Hasil Cek_dr_Jun

by Universitas Ahmad Dahlan Yogyakarta 39

Submission date: 25-Oct-2023 02:25PM (UTC+0700)
Submission ID: 2206692185
File name: dr_Jun.pdf (1.12M)
Word count: 2836
Character count: 16137

Ahmad Dahlan Medical Journal
VOL 3 No. 2, November 2022, p. 84 - 92
http:// http://journal2.uad.ac.id/index.php/admj

Chronic Osteomyelitis After a Partial Internal Fixation Surgery: A Case Report

[1]Elvina Prisila*, [2]Moch.Junaedy Heriyanto
Email : ***elvina.prisila@med.uad.ac.id**
[1]Department of Radiology, Faculty of Medicine, , Universitas Ahmad Dahlan, Yogyakarta
[2]Department of Surgery, Faculty of Medicine, Universitas Ahmad Dahlan, Yogyakarta

ARTICLE INFO

Article history
Received 24 Oct 2022
Revised 18 Nov 2022
Accepted 21 Nov 2022

Keywords
Chronic osteomyelitis,
X-ray
CT
Open fracture
Case report

ABSTRACT

Chronic osteomyelitis is a condition of acute osteomyelitis that has failed to heal because appears as long-lasting and refractory disease in which bacteria may produce biofilms consisting of matrix proteins and polysaccharides to protect the bacteria from antibiotics and monocyte-macrophage system obliteration. We report a 40-years-old man with a history of postoperative open fracture of the right femur 6 months ago. Pain (+). X-ray examination showed the results: attached plate and screw with nonunion old fracture of the femoral dextra alignment and less apposition with sclerotic features, osteodestruction of the left femoral system, leading to osteomyelitis. Then performed a partial internal fixation removal operation. From the results obtained in the patient, it was concluded that there was osteomyelitis in the femur due to complications from postoperative open fracture of the right femur.

Introduction

Chronic osteomyelitis is most common seen among adults whereas acute osteomyelitis most often affects children and also rare incidence of muculoskeletal infection.[1,2] Chronic osteomyelitis is a condition of acute osteomyelitis that has failed to heal because appears as long-lasting and refractory disease in which bacteria may produce biofilms consisting of matrix proteins and polysaccharides to protect the bacteria from antibiotics and monocyte-machrophage system obliteration.[2,3] Chronically infected ulcers eventually migrate from the soft tissue to the underlying bone as may occur with diabetic ulcers or ulcers associated with peripheral vascular disease.[1,4] In a patient with chronic osteomyelitis, a few weeks to several months after the onset of acute infections, a sequestrum should be observable via x-ray, and the patient may experience chronic infetion and sinus drainage.[2] Not only that, chronic osteomyelitis is associated with vascular and immune-comprimising condition such as peripheral vascular disease and diabetes mellitus.[1] Various causes may contributed

to the occurrence of chronic osteomyelitis including treatments failure of acute osteomyelitis, poor bone vascularization, systemic involvement, multiple and resistent microorganisms such as *Mycobacterium tuberculosis* and *Treponema* sp., a hematogenous type of osteomyelitis, trauma, iatrogenic causes such as joint replacements and the internal fixation of fractures, compound fractures, and .[3,4] Other related disorders are chronic recurrent multifocal osteomyelitis are tuberculous osteomyelitis, synovitis, acne, pustulosis, hyperostosis, and osteitis (SAPHO) syndrome.[4]

The long-lasting inflammatory activity causes bone destructuon and may promote the development of neoplasias in patients with chronic osteomyelitis. The incidence of carcinogenesis in the setting of chronic osteomyelitis varies ranging from 1.6 – 23%, and the most affected bones are tibia and femur.[3] A rare appear is a sclerotic nonpurulent form of osteomyelitis occurs this is termed Garres sclerosing osteomyelitis.[4] In this case report, we are reporting a case of a 40 years old man with a history of osteomyelitis after a partial internal fixation due to open fracture.

Case Presentation

We report a 40-years-old man with a history of postoperative open fracture of the right femur 6 months ago. The patient had complained pain, redness and tenderness on the surgery site. He was taking a prophylactic antibiotic as well as anti-inflammation after the surgery. X-ray examination showed the results: attached plate and screw with non union old fracture of the femoral dextra alignment and less apposition with sclerotic features, osteodestruction of the left femoral system, leading to osteomyelitis. Then performed a partial internal fixation removal operation.

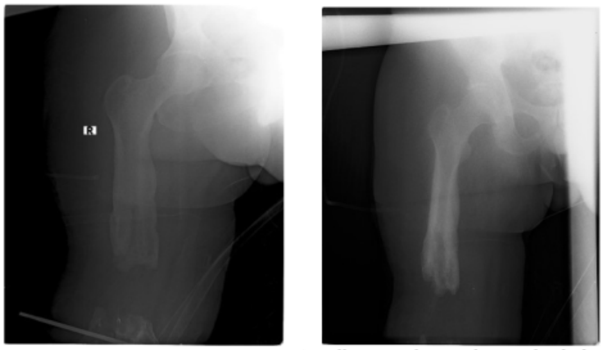

Figure 1. Follow up plain radiograph of after the first surgery.*

*From the top left to the bottom right, the development of the fracture union. The last two pictures showed the worsening of the osteomyelitis and ended up with the site being amputated.

Treatment

The patient underwent radiological examination and treatment paradigm for chronic osteomyelitis is poorly researched.[1,2] Considering the symptoms, physical examination, and radiological examination, debridement was performed and when pus was observed the insternal fixation was replace. Culture taken from bone lesion.[2] Antibiotic choice is guided by microbial culture results.[1] When the patient's body temperature rises, treatment procede with the intravenous antibiotic cefazolin due to the patient's allergy to penicillin and surgical debridement.[2]

Disscusion

Classification

Cierny and Mader proposed an anatomic classification of chronic osteomyelitis are type 1 include endosteal or medullary lesion, type 2 include superficial osteomyelitis limited to the surface, type 3 is localized well marked legion with sequestration and cavity formation, and type 4 is diffuse osteomyelitis lesions.[4]

Pathogenesis

The most commonly cited caused is an autoimmune entheseopathy which may be triggered by a virus or bacteria.[5] Laboratory studies displayed increased innflammatory markers and markers of bone turnover.[1] In most instances, osteomyelitis results from hematogenous spread, although direct extension from trauma and/or ulcers is relatively common (especially in the feet of diabetic patients). In the initial stages of infection, bacteria multiply, triggering a localized inflammatory reaction that results in localized cell death. With time, the infection becomes demarcated by a rim of granulation tissue and new bone deposition. Although no organisms are recovered in up to 50% of cases, when one is isolated, *Staphylococcus aureus* is by far the most common pathogen. Different organisms are more common in specific clinical scenarios.[1,6] Our patient had a history of open fracture, where the wound had exposed for more than ten hours before the surgery was done.

Radiographic

Radiologic assessement of chronic osteomyelitis is performed for the following reasins : (1) to evaluate bone involvement (e.g. the extent of active intramedullary infection or abscess superimposed on areas of necrosis, sequestrum, and fibrosis) and (2) to identify soft tissue involvement (areas of cellulitis, abscess, and sinus tracts).[4] In some instances, radiographic features are specific to a region or particular type of infection, for example : subperiosteal abscess, brodie abscess, pott puffy tumor, and sclerosing osteomyelitis of Garre.[6]

On imaging, chronic osteomyelitis precents with feature of osteonecrosis including cortical destruction, osteosclerosis, and eventually periosteal thickening.[1] For the detection of acute osteomyelitis, the sensitivity of plain radiography is less than 5% at presentation and about 33% at 1 week; however, the sensitivity is 90% 3-4 weeks after presentation. Stress fractures, osteoid osteomas, and other causes of periostitis may mimic acute or chronic osteomyelitis.[4]

Plain Radiograph

Plain radiography has low sensitivity and specificity for detecting acute osteomyelitis. As many as 80% of patients who present in the first two weeks of infection onset will have a normal radiograph. Bone marrow oedema, which is the earliest pathological feature, is not visible on plain films. The features of acute osteomyelitis that may be visible include a periosteal reaction secondary to elevation of the periosteum, a well-circumscribed bone lucency representing an intraosseous abscess and soft tissue swelling.[7]

Figure 2. (1A)Osteomyelitis in the right foot of 63-years-old male, The dorso-plantar radiographs shows a periosteal reaction around the 1st metatarsal diaphysis (white arrows).[7]

Figure 3. A 6-years-old girl with no history of trauma presents with pain and swelling in her right knee. (2A) The anteroposterios radiograph showe a well-circumscribed lucent lesion with sclerotic margins in the right distal femur metaphysis, suspicious for an intraosseous abscess.[7]

In chronic osteomyelitis, a sequestrum may be visible on plain radiographs as a focal sclerotic lesion with a lucent rim.

Figure 4. Chronic osteomyelitis in a 9-years-old boy with non-united left distal humerus fracture. (3A) The lateral radiograph shows marked periosteal thickening (black arrow) and a central sclerotic lesion with a lucent rim (black arrow).

The earliest changes are seen in adjacent soft tissues +/- muscle outlines with swelling and loss or blurring of normal fat planes. An effusion may be seen in an adjacent joint. In general, osteomyelitis must extend at least 1 cm and compromise 30 to 50% of bone mineral content to produce noticeable changes on plain radiographs. Early findings may be subtle, and changes may not be obvious until 5 to 7 days from onset in children and 10 to 14 days in adults. On radiographs taken after this time period, a number of changes may be noted:

- regional osteopenia
- periosteal reaction/thickening (periostitis): variable; may appear aggressive, including the formation of a Codman's triangle

- focal bony lysis or cortical loss
- endosteal scalloping
- loss of trabecular bone architecture
- new bone apposition
- eventual peripheral sclerosis

In chronic or untreated cases, eventual formation of a sequestrum, involucrum, and/or cloaca may be seen.

Figure 5. Radiographic examination showed new bone thickening that formed as sheath or involucrum severing the sequestrum and infected tissue. X-ray image of right-leg AP and lateral view showing delayed union and infection of the bone.[2]

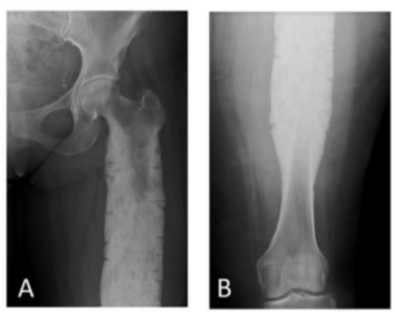

Figure 6. (3A and 3B) showed involvement of the femoral diaphysisi with sparing of the femoral head, neck, and distal femur.[1]

In our patient, X-ray examination showed the results: attached plate and screw with non union old fracture of the femoral dextra alignment and less apposition with sclerotic features, osteodestruction of the left femoral system, leading to osteomyelitis

Computed Tomography

CT is of definite value for studying the entire articular surface of bone and periarticular soft tissues; for delineating the extent of medullary and soft tissue involvement; and for demonstrating cavities, serpiginous tracts, sequestra, or cloacae in osteomyelitis. CT may depict intramedullary and soft tissue gas, sequestra, sinus tracts, and foreign bodies. CT shows more sequestra than does the conventional method of investigation. An important advantage of CT is its ability to demonstrate lesions in the medulla and infections in the soft tissues. CT is the standard modality when looking for a sequestrum.[4] CT is superior to both MRI and plain film in depicting the bony margins and identifying a sequestrum or involucrum. The CT features are otherwise similar to plain films. The overall sensitivity and specificity of CT is low, even in the setting of chronic osteomyelitis, and according to one study are 67% and 50%, respectively.[6] One advantage of CT is that, for patients with acute osteomyelitis, it depicts changes earlier in the disease process than does plain imaging. CT is especially good for imaging the spine, the pelvis, and the sternum.[4]

Some limitations CT include inability to confidently detect marrow edema; therefore, a normal CT does not exclude early osteomyelitis. Another limitation is the presenting of image degradation by streak artifact when metallic implants.

However, the evaluation of osteomyelitis with CT is limited by its poorer soft tissue resolution compared to MRI. CT is unable to demonstrate bone marrow oedema, which means that a normal CT does not exclude early osteomyelitis. Other limitations of CT are ionizing radiation exposure and image degradation by streak artefact when metallic implants are present. Despite these limitations, CT remains a useful alternative when MRI is unavailable or contraindicated.[7]

Figure 7. (4C) Imaging of Computed Tomography (3D-CT) demonstrated trabecular disorganization, sclerosis, and multifocal areas of complete obliteration the medullary space.[1]

Magnetic Resonance Imaging

MRI is the most sensitive and specific and is able to identify soft-tissue/joint complications. Bone marrow edema is the earliest feature of acute osteomyelitis seen on MRI and can be detected as early as 1 to 2 days after the onset of infection.[6] One advantage of MRI is its multiplanar capability; because of this multiplanar capability, MRI provides better anatomic detail and better soft tissue contrast. MRI is especially good in assessing vertebral osteomyelitis, which has a characteristic pattern of confluent vertebral body and disk involvement. The presence of titanium devises and other orthopedic devises usually poses no problem apart from causing artifacts.[4]

In suspected osteomyelitis, the affected area is imaged in axial, sagittal and coronal planes using multiple pulse sequences. A pulse sequence is a set of parameters that highlights different tissue characteristics. The typical sequences used in the evaluation of osteomyelitis are as follows:

- T1-weighted (T1W) sequences provide good anatomical detail and enable delineation of the medulla, cortex, periosteum and soft tissues. On T1W images, fluid has low signal (appears dark), abscesses have low to intermediate signal and fat has high signal;
- Fluid-sensitive sequences include T2-weighted (T2W), fat-suppressed (FS) and short-tau inversion recovery (STIR) sequences. These all display fluid as high signal and are useful for detecting infection and inflammation, which cause an increase in tissue fluid content. Fat on T2W images has variable signal but is generally less bright than on T1W images. In

fat- suppressed and STIR sequences, the signal from fat is decreased, increasing the visibility of inflammatory changes and fluid collections. Fat suppression can be applied to T1, T2 or proton density-weighted sequences. STIR sequences are more commonly used as the fluid-sensitive sequence in an osteomyelitis MRI protocol, as they are generally more sensitive than fat-suppressed sequences in demonstrating fluid;

- Proton density-weighted (PD) sequences are intermediately weighted between T1 and T2. PD images provide good anatomical detail but with less tissue contrast compared to T1W images.[7]

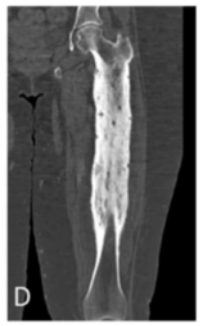

Figure 8. (4D) Multiplanar reconstruction (MPR) showed ahalo of soft tissur density surrounding the midshaft femur, elevating adjacent musculature by about 1 cm.[1]

Table 1. A summary of the key terms used to describe the pathological process in osteomyelitis and their MRI signal characteristics.

Key term	Pathological process	MRI signal		
		T1	**T2**	**T1 + C**
Bone marrow oedema	Accumulation of pus within the medullary cavity, leading to vascular congestion	Low	High	High
Intraosseous abscess	Formation of reactive bone and granulation tissue around intramedullary pus	Low	High	Peripheral enhancement
Subperiosteal abscess	Accumulation of pus beneath elevated periosteum	Low	High	Peripheral enhancement
Cloaca	A cortical defect that allows pus to drain between bone and soft tissue	Low	High	Low
Sinus tract	A channel, lined with granulation tissue, that allows pus to drain between bone and the skin surface	Low	High	Peripheral enhancement
Sequestrum	A separated fragment of necrotic bone that is surrounded by pus, granulation tissue and an involucrum	Low	Low	Peripheral enhancement

However, in our patient, we did not perform CT Scan nor MRI, because from the plain radiograph examination, the imaging of Osteomyelitis had been cleared enough. Plain radiograph was said to be having low sensitivity and specificity on detecting acute osteomyelitis. In our case, our patients had suffered chronic osteomyelitis where all the features was clear enough on plain radiograph imaging. Thus, no further radiology examination needed. On chronic osteomyelitis, a plain radiograph has enough sensitivity and specificity, as well as cost-effective for the patients.

Conclusion

From the results obtained in the patient, it was concluded that there was a osteomyelitis chronic in the femur due to complications from postoperative open fracture of the right femur. A plain radiograph was done and showed a clear imaging of sclerotic features, osteodestruction of the left femoral system, leading to osteomyelitis. On a high risk patients, it is necessary to recognize osteomyelitis as soon as possible to avoid higher rate of mortality and morbidity.

Reference

Khan, AN. 2017. Chronic Osteomyelitis Imaging. *Medscape* [Internet]. [Download 2021 February 2]**;** volume (terbitan): Available on : https://emedicine.medscape.com/article/393345-overview#a1**.**

Lee, YJ, et al. 2016. The Imaging of Osteomyelitis. Quantitative Imaging Medicine and Surgery. 6(2): 184–198.

Munir, MA, Pascal AT, Prihantono. 2020. Internal Fixation of Delayed Union of Fracture With Chronic Osteomyelitis Due to Staphylococcus Epidermidis: a Case Report. *Annalis of Medicine Surgery*. 56: 56–60.

Patel, Maulik S., Frank Gaillard, et al. Osteomyelitis. Radiographic [Internet]. [Download 2012 Februay 2]; Available on : https://radiopaedia.org/articles/osteomyelitis#nav_radiographic-features

Peng Lin, Yuhao Luo, Xianrong Huang, Zhong Li. 2020. Carcinogenesis and Precancerosis Transformation of Chronic Osteomyelitis: 6 Cases Report and Literature Review. *Medical Hypotheses.* 140 : 1–5.

Reasoner, SA, et al. 2020. Chronic Femoral Diaphyseal Osteomyelitis With Radiographs Initially Concerning for Paget Disease of the Bone. *Radiology Case Reports*. 15(4): 344–348.

Thakur, U, et al. 2012. Synovitis, Acne, Pustulosis, Hyperostosis and Osteitis (SAPHO) and Chronic Recurrent Multifocal Osteomyelitis (CRMO): Role of Imaging in Diagnosis. *Radiography*. 18(3): 221–224.

Hasil Cek_dr_Jun

ORIGINALITY REPORT

17%	7%	5%	13%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	myplasticsurgeryexams.com Internet Source	4%
2	Submitted to Universitas Ahmad Dahlan Student Paper	4%
3	Submitted to University of Derby Student Paper	3%
4	www.mskcases.com Internet Source	3%
5	Submitted to Taylor's Education Group Student Paper	3%

Exclude quotes	On	Exclude matches	< 3%
Exclude bibliography	On		