Fluid Collection Evacuation

32

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Contents

32.1 Introduction

One of the most important prognostic factors in patients with musculoskeletal fluid collection is the delay in establishing therapy, both in order to get a diagnosis of septic process which requires analysis of fluid and in order to avoid compartment syndrome. Ultrasonography is a rapid, portable, sensitive technique for fluid collection management. The study can be easily repeated for follow-up of lesions.

Fluid collection must be completely aspirated and the cavity is irrigated with a volume of saline that is half of the aspirated fluid volume and the irrigation is continued until the aspirated fluid is clear. Typically needle drainage is chosen for smaller abscesses and catheter drainage is preferred for the drainage of multiloculated abscesses and for larger ones. This technique avoids unnecessary catheter insertions into sterile fluid collection such as lymphoceles and hematomas.

32.2 Abscess

US allows real-time guidance of fluid aspiration and can reduce the risk of contaminating other anatomic compartments, especially in the hands, wrists, and feet. Radiography provides complementary information and should be performed in conjunction with US. US is the imaging modality of choice for diagnosis of superficial abscesses. Dynamic compression with the US probe and color Doppler imaging can facilitate the detection of superficial abscesses. US may help in the early diagnosis of osteomyelitis by demonstrating subperiosteal or juxtacortical fluid collections and by providing guidance for aspiration of these collections.

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Abscesses may have different features at US. The lesion may appear as an anechoic or diffusely hypoechoic mass which increases through transmission or may be hyperechoic or isoechoic relative to surrounding tissues and lack mass effect. The margins may be well circumscribed or blend in with the surrounding tissues. Sometimes, an echogenic rim is seen. Septa may be present, as well as internal echoes, which represent debris or gas. Power or color Doppler imaging may be used to demonstrate hyperemia at the periphery of the mass and absence of flow in the center (Fig. 32.1).

Dynamic evaluation of the soft-tissue area by palpation or gentle compression with the US probe is useful to reveal the motion of the liquefied purulent material in cases of isoechoic or hyperechoic abscesses. US plays a major role in the detection and management of superficial abscesses, being deeper fluid collections, particularly in the lumbar and pelvic regions, more easily managed by the guidance of magnetic resonance imaging or computed tomography (diagnosis, determination of location and extent, and percutaneous management). MR imaging and CT also provide detailed information regarding osseous involvement, which would not be available with US (Fig. 32.2).

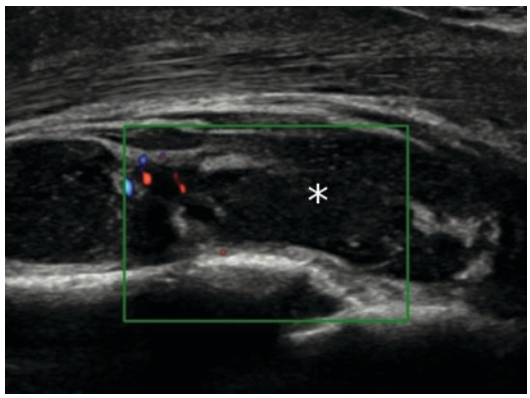

Fig. 32.1 Longitudinal US scan of an anechoic collection with multiple internal echoes (*asterisk*). The margins are well circumscribed and septa are present with color Doppler imaging demonstrating hyperemia at the level of the septum and absence of flow in the center. The abscess is lying on the cortical bony surface of the tibia

Ultrasound-guided drainage of soft tissues' abscesses is a safe and effective treatment approach. Needle drainage is the most common first-line treatment approach because of the simplicity of the procedure, improved patient comfort, and reduced costs. Catheter drainage will be reserved for large multiloculated abscesses. Follow-up US may show that a repeat puncture and drainage are necessary. Most drainage procedures are performed without any anesthesia and apart from minor discomfort during the drainage procedure and the subsequent indwelling catheter period, there were no serious complications related to the drainage procedures. All procedures must be performed under aseptic conditions, which include sterile draping of the transducer. Patient must be prepared for the drainage procedure, which includes being informed about the nature of the procedure and the possible related discomfort in compliance with medicolegal legislation. A diagnostic puncture must be performed in all patients introducing a spinal needle (16–18 G) into the fluid collection under continuous US guidance and fluid from the cavity is aspirated with a syringe. When pus is aspirated, either the needle drainage or the catheter drainage protocol may be implemented, with the latter being an extension of the diagnostic puncture introducing a guidewire and a self-retaining pigtail catheter over the guidewire into the cavity.

32.3 Hematoma

Ultrasound-guided hematoma evacuation is a well-tolerated procedure. However, the proportion of unsuccessful evacuations and hematoma recurrence is substantial (13%). Such a rate of unsuccessful evacuation is because of excessive density and/or viscosity of the content. Ideally, hematoma evacuation must be performed before 3–5 days since the beginning of the muscular

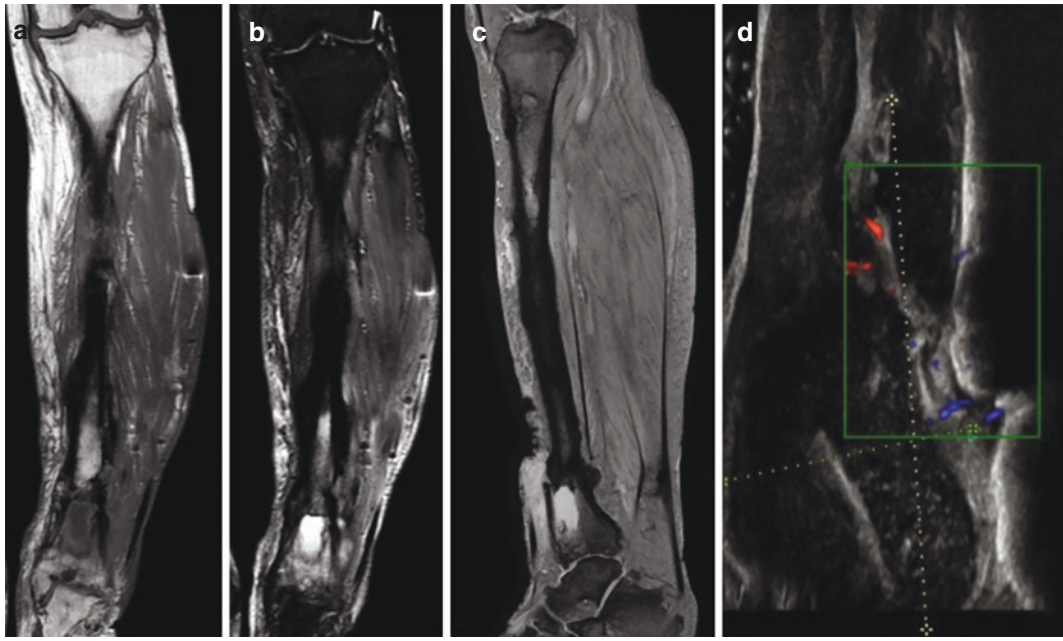

Fig. 32.2 Reactivated chronic osteomyelitis. (**a**–**c**) MRI T1w and STIR coronal sequences and GRE T2*w sagittal sequence of left tibia show signs of chronic osteomyelitis with widening of the diaphysis, cortical thickening, and irregular periosteal reaction. Multiple central medullary lesions consistent with sequestrum are also visible. (**c**, **d**) GRE T2*w sagittal sequence and longitudinal sonogram of the distal thigh demonstrate a large hypoechoic heterogeneous abscess that communicates with the bone marrow cavity through a cortical break. During US study, compression with the transducer demonstrated in-and-out motion of debris from the bone through the opening in the cortex

bleed, especially in the case of large hematomas in the liquid phase.

Between 10% and 23% of bleeding episodes in the musculoskeletal system of hemophilia patients occur in the muscles. When a muscle bleed is suspected, confirmation must be achieved by means of imaging tests (ultrasound, MRI, CT). Then, immediate (early) enhanced on-demand hematological treatment must be started until the full disappearance of the hematoma. If untreated, muscle bleeds can cause complications such as nerve injury, compartment syndrome, myositis ossificans, pseudotumor, and even infection (abscess). Currently, the literature for muscle hematomas in the nonhemophilic population suggests that ultrasound-guided percutaneous drainage, or surgical drainage performed as open surgery if percutaneous drainage fails, could be beneficial in terms of achieving better and faster symptom relief.

Further Readings

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