately, many publications still hold the belief that JOCD is the result of an osseous fragmentation, unaware that JOCD is a disease of epiphyseal cartilage origin with delays in the ossification front². As a result of limited research and awareness, current diagnostic imaging methods, radiography and MRI *lack accuracy to inform treatment decisions*³. Further, the recommended care and treatment guidelines from 'The American Academy of Orthopaedic Surgeons' are largely inconclusive⁴ due to a lack of significant and high-level evidence. **Thus, standard of care (SOC) varies widely.** An initial variable 3-18 months¹ watch-and-wait period of nonoperative treatment is followed by surgical intervention, such as drilling or open curettage and fixation with proximal tibial bone grafting in patients that do not heal naturally. Furthermore, there is no standardized surveillance period length, raising concerns for both long-term adverse joint outcomes and quality of life for the patients and their families. There is insufficient data on the timeline of JOCD from the onset of symptoms to the first appointment and from the first diagnosis to patients healing. Here we hypothesize that variability and delay in the diagnosis and treatment of Juvenile Osteochondritis Dissecans (JOCD) are associated with the absence of standardized evidence-based guidelines for patient care.

METHODS: This study is an IRB approved and HIPPA compliant retrospective study. The inclusion and exclusion of JOCD criteria were reviewed for 91 consecutive patients who were referred to a metropolitan clinical practice including the University of Minnesota and TRIA, between 07/28/2011 and 10/06/2021. Of these 91 patients, 10 were excluded due to missing timeline information in Epic and/or PACS. Thus, the final study group consisted of 81 consecutive patients and 107 knees with JOCD (20 females and 61 males; mean age 20.3 years; age range 5-25 years). Using Epic and PACS, the investigators collected information pertinent to the timeline of JOCD disease progression. This included dates of first symptoms and first healthcare appointment, dates of imaging studies, dates of conservative therapy, dates of surgery, and dates of healing. The dates of the imaging studies ranged from 11/12/2010 to 6/2/2023. The time interval in days was calculated for the time between first symptoms and first healthcare visit as well as the time between first healthcare visit and imaging studies. The time interval in days was also calculated for the time between the first diagnosis and first conservative therapy, first surgery, and date of healing. The subjects were split into two groups: those that healed from conservative therapy alone and those that underwent surgery, with or without failed conservative therapy. Mean and standard deviation were then calculated for each time interval.

RESULTS: The main results included two separate parts: 1. the patient response, defined as the time period from first JOCD symptoms to first healthcare appointment, and 2. the healthcare response, defined as the time between first appointment and healing. The patient response was 0.65 years (237 days) with a standard deviation of 1.15 years (420 days). The mean time between first clinic visit and first X-ray was 0.15 years (55 days) with a standard deviation of 0.79 years (288 days). The mean time between first clinic visit and first MRI was 0.27 years (99 days) with a standard deviation of 0.64 years (233 days). 53 subjects received conservative therapy only after diagnosis. The average time between diagnosis and healing after only using conservative therapy was 1.47 years (537 days) with a standard deviation of 1.42 years (518 days). 54 subjects received surgery after diagnosis or after failed conservative therapy. The hospital response for these subjects, from first appointment to healing, was 2.02 years (738 days) with a standard deviation of 1.62 years (593 days).

DISCUSSION: The most important finding of this study is the delay and variability in the healthcare response to JOCD patients. These patients, seeking medical care for varied histories of knee pain, face significant periods of delay as they wait for an accurate diagnosis. Patients experience a wide variety of treatments as there are no standard evidence-based diagnosis and treatment guidelines⁴. This finding is demonstrated by the large standard deviations found among treatment times. These findings support our hypothesis that the current lack of diagnosis and treatment guidelines for young patients with JOCD is due to a non-standardized response from the healthcare system, resulting in large delays in the diagnosis and treatment of the condition. A recent study provides pilot data on imaging metrics that can differentiate between patients that need surgery and those that heal nonsurgically⁵. Ultimately, improving JOCD outcomes is not just a matter of physical health, but a vital investment in the well-being and timely management of JOCD patients. Updating and correcting the status quo of current SOC is necessary to identify unmet clinical needs, thus, calling for a systematic approach to a paradigm shift through orthopedic research.

SIGNIFICANCE/CLINICAL RELEVANCE: This retrospective analysis highlights significant delays in the diagnosis and treatment of JOCD, emphasizing the variability in public awareness and the current healthcare response to JOCD. This variability, accentuated by the lack of standardized, evidence-based guidelines, potentially exacerbates the condition, necessitating prolonged and sometimes more invasive treatments. Given the profound impact on the quality of life for affected young patients, there is an imperative need to develop and adopt evidence-based SOC for timely diagnosis and intervention.

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