



CASE REPORT



A clinical case of cellulitis: the role of ultrasound in the differential diagnosis and therapeutic approach

Un caso clinico di cellulite: il ruolo dell'ecografia nella diagnosi differenziale e nell'approccio terapeutico.

Chiara Gullotto * Andrea Midi ° Andrea Eduardo °°

Abstract: Erysipelas and cellulitis are the most common soft tissue infections, whose differential diagnosis is of fundamental importance to implement targeted therapeutic choices. The evaluation is predominantly clinical given the nonspecificity of laboratory tests, however instrumental diagnostics provides a valid aid in support of clinical objectivity. Although the use of Computed Tomography Scan and Magnetic Resonance Imaging represents traditional imaging, the recent introduction of ultrasound allows for differential diagnosis in a rapid, accurate and reliable manner, allowing for the most targeted therapy to be implemented based on the type of infection. This text reports the case of a soldier in whom ultrasound was decisive in making a targeted diagnosis and in ensuring an adequate choice of type and therapeutic modality that proved crucial for a rapid *restitutio ad integrum* without relapses.

Riassunto: Tra le più comuni infezioni dei tessuti molli troviamo erisipela e cellulite, la cui diagnosi differenziale è di fondamentale importanza per attuare scelte terapeutiche mirate. La valutazione è prevalentemente clinica stante l'aspecificità degli esami di laboratorio; tuttavia, la diagnostica strumentale fornisce un valido ausilio in supporto all'obiettività clinica. Sebbene l'utilizzo di Tomografia Assiale Computerizzata e Risonanza Magnetica Nucleare rappresenti l'imaging tradizionale, la recente introduzione dell'ecografia permette di operare diagnosi differenziale in maniera rapida, accurata e affidabile, consentendo di porre in essere la terapia più mirata in base alla tipologia d'infezione. In questo testo viene riportato il caso di un militare in cui l'ecografia è stata dirimente per porre diagnosi mirata e per garantire adeguata scelta di tipologia e modalità terapeutica che si sono rivelate cruciali per una rapida *restitutio ad integrum* senza recidive.

Key words: Cellulitis; erysipelas; soft tissue infections; differential diagnosis; ultrasound; antibiotic therapy.

Key messages:

- Erysipelas and cellulitis are the two most common types of soft tissue infections in the general population.
- Differential diagnosis between erysipelas and cellulitis is a common problem and is crucial setting up appropriate and timely treatment.
- Ultrasound is a fundamental diagnostic tool to distinguish these conditions, thanks to its ability to visualize soft tissues in real time.

Introduction

Soft tissue infections consist of a wide range of pathological conditions ranging from impetigo to frank abscess to necro-

tizing fasciitis. Differentiating the type of infection dealing with, can be difficult in some cases, but it is essential to make appropriate therapeutic choices. The two most common soft tissue infections are

erysipelas and cellulitis (1). Erysipelas is a skin infection that affects the dermal layer of the skin and can also extend to the superficial cutaneous lymphatic vessels. It is characterized by the pres-

* OF-1. MD Emergency Medicine Specialist. Head of the First Aid and Health Care Unit. Comando Aeroporto "Centocelle" – Q.G. COMAER.

° OF-2. MD Occupational Medicine Specialist. Occupational Health Physician. Comando Aeroporto "Centocelle" – Q.G. COMAER.

°° OR-8. 2nd Section of Occupational Medicine OfficeR. Comando Aeroporto "Centocelle" – Q.G. COMAER.

Corresponding: Email: chiara.gullotto@aeronautica.difesa.it



ence of erythema with well-defined and slightly raised edges, and modest edema. Systemic symptoms are mostly absent. Cellulitis is an infection of the deep dermis and subcutaneous tissue with edema and erythema with blurred edges, and warm, tense and shiny skin. It can be primary (due to predisposing factors such as obesity, lymphedema, chronic venous insufficiency, dermatological diseases) or secondary (due to trauma, ulcers, burns, interruptions of the cutaneous solution of continuity). It has an acute onset and can be accompanied by fever, lymphangitis and lymphadenomegaly. The most frequent sites for the development of these infections are represented by the lower limbs and, subsequently, the upper limbs and face. The diagnosis of the two nosological entities is mainly clinical, and carrying out microbiological tests or laboratory tests is not indicated. Elevated leukocytosis, ESR and C-reactive protein are common findings, but their detection does not change the therapeutic management. CT (Computerized Tomography) allows for an accurate assessment of the presence, extent and characteristics of the infection. MRI (Nuclear Magnetic Resonance Imaging), as a second step, can also provide adequate imaging (2). Ultrasound represents a further alternative for a rapid and targeted diagnosis without exposing the patient to ionizing radiation. The most common etiological agent of erysipelas and cellulitis is represented by group A Streptococci (*S. Pyogenes* in 67% of cases), more rarely *Staphylococcus Aureus* and *Pseudomonas Aeruginosa* (3). The treatment of erysipelas involves empirical antibiotic therapy taken orally, while in the case of cellulitis, i.m. or i.v. administration is preferable. Topical antibiotic therapy is contraindicated in both cases.

Penicillins, Cephalosporins and Macrolides represent the best therapeutic options. The duration of antibiotic therapy should be between 5 and 10 days based on the severity of the clinical picture (4). If the infection involves an extremity, the limb should be kept unloaded. Anticoagulants are indicated in severe infections and in subjects at risk for venous thromboembolism events; similarly, severe infections can be treated with the addition of corticosteroids to accelerate healing. In general, the prognosis of erysipelas and cellulitis is good, allowing for outpatient management. However, in some cases, serious but rarely fatal complications may occur. Local complications include abscess formation, skin necrosis, hemorrhagic purpura, thrombophlebitis and bullous formation, which may evolve into systemic complications of a septic nature: in these cases, hospitalization is indicated for better patient management (5).

Purpose

The purpose of this case report is to describe a case of cellulitis presented to clinical observation in the infirmary, in order to illustrate the importance of ultrasound as a diagnostic tool in the distinction between two often overlapping clinical conditions, erysipelas and cellulitis, in order to target and optimize the therapeutic choice.

Clinical case presentation

A 38-year-old male soldier is admitted to the Infirmary of the H.Q. COMAER – Centocelle (Rome) for the onset of erythema, edema and pain in the right foot and leg from approximately four days. He does not report any significant

previous pathologies (except obesity), denies taking chronic therapy, and reports a drug allergy to Amoxicillin + Clavulanic Acid. He has independently taken common anti-inflammatory drugs (NSAIDs) without relief.

He reports having had a low-grade fever, responsive to Paracetamol. On physical examination, the right foot and leg appear to be erythematous and edematous circumferentially, warm to the touch and with the step-off-sign, and digital pressure determines an increase in the pain symptoms. The erythema, extending up to approximately 5 cm below the lower patellar margin, has not well-defined margins. In correspondence with the interdigital spaces and the dorsum of the right foot, the presence of torn blisters is observed, a consequence of having worn amphibians for several days without interruption and probably representing the entry point of the infectious noxa (**Fig. 1**). Edema and erythema with blisters of the foot presented by the patient) The clinical evidence supports a picture of erysipelas or cellulitis, therefore ultrasound is used to distinguish between the two nosological pictures and to appropriately direct the therapy. The ultrasonographic examination is performed with a high-frequency linear probe (7 – 15 Mz, Chison ECO5), and the examined area is evaluated with longitudinal and transverse scans. The examination shows widespread alterations of the skin and subcutaneous tissue, in particular the presence of hyperechogenic fat lobules with interlobar septa filled with liquid typical of subcutaneous edema, and inflammatory infiltration of the dermis is identified (**Fig. 2**). Cobblestone appearance in cellulitis): therefore, a differential diagnosis of cellulitis is made. An increase in vascularization in the affected area was also noted, another



Fig. 1 - The patient presents with oedema and erythema with flittene in the foot.

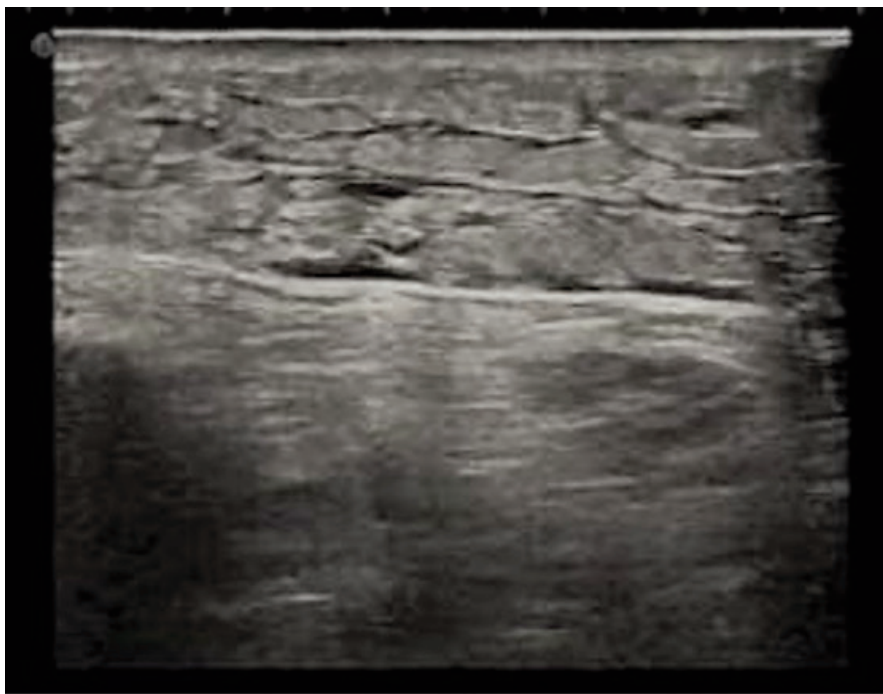


Fig. 2 - "Cobblestone" appearance in cellulite.

element in favor of the aforementioned diagnosis, in the absence of superficial or deep venous thrombosis. No abscesses were detected. Antibiotic therapy was therefore undertaken with Ceftriaxone 2 g i.v./day and Clarithromycin 500 mg orally 3 times/day for ten days. In consideration of the obesity and seden-

tary employment (office work) of the soldier, it was considered appropriate to combine Enoxaparin Sodium 6000 IU s.c./day and Methylprednisolone 20 mg i.v./day. Gastroprotection was guaranteed with Pantoprazole 40 mg orally/day. Locally, in correspondence with the damaged blisters in the interdig-

ital spaces, daily dressings were performed with Iodopovidone 10% and Hyaluronic acid sodium salt 0.2%. Complete healing was achieved in ten days with "restitutio ad integrum", and at the follow-up carried out after 15 days no recurrence occurred (**Fig. 3**). Patient's foot at the end of the therapeutic cycle)

Discussion

Erysipelas and cellulitis are the most common soft tissue infections, mostly caused by group A Streptococci, and frequently affecting the lower limbs, upper limbs and face. Since laboratory diagnostics in both conditions show a nonspecific increase in inflammation indices, the diagnosis is purely clinical. To distinguish between the two forms of infection and adequately manage therapy, avoiding local, systemic and recurrence complications, it is necessary to resort to instrumental diagnostics. CT allows for differential diagnosis, the examination is rapid, and provides excellent anatomical differentiation between soft tissues and bones, identifying and circumscribing the inflammation (2). On the other hand, CT exposes patients to ionized radiation, with carcinogenic potential. Recently, therefore, the use of MRI has increased, although it represents a second-level examination in cases where the scan must be repeated or instrumental monitoring is necessary. The use of MRI is also limited by the availability, costs and timing of the examination (6). In this context, ultrasound provides an alternative imaging modality for early diagnosis by distinguishing between the various clinical forms of inflammation without exposure to ionizing radiation; it therefore allows for a reduction in the time between clinical presentation and the start of pharmaco-



Fig. 3 - Patient's foot at the end of the treating cycle.

logical treatment, and has high sensitivity (85%), specificity (98%) and accuracy (97%) for the differential diagnosis between erysipelas and cellulitis and the identification of any local complications (7). In fact, ultrasound allows for the visualization not only of the presence of fluid material and any abscess collections, but also of all the changes in the subcutaneous tissue that are characteristic of its inflammatory involvement. In

cellulitis, the following are typically observed: hyperechogenic and thickened subcutaneous tissue compared to the surrounding and contralateral tissues, due to the presence of inflammation and edema (**Fig. 4**).

Hyperechogenicity and thickening of the subcutaneous tissue in cellulitis); Cobblestone Appearance, a pathognomonic sign resulting from an increase in the amount of subcutaneous fluid,

whereby hyperechoic lobules of fat are separated from anechoic areas of fluid; increased vascularization and local blood flow identifiable by color Doppler (**Fig. 5**). Increased vascularization in cellulitis) as an indicator of active inflammation (8). Although ultrasound has its limitations in being an operator-dependent technique and having limited vision in anatomical sites that are difficult to examine, it still has numerous advantages such as timeliness, non-invasiveness, repeatability, accessibility and the possibility of making differential diagnoses between subcutaneous infections without the use of ionizing radiation. The ultrasound recognition of the various pathognomonic pictures therefore makes this imaging method a valid option for timely management and therapeutic management, avoiding complications and recurrences (9).

Conclusions

Erysipelas and cellulitis are two soft tissue

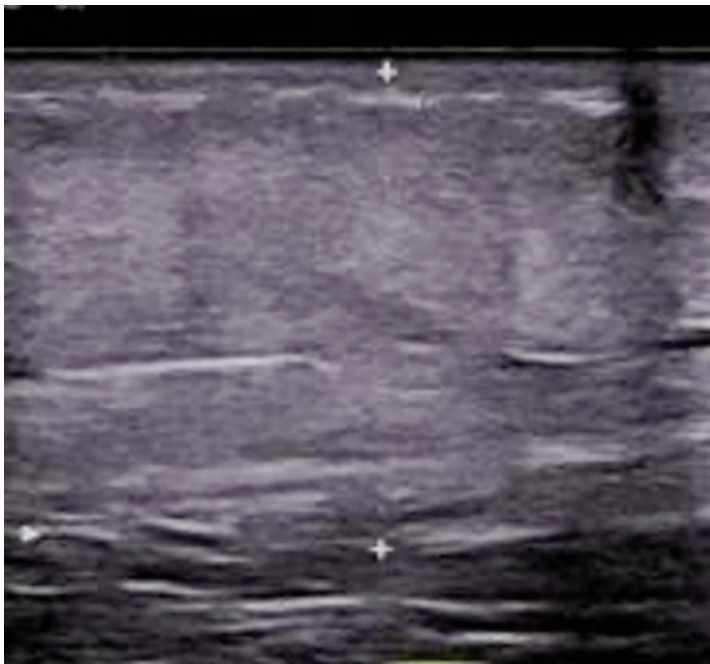


Fig. 4 - Hyper-ecogenicity and thickening of subcutaneous cellulite.

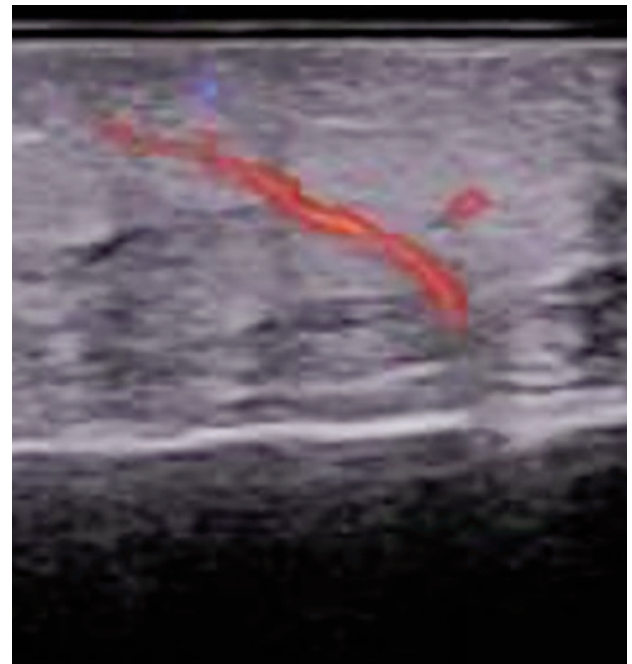


Fig. 5 - Increased vascularization in cellulite.



infections that require timely differential diagnosis and targeted therapy to avoid local and systemic complications. Although the diagnosis and differential diagnosis are often made on the basis of the clinical presentation (characteristics of the skin surface and margins of the erythema, possible presence of systemic symptoms and signs), the possibility of using ultrasound imaging allows for a clearer and more in-depth overview, and allows for discerning between the two forms of infection by targeting the therapy without resorting to exposure to ionizing radiation that would require a CT scan or the prolonged times that would require an MRI. The infiltration of the subcutaneous tissue and dermis detected by ultrasound is in fact pathognomonic for cellulitis, and in our case allowed both to exclude the presence of local complications and to undertake timely and appropriate therapy, with containment of the infection and complete resolution of the pathological picture.

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Disclosures:

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