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Osteoarthritis In Children: Overview of the Prevalence, Burden, Pathology and Management

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Abstract

Osteoarthritis (OA) is a pathology of the joints that causes pain and mobility issues. OA is one of the biggest causes of disability among workers. OA is usually known as a disease of the elderly. However, OA also occurs in children. The biggest risk factor in development of OA in children is obesity. In this review we summarize the burden, pathology and management options for osteoarthritis in children.

Keywords: Osteoarthritis; Childhood; Knee pathology

Abbreviations: OA: Osteoarthritis; NHANES: National Health and Nutrition Examination Survey; RA: Rheumatoid arthritis; MRI: Magnetic-resonance image; BIM: Body mass index; JIA: Juvenile Idiopathic Arthritis

Introduction

Osteoarthritis (OA) is a complex chronic degenerative condition characterized by articular cartilage loss periarticular bone remodeling. OA can be classified into two types, primary or secondary OA. In the United States, OA is the most common joint disorder. OA usually occurs in older adults. In people aged 45, the age-standardized prevalence of radiographic knee OA was 19.2% in the Framingham Study participants and 27.8% in the Johnston County Osteoarthritis Project participants [1]. 37% of participants in the third National Health and Nutrition Examination Survey (NHANES III) who were 60 years or older had radiographic knee OA [1]. The main symptom of OA is pain. The degree of pain dictates the treatment option. The pain can limit the movement to the point where it may lead to disability. In the United States, OA is the second largest cause of work disability, only second to ischemic heart disease in men over the age of 50 [2]. OA is the most frequent reason for total hip and total knee replacements [3].

There are many risk factors to the development of OA in adults. The strongest risk factor for OA in any joint is age [1]. Increased age is means increased cumulative stress and load on the joints. Other risk factors include female gender, diet, genetics and also rheumatoid arthritis (RA) which can lead development of OA, the means that risk factors associated with RA are also risk factors for OA [4-7]. Even tough OA is classically described as disease of the old, it still occurs in young children. One major risk factor for development of OA in children is obesity [8]. According to study of 20 morbidly obese people in the range of 9- to 19-year-olds, all had bone and cartilage alteration on Magnetic-resonance image (MRI) [9]. One fact to notice is that the increase in incidence of OA has increased with the increase in body mass index (BMI) [10]. Another study on morbidly obese children showed that morbid obesity is significantly associated with early lesions of the knee cartilage [8]. This is worrisome as the prevalence of overweight children had doubled in the United States in the last two to three decades [11]. Estimations show that there are over 22 million children under the age of 5 who are severely overweight [12]. To show the extent of the burden, around 15% of general pediatric consultants are for the pain of musculoskeletal system [13]. MRI of morbidly obese children with knee pain show that their knees have the same pathological changes as adults with OA. An important distinction to make is that osteoarthritis in children is different from Juvenile Idiopathic Arthritis (JIA), which is an

immunological disease. The pathogenesis of osteoarthritis in morbidly obese children is not fully known. The most accepted hypothesis is that the increased stress on joints due to the extra weight leads to wear and tear, however there is also an alternate hypothesis that OA may be due to a metabolic syndrome [14].

The goal or aim of OA management is to reduce pain, optimize function and modify the process of joint damage. The most important first step is to target the risk factor that causes the disease and are modifiable [15]. The ideal way to prevent OA in morbidly obese children would be increased physical activity. However, due to the joint pain this may not only be difficult but may aggravate the pain. Regarding pharmacological intervention, a vast selection of interventions is used to address pain and function [16]. It is of great importance to place preventive measures and implemented in children who developed OA or those who are children or grandchildren of individuals with OA as they are predisposed to developing OA [17].

Nonpharmacological therapy is considered the mainstay of OA management and can be done with pharmacological therapy to relieve pain if necessary. First, a combination of aerobic and strengthening exercises is usually indicated to address the specific disability caused by OA, and these exercises should be individualized to the patient specially children [18,19]. Losing weight have also proven to reduce pain up to 50% in adult population [20]. However, the effect could remain in children and as such losing weight is another effective modality in cases of obese children. Lastly, the use of walking aids or knee braces can also be considered in specific patients that have malalignment to improve pain [16].

Conclusion

Management for OA can also include pharmacological intervention. Main modalities used in OA include oral and topical NSAIDs, with topical capsaicin, duloxetine and intraarticular glucocorticoids as additional options used depending on the clinical scenario [16]. The choice of agent comes down to the specific joint and number of joints affected, as well as comorbidities. If one or a few joints affected, specifically the knee and/or hand, the use of topical NSAIDs is enough due to its similar efficacy to oral agent and their better safety profile [21]. Oral NSAIDs is usually reserved for those who have inadequate response to topical NSAIDs, or for those with multiple joints, or involvement of the hip joint. In case of co-commodities (eg. Diabetes, hypertension) the use of cyclooxygenase (COX)-2 selective NSAID is preferred [16]. Surgical management is predominately total joint replacement, which is highly effective in the cases conservative therapies have failed to provide adequate pain relief [22]. Best way to reduce the progression of OA to the point of disability would be screening. Screening for joint pathologies, specifically of the knee and hip in morbidly obese children could avoid the need of major procedures such as joint replacement surgery.

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