Acute Patellar Osteomyelitis in a Child after a Blunt Trauma
- Case Report -

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Osteomyelitis of the patella is a very uncommon condition that occurs mostly in the pediatric population. In addition to its rarity, nonspecific and variable clinical presentations usually lead to postponement in making the correct diagnosis. Moreover, it is often missed as prepatellar bursitis or septic arthritis of the knee. Nonetheless making early diagnosis and initiating prompt treatment is most important to preventing this condition from becoming chronic. In this case report, the authors encountered this rare condition of the patella in a child that was first misdiagnosed with pyogenic arthritis or prepatellar bursitis of the knee. The delay in making the diagnosis led to intractable progression of the disease, and sequestrectomy was required to stabilize the condition.

Key Words: Patella, Osteomyelitis, Trauma

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Since its first description by Thirion in 1829 for two centuries around 100 cases of the patellar osteomyelitis have been reported.\(^1\)\(^,\)\(^2\) In addition to its rarity, nonspecific symptoms and variable clinical presentation make the diagnosis difficult at first.\(^3\)\(^,\)\(^4\) The disease primarily involves children, but some adult cases are also present.\(^5\) When a child presents to a clinic with painful swelling knee, there are various range of diseases that need to be differentiated, and differential diagnoses including septic arthritis, prepatellar bursitis, traumatic injury, cellulitis, synovitis, cysts, and neoplasia.\(^6\) Early diagnosis and prompt antibiotic treatment is mandatory for complete recovery and avoiding serious sequelae in chronic stage of the disease. In this report the authors encountered a rare osteomyelitis of the patella in a healthy child who had suffered a minor blunt injury to his right knee.

Case Reports

A 6-year-old boy who had no medical history other than having a minor blunt injury (banging against the
wall of swimming pool) to right knee visited our emergency department for painful swelling in his right knee via a local orthopedist. The knee pain was persisted two weeks ago and aggravated a few days ago. The right knee was severely tender with swelling, redness, heating sensation. He was moderately febrile (37.3°C). Under the suspicion of septic arthritis or bursitis, needle aspiration was performed. About 4 ml of fluid that appeared to be pus like was aspirated from prepatellar area. Laboratory examination revealed increased levels of erythrocyte sedimentation rate (ESR; 56 mm/h) and C-reactive protein (CRP; 6.0 mg/dl), and white blood cell (WBC) count was normal. Exception to soft tissue swelling, simple radiography revealed insignificant findings (Fig. 1). Under the suspicion pyogenic prepatellar bursitis of the knee, emergency incision and drainage was performed. In the operation room there was collection of pus in the prepatellar area (Fig. 2). Intraarticular area, knee joint fluid was clear and patella bone and cartilage was not injured. Debridement of necrotic and infectious tissues in the prepatellar area was done, and the joint space was closed after irrigation. Flumatin (flomoxef sodium) was injected as an empirical antibiotic and then replaced with Vancomycin (vancomycin hydrochloride) according to culture reports that showed methicillin-resistant Staphylococcus aureus (MRSA). The inflammatory markers normalized within a few days after the surgery, and symptoms and signs improved except mild warmth of knee. However, wound dehiscence was observed on distal portion of the incision wound, and serous fluid was started to discharge from the area a week after the surgery. Despite both inflammatory markers stayed within normal range, the profile of discharge changed from serous to pus like within next few days, indicating failure to control the infection. To find exact origin of the infection source, magnetic resonance imaging (MRI) was taken, and on MRI there was osteolytic defect in the anterior portion of the patella (Fig. 3). The defect was about 15×15×6 mm in size. Under the patellar osteomyelitis, second operation was planned to remove pyogenic fluid and potential sequestration inside the patella. During the operation, it was found that the area of wound dehiscence was communicating to the osteolytic lesion of the patella (Fig. 4). After dissecting soft tissues around prepatellar region, a hole was noted on the anterior aspect of the bone (Fig. 5). Sequestrectomy followed by wound irrigation and debridement was performed. MRSA was again reported on intraoperative culture. Intravenous vancomycin was continued for another two weeks until the inflammatory markers normalized. There was no more wound problem, and the patient

Fig. 1. Simple radiographies of anteroposterior (A), lateral (B), and skyline (C) views of the knee revealed insignificant findings except for soft tissue swelling in the right knee.

Fig. 2. During first operation, midpatellar incision was made over the patella, and there was collection of pus in the prepatellar area.
Fig. 3. Axial (A), coronal (B), and sagittal (C) views of magnetic resonance imaging taken a few days after the first operation revealed joint effusion, wide infiltration of subcutaneous tissue and osteolytic lesion with sequestration that was communicating with the prepatellar bursa. There were no remarkable pathologic signals in the femur or tibia and no evidence of direct connection of subcutaneous lesions with intraarticular space.

Fig. 4. During the second operation, it was noted that there was a sinus connected the area of a dehiscence wound to the prepatellar bursa.

Fig. 5. A hole was found on the anterior aspect of the patella that was directly communicating with the prepatellar bursa.

was discharged. At the latest follow-up of seven months after the discharge, the patient was actively participating daily and sports activities without any visible or functional difficulty, and no sign or symptom of recurrence was present (Fig. 6).

Discussion

Currently osteomyelitis is an uncommon illness found among children in developed countries.\(^7,8\) Osteomyelitis of the patella has exceptionally much rarer occurrence that can be easily missed as other illnesses found in the knee joint. Since early diagnosis and prompt treatment is necessary to prevent the disease to progress, but its variable clinical presentations and rarity lead to delay in making the correct diagnosis. Although half of the children with other acute hematogenous osteomyelitis are under the age of five,\(^7,8\) the most prevalent ages for patellar osteomyelitis are between 5 and 15 years, making diagnosis further deceptive, and the reason for difference in prevalent ages is associated with development of the patella.\(^1,4,5,9\) Prior to age of 5 years, patella is mainly consisted with cartilaginous material that has few vascularization, and noticeable vascularization begins at age of 4 years and beyond as it ossifies. Maximal vascularization is achieved around 12 years, and at 16 years ossifi-
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Fig. 6. Latest follow-up plain radiography (7 months post-operation day). Anteroposterior (A), lateral (B) view revealed osteolytic changes in patella. There were no significant findings for the femur, tibia and knee joint space.

cation of the bone is complete with reduction in blood supply.\textsuperscript{2,5,6,9,10} Once vascularization is diminished, circulation becomes sluggish for infective emboli to be unlikely carried into the bone,\textsuperscript{13} thus making this rare condition most prevalent in this particular age group.

Diagnosis is complex since findings of physical examination and imaging or laboratory workups are nonspecific for acute osteomyelitis of the patella. In previous literatures blunt trauma like our case is known to be a preceding event prior to the development of the osteomyelitis, but there also presents large number of cases without any conceivable cause.\textsuperscript{6,9} Locally, erythema, warmth, swelling, and tenderness may be present, and most literatures agree that focal pinpoint tenderness over particular area of the patella is the single most important clinical sign to suspect patellar osteomyelitis.\textsuperscript{2,4,5} In addition, systemic signs such as fever and malaise may also exist. Laboratory workups including WBC count, ESR, and CRP may show some changes, and ESR and CRP are more reliable and sensitive than WBC count. But they are not specific for the osteomyelitis. However, these markers are more useful in observing response to treatment rather than differentiating the disease.\textsuperscript{7,8}

Imaging studies include simple radiography, radionuclide bone scan, computed tomography (CT) and MRI. Simple radiography in early stage of the disease does not have much clinical value since no significant bony change is evident during acute phase. CT may provide evidence of early bone changes, but sensitivity and specificity is lower than MRI. Radionuclide bone scan is a helpful diagnostic tool that can localize areas of osteomyelitis with good sensitivity, and it may help to identify other infectious focuses.\textsuperscript{4,5} Most literatures agree that MRI provides particular worth to identify and confirm the condition.\textsuperscript{3,4,6,9} Because it provides good contrast between lytic lesion and normal area of the bone and information about joint and growth plate involvement, thus when suspicion on osteomyelitis of the patella is high or initial consideration about a cause of knee pain is under a doubt, MRI should be performed prevent further postponement in making the accurate diagnosis. In our case, we have to suspect that if there’s any chance for infectious prepatellar bursitis had developed to osteomyelitis and intractable progression of initially considered pyogenic prepatellar bursitis prompted to perform further study. Despite of delay, we were able to provide
proper treatment according to result of MRI. It is our consideration that if the imaging was performed earlier second operation may have not been necessary in our case.

Surgical treatment has been particularly necessary in cases with bacteria with specific virulence such as MRSA and formation of sequestration. It is our indication for surgery has been as debatable as deciding how to treat conservatively. Some indications are the presence of subperiosteal and soft tissue abscesses, no response to intravenous antibiotics after 48 to 72 hours and evidence of sequestration. All necrotic materials and pus must be removed to have good clinical outcome and to prevent the disease to become recurrent and chronic. Incidence of infection spreading into joint area is uncommon in children because thick layer of cartilage covers ossifying focus of the patella in children. This thick barrier makes osteomyelitis of the patella found in children more resistant in spreading the infection to the joint space, and like in our case spread of the infection more commonly points superiorly to prepatellar bursa that mimics and confuses treating orthopedist to think the condition as pyogenic bursitis rather than a problem in the bone. When pyogenic arthritis is suspected along with osteomyelitis of the patella on imaging studies, knee joint aspiration should be performed before opening up the joint space since many noticed that once considered pustulant fluid in the joint prior to a surgery to be actually sterile joint effusion that is reactive to osteomyelitis of the patella. Thus unnecessary arthroscopy should be avoided since it may introduce infection to the joint space.

Although the diagnosis was often postponed in most of previous cases, osteomyelitis of the patella can be resolved successfully without serious sequelae or relapse. Variable clinical presentation and rarity of the disease distracts physicians to ignore it as a probable cause of knee pain. However an orthopedist should always keep in mind that early diagnosis and prompt initiation of antibiotics with or without surgical debridement and drainage is necessary to ensure complete cure of the disease and to avoid unnecessary treatment. Because a delay in diagnosis may raise the chance of the disease to become chronic or to cause complications, suspicion of osteomyelitis of the patella should be included when a child with knee pain is encountered.

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둔상 이후 소아에서 발생한 급성 슬개골 골수염
- 증례 보고 -
정회정 ⋅ 김두섭 ⋅ 염준섭 ⋅ 장영환
연세대학교 원주의과대학 정형외과학실
소아에서 발생하는 슬개골 골수염은 흔치 않은 질환이다. 게다가 비특징적이며 다양한 임상 양상을 보이는 골수염은 정확한 진단을 내리지 못하고 진단이 지연되기도 한다. 그리고 종종 슬개골 활액막염이나 슬관절의 화농성 관절염으로 오인되기도 한다. 그럼에도 불구하고 초기 진단과 초기에 적절한 치료는 이것이 만성 골수염으로 진행하는 것을 막는 데 중요하다. 저자는 소아에서 둔상을 당한 후 슬개골에 발생한 급성 골수염을 초기 진단을 정확히 하지 못하고 치료한 케이스가 있어 이를 보고하고자 한다.
색인 단어: 슬개골, 급성 골수염, 둔상

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