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**How Osteochondritis Dissecans Effects the Skeletal System?**

**Introduction**

The term osteochondrosis refers to a collection of disorders which affect the growing skeleton system. These disorders comprise injury, growth or excessive use of the developing growth plate beside relative ossification centers. However, the precise etiology of these disorders remains unknown. An instrumental role is played by repetitive trauma, genetic causes, mechanical factors, vascular abnormalities and hormonal imbalances. The distinct condition osteochondritis dissecans (OCD) manifests a condition which establishes in joints. Essentially, adolescents and children are affected by it. It primarily occurs when a minor segment of bones advance to separate from the surrounding region because of the lack of blood supply. Consequently, both the small section of bone and the cartilage surrounding it begins to loosen and crack. The common joints which suffer from the adverse impacts of osteochondritis are the elbow, knee and ankle. Othe joints can also be affected by it. A wide range of children can develop the condition in one joint but there occur instances where OCD was developed in several joints. In several cases, the cartilage and affected bone heal naturally. If a child is growing, the process of natural cure is likely to occur in comparison to the adolescents.

**Anatomy**

 The essence of a joint is defined as the ends where bones meet as ankle, knee or the shoulder joint. Articular cartilage is a slippery and smooth tissue which causes healthy joints to move with ease. The purpose of cartilage is protecting and covering the ends of bones where a joint is formed. The most common occurrence of OCD takes place in the knee which is at the end of the thighbone (femur).

**Symptoms, Signs and Risk Factors**

There exists a certain category of the population who are prone to get affected by OCD. It develops commonly in adolescents and children aged between 10 and 20. A study revealed that the children who developed it were proactive in sports. Since it develops in the growing structure of bones, the children who are highly active in sports are in the most vulnerable condition. OCD is three to five times more common to occur in boys. However, the increase in the number of girls getting affected by it is an indication of the enhanced participation of girls in sports. Athletes, baseball players and gymnasts are the groups that develop the condition persistently. OCD generally affects boys and girl ranging from 9 to 18 years old. The symptoms of OCD vary from person to person and are dependent on the joints which get affected. Following are the common symptoms of the condition:

* Tenderness and Swelling: The skin which surrounds the joint may become tender or swollen.
* Joint Locking or Popping: The joint might pop or stick rigidly in one position after losing a fragment that gets stuck between bones while making a movement.
* Decreased Extent of Motion: The affected person might be unable to straighten the precarious limb completely.
* Weak Joints: The affected person might experience as the joint is potentially weakening or giving away.

These symptoms comprise both the advanced initial cases of OCD.

**Causes**

A study conducted on 11 patients aged sixteen years with osteochondritis dissecans of medial femoral condyle were examined to research the potential causes and symptoms. The histological findings of the research stipulated that the pathological progression of OCD and origins are caused by the following elements: initial changes in the subchondral area is a subchondral fracture or bone necrosis (Ytrehus et al.). Afterward, it is absorbed and further replaced by cartilage or subchondral trabeculae without bone trabeculae.

 However, the essential causes of OCD are unknown. The bone gets affected because of the reduced blood flow. It is postulated that it is caused by the repetitive trauma as several episodes of a minor, small or an unrecognized complication which damages the bone. Moreover, genetics also play a dominant role. The genetic element makes several people more inclined to get affected by the disorder.

 Since 1996 and 2005, twelve patients with OCD defined as medical femoral condyle were inspected to determine the primary causes (*Juvenile Osteochondritis Dissecans: Cartilage T2 Mapping of Stable Medial Femoral Condyle Lesions | Radiology*). Several reports which intended at elucidating the pathogenesis of OCD constituting subchondral fracture, genetics, ischemia and repetitive trauma underpinned the causes of OCD. Experts advanced to determine the origins based on the empirical histological studies of OCD lesions. It can also be a kind of subchondral fracture. One of the prominent cause identified was the drastic transition in the structure of the subchondral bone and extracellular matrix inducing repetitive stress. The research studies further stipulated that the fragmentation in OCD follows an ununited osteochondral fracture. It can be caused after a rupture of the vessels in canals and damage of cartilage canals. However, certain limitations made the results of the studies contentious. The contemporary histological findings revealed that the pathological onset of osteochondritis dissecans could rarely be exactly determined from the clinical symptoms.

 The number of subjects in the study was small. It also struggled to locate the precise timeframe when OCD developed initially and the histological variances of OCD fragments can be affected by the duration. The potential causes located by the research study underpins the fragment section to have at least three distinct histological aspects. They were the reflection of the duration following the onset of OCD and are associated with the extent of unification between both sides. Moreover, the explicit relation between radiological and histological studies ought to be assessed to refine the scope of studies and identifying intricate causes and timeframe of initiation of OCD.

**Repetitive Trauma**

 The scientific approach to conduct research on OCD relies essentially on the comprehension of the fundamental pathological process, several stages of the disease, multifold etiology and the long time duration from the transition from a primary lesion to clinical disease (Andriolo et al.). Trauma has remained the most prominent dimension to study the manifestations of OCD. Excessive athletic activity in humans potentially enhances the severity and prevalence of macroscopic osteochondral lesions. The major trauma has been highlighted as the factor to establish osteochondral fractures. However, its contribution towards the initial establishment of OCD appears limited as per research studies and scientific experiments. Major trauma lone struggles to sufficiently postulate that lesions manifest in certain predilection sites and are often bilaterally symmetric. A wide range of studies has focused on molecular and biochemical traits of the tissue constituting lesions of osteochondritis. The specific tissue is gathered on the basis of gross appearance and is then compared to the tissue which appears normal. The objective of these research studies was offering a refined comprehension of the pathogenesis of the deliberated disease. Since the tissues collected and grossly appearing lesions are, in essence, chronic, they reflect the late instances occurring in the process of the disease. These results ought to be interpreted with care. They possess the tendency to provide the existence of upregulation of catabolic, inflammatory and anabolic factors that mirror the process of degradation and development of reparative tissue.

 In the past, studies have been focused on the chronic levels of the disease. The progress and initiation of OCD are attributed to many factors ranging from the establishment of initial lesions and chronic stages. To explicate the development of the disease, the molecular scientific research on tissues reflecting the chronic lesions are unlikely to offer empirical evidence and information. The bottom line is that the most pivotal step towards the pathogenesis of manifestation of osteochondritis is the necrosis of cartilage canals.

**Epidemiology (Non-Operative)**

 The anatomic location categories of juvenile osteochondritis dissecans JOCD have been highlighted by several researchers. However, the description of these researchers is varied yet they acknowledge the need to precisely mapping the place of the lesion and ascertaining the surroundings. The significance of these classifications highlights the fact that JOCD is prominently a failure of the stress-bearing location of the knee and is not affected by the non-weight component of the medial femoral condyle (Eismann et al.). It is also insufficient to estimate that the lesion is formed on the lateral femoral condyle. A precise comprehension of the diagnosis of JOCD can enhance its understanding which gets affected by both size and location.

**Conservative**

The history of the epidemiology of OCD is devoid of a rational consensus. The opinions of clinical researchers assert to either operate irrespective of the circumstances or do nothing. The outcomes are inconclusive because OCD and JOCD cases are largely mixed and the numbers are very small. Despite the ambiguous availability of data and information, the significance of nonoperative treatment is definite. The primary goal of conservative treatment is accomplished to acquire lesion healing before the psychic closure to prevent the early onset gonarthrosis. If a patient demonstrates compliance, is not nearing psychic closure, has a smooth lesion, the chances are approximately 50% the lesion will heal in 11 to 19 months (Kosaka et al.). The rationale that half of the instances will be successful as analyzed by the radiographic healing never manifests an option for the initial operative treatment.

**Fundamental principles**

 The general principle of the treatment is reducing exercise to an extent where the daily activities do not reflect the symptom. Primarily, the modification of this activity may require using crutches for 7 to 9 weeks. Braces, prolonged nonweight components and casts are not recommended in most of the practices (Hangody et al.). Once the affected person has received the symptom-free levels, crutches are removed and the patient advances for further treatment. For instance, the patient follows a specific scintigram of the knee supplemented with clinical assessment every seven weeks until the scintigraphic and clinical evaluation reflects that healing has potentially surfaced. In this period, competitive sports are entirely eliminated. Moreover, several activities and elements are suggested by doctors to enhance the healing process. Minor strength training, swimming and recreational training are prescribed.

**Patient’s Compliance**

 Before approaching medical assistance, the patients of the affected children and adolescents feel guilty. The extension of the disease worsens the symptoms. When the lesion is not completely detached, parents get reaffirmed that children history is usual, not the exception. Despite the dealy to seek clinical attention, the prognosis is rarely affected adversely and promising outcomes can be accomplished.

**Follow Up**

 As the process of radiology of the knee is insensitive to worsen or improve the lesions, the principal instrument is scintigraphy. After every four months, scans must be obtained. Scintigraphy will begin to decrease after the stage of the symptom-free condition gradually has been achieved. The process of healing is deemed to have occurred once the scintigram reflects a decreased activity in the lower-level stage. The time to reach this extent of healing is 9 months. If the patient has a low-level extent II scintigraphy and a normal clinical assessment, the return to sports is not prevented (*Osteochondral Lesions of the Knee: Differentiating the Most Common Entities at MRI | RadioGraphics*).

**Operative Treatments**

 The essential concern is when should be the non-operative treatment be abrogated? The following factors are explicit indicators: persistent of signs in compliant patients, instability or detachment of the fragment while the patient is seeking treatment, advancing epiphyseal closure and worsening or elevated scintigraphic signs. A review of the studies and literature demonstrates that detachment occurs in 35% of the conservatively treated patients and has been the primary reason for the intervention of surgical methods (*Osteochondritis Dissecans of the Femoral Condyles. - Abstract - Europe PMC*).

**Partial Detachment or Loose Body**

 The presence of the unstable fragment or loose body is a potential sign of surgery. The radiographs, clinical examination and history are utilized to diagnose the unstable lesion. Joint scintigraphy, in most of the cases, proves insufficient to diagnose the lesion instability. If the lesion has been loose or unstable for months, the chances of restoring the surface arthroscopically are minor. The lesion ought to be removed and the practice of autografting or allografting should be deliberated. Besides, internal fixation is imperative for partially unstable detached or unstable lesions.

**Development of Osteochondritis Fragment**

Several experts have highlighted the manifestations of the development of partially detached or loose fragments, especially for cases involving children. It is essential when the reduction is intended arthroscopically. Because the technical adversities posed by arthroscopy are detrimental, these cases are treated usually by open methods. Afterward, the lesion is significantly reduced in proportion besides several trial reductions. This process continues until the fragment precisely adjusts the crater. The subchondral bone is sclerotic and also needs curettage. This initiates a further complex depth defect that is addressed by cancellous grafting from the surrounding femoral condyle to attain the restoration of the affected surface. It is worthy of mentioning that every trial reduction offers the surgeon the best estimate of the rotational position of fragment.

**Removal of Fragment**

 A wide range of clinicians postulates that the loose bodies and partially detached lesion which have existed for consideration duration are an inappropriate replacement. The tissue which fills the OCD crater after the cure has a decreased tendency to adjust with the weight-bearing activities. The optimal time to treat the condylar defects is the duration of the first procedure. Though unproven, the utilization of patient's tissue yields a long term benefit than 65% reported for allografts.

**Internal Fixation**

 The alternates for internal fixation comprise biodegradable pins, bone pegs and cannulated screws. The essential objective of internal fixation is the acquisition of rigid internal fixation. Consequently, the early joint motion is permitter which anatomically restores the surface of the joint and enhances the revascularization of the fragment. When the lesions are reexamined at the time of second-look arthroscopy, the appearance of lesion becomes precarious in certain cases. The damage inflicted on articular cartilage is considerable when the lesion reflects bronze tint.

 To conclude, the instances of OCD are persistently addressed by orthopedic surgeons. The pathological manifestation of OCD has been determined by several studies with certain limitations as deliberated above. Both the operative and nonoperative treatments have proved productive to treat OCD. The principal factors which determine the need and methods of treatment are contiguity of bone-cartilage and subchondral surface and skeleton maturity at onset. The repetitive trauma, occurring in athletes and people inclined towards sports activities, manifests the fundamental development of the osteochondritis dissecans. To summarize, OCD is the subchondral necrosis of a bine with damage of articular cartilage which impacts the femoral condyles. JOCD takes place in a person who is skeletally immature while OCD occurs after physis gets closed. The essential causes of OCD remain unknown while several researchers have postulated theories based on empirical studies.

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