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RESEARCH ARTICLE

LEFT KNEE REPLACEMENT FOR 62-YEAR-OLD FEMALE WITH HUGE SUCHONDRAL CYST COMMUNICATING WITH MEDULLARY CANAL OF TIBIA: A CASE REPORT

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Abstract

Geodes or subchondral cyst are cystic lesion without epithelial lining adjacent to joints seen commonly in articular diseases particularly rheumatoid arthritis and osteoarthritis. This article reviews detailed history, examination and investigations of 62 years-old female patient known case of bilateral knee osteoarthritis with intraoperative incidental finding of large geode at left tibia. The present report aimed to highlight the importance of preoperative assessment in terms of radiographic appearances and clinical information to exclude any subchondral cysts, osteochondral defects and any surprise during surgery. . We recommend that all arthroplasty cases should be done with revision system and extension stems available as a backup in the center.

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Introduction:-

Knee osteoarthritis (OA) is the most common arthritic condition worldwide among adult and geriatric population. ⁽¹⁾ Typically, it is a painful and debilitating disease associated with cartilage deterioration and altered subchondral bone. ⁽²⁾ The exact mechanism of cartilage degradation in osteoarthritis is not fully understood, but complex factors of genetic, environmental, metabolic and biochemical factors have suggested. ^(3,4)

In the United States (USA), prevalence of knee Osteoarthritis (OA) is approximately 10% in men and 13% in women among adults 60 years of age or older. ⁽⁵⁾ In Saudi Arabia and based on local study, there are (13%) cases of clinical OA of the knee in the adult population and this number raises with the old ages and reaching up to 30.8% in those aged 46-55 years and 60.6% in the age group 66-75 years. ⁽⁶⁾

Osteoarthritis (OA) possesses marked variability of disease expression according to the age of disease onset, sequence of joint involvement, and disease progression. ⁽⁷⁾ The primary symptoms of osteoarthritis (OA) are joint pain, stiffness, and locomotor restriction. ⁽²⁾ Geode is Geological term meaning a rounded pocket of gas in a mineral specimen, however, in medical field refer to a subchondral cyst. ⁽⁸⁾

Researchers indicated that there is a role of subchondral bone cysts in OA progression; in particular, how subchondral bone cysts may influence pain or how subchondral bone cysts influence subchondral bone mechanical behavior. ^(9,10)

In the context of treatment, the evidence-based approaches to the treatment of knee osteoarthritis (OA) include nonpharmacological, pharmacologic, and surgical modalities targeted at relieving pain, improving joint function, and modifying risk factors for disease progression. ⁽¹⁾ However, Knee replacement surgery has become a routine

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procedure as surgical option of knee OA. This is the case report with detailed history, examination of 62 years-old female patient with bilateral knee osteoarthritis associated with large geode at left tibi

Report of the case:

Clinical presentation and history”

62 years old female patient with known history of chronic obstructive pulmonary disease (COPD), hypertension and ischemic heart disease. She had presented to the orthopedic clinic with progressive bilateral knee pain, more in the left knee. Her symptom was severe enough to make her unable to walk or perform the daily activities. She can walk up to 15 minutes and uses wheelchair for long distance. She did not get any improvements with non-operative treatment including medications and physiotherapy

Examination:

On physical examination: patient came on wheelchair to the clinic, and she had bilateral varus deformity range of motion from 0 to 90. Varus and valgus stress test stable at 0 and 30 degrees with no laxity. Body mass index (BMI) was 33.

Investigations and Procedure:

X ray bilateral knee 3 viewing standard view revealed advanced bilateral knee osteoarthritis with severe varus deformity (Figure 1) and decrease bone mineral density in the x ray. DEXA scan showed the average T-score was -2.5.

Bilateral knee replacement as a good option of treatment had discussed with the patient and she was keen to get her bilateral knee symptoms improved. As planning of surgery, she was on Teriparatide 20 microgram subcutaneous injection daily for 3 months to improve bone quality before surgery. Patient was considered for bilateral knee replacement after preoperative assessment from cardiology, pulmonology and anesthesia. The plan was bilateral knee replacement in staged setting and left knee had planned to be done first.

After induction of anesthesia, a tourniquet had applied and it was only inflated during cementation. Prophylactic preoperative antibiotics had given to the patient intravenously. Standard anterior knee approach with medial para patellar arthrotomy was performed. Removal of menisci, osteophytes and remnant of cruciate ligaments was done. All cuts for the femur had performed as described by the manufacture (Smith & Nephew Genesis 2). The trial prosthesis inserted and the appropriate size had chosen and the patella was tracking well. The tibial cut performed using the extramedullary guide.

During application of the extramedullary guide, we noticed that the pin holding the tibial cutting block was loose. During the tibial cut, there was a very large subchondral cyst (Figure 2) and it was communicating with the medullary canal. Intraoperative culture and tissue for histopathology was obtained. The depth of the lesion was about 35 cm and it was extended down to tibia plafond and the lesion was occupying most of the intramedullary canal and proximal part of the tibia leaving only cortical shell. The bone cyst was curetted and irrigated under fluoroscopic guidance. The intraoperative plan was to use the tibia component with stem and to bone graft the distal part of the lesion. We planned to use tibial stem prosthesis 10 * 20 cm length (Figure 2). We cemented tibial component first then the femoral component and there was no cement around the keel.

Postoperative Management and Follow-up:

Following the surgery, the patient had a good initial improvement without post-operative complications, with a physical therapy plan aiming for improving range of motion. Patient has got advised to partially weight bear after surgery and instructed to perform isometric and isotonic quadriceps strengthening and range of motion (ROM) exercises. The culture and histopathology results were unremarkable for infection and malignancy. The pathology of cystic lesions showed fat tissue and cysts with a wall of fibrous connective tissue, indicating a subchondral cyst.

Patient was evaluated using the Knee Society Clinical Rating System at pre-operative time and at 3, 6 months post operatively with plain radiograph in each visit.

In the last visit (6 months post-operative), she was walking without help or pain and her range of motion is from 0 to 90 degrees. Her knee was stable in varus and valgus stress test at 0 / 30 degrees (Figure 3). MRI of the right knee

will be requested to exclude any sub-chondral cysts or osteochondral defects that may will be present incidentally during her next surgery.



Figure 1:- Pre-op AP X-ray of the right and left Knee showing OA with Varus.



Figure 2:- Intra-operative finding of large subchondral hollow cyst, left photo showing the Bone Graft Press-fitted into the Cavity.



Figure 3:- X-ray of Post left knee replacement surgery(AP view) and (Lateral view) showing Consolidation of Graft.

Discussion:-

The term cyst implies a fluid-filled cavity with an epithelial lining but subchondral cavities frequently are only a focal area of cavitation and uniformly without an epithelial lining.⁽¹²⁾ The term geode may be more suitable to describe these features.⁽⁸⁾

Geodes are common in many types of articular diseases particularly rheumatoid arthritis and osteoarthritis. They are many researches that highlight the association of subchondral cysts with rheumatoid arthritis, successfully treated with standard stem and bone grafting.^(13,14) However, there have been limited number of reported cases⁽¹⁵⁾ of huge subchondral cysts in osteoarthritic patients to our knowledge. In the present osteoarthritic patient, bone defects, huge geode seen intraoperatively, and this is explaining the progressiveness of patient's knee pain. Two-musculoskeletal radiologist had reviewed x rays that performed preoperatively and their report was not consistent with what was intraoperatively in term of the size of the lesion.

Geodes are often multiple and variable in size whereas solitary and large geodes are unusual. Dominant radiological feature of large geodes in degenerative joint disease could be the reason behind the missing or misdiagnosis of geodes. There has been one documented case of a patient commencing a course of radiotherapy for a suspected diagnosis of hip sarcoma when subsequent findings demonstrated the lesion to be a geode.⁽¹⁶⁾ This highlights the need for Preoperative MRI should be done to exclude any subchondral cysts, osteochondral defects and any surprise during surgery.

The OA is degenerative joint disease that has sometimes a characteristic of cyst formation with unknown mechanism. There are two theories proposed with regard to the pathogenesis of subchondral geodes either by bone contusion or through forcing the synovial fluid into the subchondral bone.⁽⁹⁾ Taken together, these previous reports^(17, 18,19) and our findings suggest one degenerative subchondral cyst may fuse with another old intraosseous cavity filled with fat tissue. Accordingly, the coalescence of two different cysts at different stages may result in huge cyst formation.

Conclusion:-

Osteoarthritis is most commonly affects the knee joint and it has been reported globally as a leading cause of disability worldwide in adults over the age of 50 years. Knee OA is usually bilateral, although one side may be more severely affected. Progressiveness of patient's knee pain may attributed to formation of subchondral cyst (geode). Knowledge of the radiographic appearances, along with clinical information obtained during history and examination should enable the clinician to differentiate benign entities from more aggressive processes such as tumor. However, if large cyst was suspected and knee replacement is required, preoperative MRI should be done to

exclude any subchondral cysts, osteochondral defects and any surprise during surgery. We also recommend that all arthroplasty cases should be done with revision system and extension stems available as a backup in the center. We also recommend that all knee x rays should be reported by a musculoskeletal radiologist to minimize the unexpected finding as the case we have.

Ethical consideration:

The patient was informed that data from the case would be submitted for publication, and she gave her consent.

Conflicts of interest:

None.

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