Diagnosing and managing lower limb cellulitis

Keywords: Cellulitis/Lower limb cellulitis/Differential diagnosis

This article has been double-blind peer reviewed

In this article...
- Diagnosing, assessing and treating cellulitis
- The importance of differential diagnosis
- Benefits of a dedicated cellulitis service

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The diagnosis of lower limb cellulitis requires careful and structured assessment. This article looks at the assessment, diagnosis and management of cellulitis, focusing on the lower limb. Assessment should include good skin examination as active skin disease, such as venous stasis eczema and athlete’s foot (tinea pedis), is often overlooked as a primary cause of lower limb cellulitis and recurrent episodes.

Cellulitis is classed as an acute spreading bacterial infection and inflammation of the connective tissue, dermis and subcutaneous layers of the skin. It is characterised with redness (erythema), warmth, swelling and pain (Fig 1). Localised tenderness is a diagnostic feature and can be accompanied by pyrexia and general malaise (Gunderson, 2011). It is an “opportunistic” infection, commonly occurring through breaks in the skin. The term “erysipelas” has been used to describe a more superficial infection of the dermis and upper subcutaneous layer of the skin; often the two presentations coexist.

There are several predisposing conditions and risk factors for cellulitis (Box 1); these should be looked for in the clinical diagnosis to aid primary and secondary treatment decisions, and make patients aware of their potential risk of further episodes.

Identified pathogens usually involve Staphylococcus aureus and Streptococcus pyogenes; other less common ones also exist. Published data on incidence is unreliable because of the variability and often inconsistent clinical practice in managing this condition (Clinical Resource Efficiency Support Team, 2005; Kilburn et al, 2003). There is no statistically significant difference in the incidence of cellulitis in men and women (McNamara et al, 2007). Studies have found a higher incidence of cellulitis in general among people over 45 years (Björnsdóttir et al, 2005).

5 key points

1. It is important to recognise diagnostic features of clinical presentation to ensure accurate diagnosis and correct management of cellulitis
2. Assessment of the lower limb needs thorough skin examination to exclude or diagnose active skin disease
3. Misdiagnosis is common; practitioners should be aware of potential differential diagnosis and appropriate investigations
4. Ongoing patient advice and education is key as patients may experience further episodes; risk factors need to be highlighted
5. Cellulitis management should be considered using a multidisciplinary approach

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Diagnosing and treating cellulitis

Presentation of lower limb cellulitis

Cellulitis commonly presents locally as a well demarcated area of redness (erythema); associated tenderness, warmth and swelling are simple clinical criteria for diagnosis. If there is no increased warmth over the skin it is unlikely to be cellulitis. Sometimes blisters are present or superficial haemorrhage and necrosis. Lymph glands may be enlarged and palpable.

The leg is the most common presenting site and in most cases unilateral; bilateral cellulitis is extremely rare (CREST 2005, Quartey-Papafio 1999). In the absence of common clinical features, differential diagnoses must be considered before starting treatment (Box 2).

Medical history

Taking a thorough comprehensive medical history is key to diagnosing cellulitis and determining risk factors and comorbidities. Onset of symptoms should be defined together with the original starting point of inflammation. History of any trauma to the area, even minor, should be ascertained and...
circumstances identified as this may help decide on antibiotic management. Injury, if any, may have occurred several days before symptoms, but patients may not relate the injury to the onset of cellulitis. Cuts and wounds obtained via water environments such as lakes, streams, sea and ponds (brackish water) may be contaminated with bacteria. Water-borne bacteria should be considered if patients fail to respond to conventional antibiotic treatments.

Fever, malaise, nausea, shivering and rigors may accompany or precede skin changes. Lymphangitis (infection of lymph vessels) can also present in more severe cases, appearing as a red line originating from the cellulitis and leading to tender swollen lymph glands draining the affected area (for example, in the groin with leg cellulitis).

Progression of symptoms, especially if this is rapid, can be a sign of a more acute and deeper infection such as necrotising fasciitis, and should be fast-tracked to acute care. Other systemic symptoms such as tachycardia and increased respirations may indicate sepsis and should be carefully monitored. Cellulitis that has spread to an adjacent structure (such as osteomyelitis) or through the blood (bacteraemia) is a serious cause for concern and requires immediate hospital admission. Patients with mild or moderate cellulitis without systemic symptoms should be managed in primary care. Wingfield (2009) contains a useful step-by-step guide on diagnosing, assessing and managing cellulitis (see tinyurl.com/Wingfield-cellulitis).

Referring to acute care
Hospital admission should be considered if symptoms are severe and worsening, including extensive skin involvement and marked spread, or systemic signs are evident. Symptoms may include:
- Unresolving pyrexia;
- Nausea and vomiting;
- Comorbidities that may complicate or delay healing;
- The very young (children under one year) and older and frail people;
- Lymphoedema;
- Facial cellulitis;
- Periorbital cellulitis (refer to ophthalmologist).

Diagnostic investigations
Patients usually respond well to standard antibiotic regimens but if there is no response to the initial choice of antibiotic, the organism may be resistant to the drug or a combination of antibiotics may be required. If any pustules, crusts or erosions are present, a swab can be taken for diagnostic purposes.

If symptoms are severe and worsening, hospital admission should be considered. Referring to acute care

Differential diagnosis
Further investigations may become necessary if differential diagnosis is suspected, for example, deep vein thrombosis. Cox (2002) and Quartey-Papafo (1999) acknowledged problems with the inappropriate diagnosis of cellulitis; for example, it can be confused with venous stasis eczema (Quartey-Papafo, 1999) (Fig 2). Table 1 illustrates the clinical difference between the two conditions.

If skin disorders such as venous stasis eczema are diagnosed and treated appropriately, there is potential to reduce the risk of cellulitis and recurrent episodes, which can lead to chronic oedema and lymphoedema (Wingfield, 2009).
If patients have pre-existing oedema, practitioners should consider aftercare of Doppler ultrasound investigations and compression hosiery (Wingfield, 2008). Leg elevation and exercise can improve venous return and reduce venous pressure and this may help to improve the skin. However, there is no evidence on the benefits of these interventions (Duffill, 2008; Barron et al, 2007).

**Venous stasis eczema (varicose eczema)**

This common inflammatory dermatosis commonly affects the lower limbs and often coexists with varicose veins. Clinical signs include inflamed red eczematous skin, itch, scaling, sometimes weeping crusty skin, pigmentation (haemosiderin deposit), hardened skin, tight red/brown skin/tissues (lipodermatosclerosis – vulnerable to ulceration) and atrophy blanching.

Treatment usually consists of topical corticosteroids and emollient therapy. A potent steroid for a short time can be more steroid-sparing than a milder potency for a longer period (Davis, 2001). Emollients and paste bandages are appropriate therapies.

Secondary infection can present in venous stasis eczema. Clinical signs include increased spread of eczema, itching, erythema, weeping and yellow crustning, and may require systemic antibiotics; switching to an antimicrobial emollient may be useful if infection is diagnosed.

**Tinea pedis (athlete’s foot)**

Tinea pedis is a curable dermatological primary cause of recurrent lower leg cellulitis (Fig 3) but is rarely diagnosed in clinical areas other than dermatology (Pierce and Daugird, 1992).

Clinical presentation includes scaling, maceration, fissuring and erythema in the interdigital area. Treatment and diagnosis of tinea pedis can potentially reduce subsequent recurrent cellulitis. Treatment usually involves administering topical antifungals such as terbinafine for two weeks. If unsuccessful, practitioners should consider taking skin scrapings for mycology and systemic therapy may be indicated.

**Lymphorrhoea**

Patients with lymphorrhoea (poorly controlled weeping of lymph from the skin surface), which is commonly associated with chronic oedema/lymphoedema are at increased risk of cellulitis. Lymphorrhoea quickly saturates dressings, clothes and footwear, increasing the risk of infection/ cellulitis through contamination and maceration of skin (Mortimer, 1995).

Patients with “wet” or “leaky” legs are often referred to dermatology, mainly because of recurrent episodes of cellulitis, discomfort, poor lymphorrhoea control and impact on resources. It is crucial not to dismiss this as untreatable – to do so is arguably negligent. Wet, leaking, smelly bandages impact significantly on patients’ quality of life and safety. Quality of life and psychological aspects should be included in any chronic oedema assessment.

Control of lymphorrhoea can realistically only be achieved with the correct lymphoedema treatment, which includes correct bandaging and skincare. The use of absorbent dressings removes moisture from the wound/skin; dressings that contain gel-forming agents that “lock” the fluid away should also be considered (Thomas, 2008). The fluid-handling capability of these dressings, however, will not solve the problem; practitioners should not continuously add to the dressing to absorb leakage, especially if there is a wound/ulcer. It is vital that absorbent dressings are considered as primary wound choice in cases of lymphorrhoea and associated wounds but their frequency of change should be closely monitored. Good attention to skincare should also be considered a benchmark in these patients (Beldon, 2009).

Compression therapy in managing lymphorrhoea is paramount if patient circulation and cardiac history allows, together with elevation and exercise. Applying compression to the lower limb aids drainage of excess fluid back in to the capillaries by reducing the capillary pressure (Anderson, 2006).

There is little evidence in the literature on the use of compression during an acute episode of cellulitis; individual presentations and patients’ medical history need to form part of the decision. Swelling caused by infection increases pressure in the tissues and leads to higher pressures than normal under compression. This could impair circulation, leading to tissue necrosis and/or distal ischaemia, especially where tissue oxygenation has been borderline under compression.

These potential risks should lead to advice to discontinue or reduce the level of compression during cellulitis episodes. From personal clinical experience the majority of patients find cellulitis too painful to tolerate compression until symptoms subside and, in most cases, would discontinue as recommended by CREST (2005). If a decision is made to continue compression during cellulitis, patients need close monitoring until the swelling and cellulitis is under control.

**A cellulitis service**

The CREST (2005) guidelines proposed increasing awareness – in both primary and acute care – of the need to improve cellulitis diagnosis and management. They advocated a dedicated cellulitis service to reduce delays in diagnosis, cut the costs and administration of inappropriate treatment and increase the day-to-day management of cellulitis and education about the condition. The multidisciplinary approach ideally should include:

- Nurse (community or hospital);
- GP;
- Pharmacist;
- Microbiologist;
- Specialist services – dermatology;
- Physiotherapist;
- Lymphoedema services.

These recommendations have been put into practice in some hospital trusts. The Norfolk and Norwich University Hospital shows an excellent example of this initiative and offers a same-day referral cellulitis clinic in the dermatology outpatient department (Wingfield, 2008). GPs can refer patients with lower limb cellulitis to this clinic, where they receive a thorough assessment including diagnosis, treatment and investigation of any differential diagnosis or coexisting skin disease.

Patients are seen by a specialist team and booked into a 90-minute assessment slot. Suitable patients are treated with ceftriaxone intravenous (IV) therapy, a once-a-day antibiotic IV treatment administered over a three-day period. After receiving their first administration in clinic they are discharged with an IV canula in situ and receive their next two doses at home from the community IV team. On day four they return to the clinic for review where they are stepped down to oral antibiotics. This has produced a significant saving on bed days, offset against the cost of outpatient treatment. In recognition of this service innovation, the clinic received the Health Enterprise East Innovation Award in 2008.

The benefits of the service are:

- A faster pathway;
Table 1. Comparing clinical features of venous stasis eczema and cellulitis of the leg

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Venous stasis eczema</th>
<th>Cellulitis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apyrexial</td>
<td>May have pyrexia</td>
<td></td>
</tr>
<tr>
<td>Itching</td>
<td>Painful</td>
<td></td>
</tr>
<tr>
<td>History of varicose veins or</td>
<td>No relevant history</td>
<td></td>
</tr>
<tr>
<td>deep vein thrombosis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Signs</td>
<td>Erythematous, inflamed</td>
<td>Erythematous, inflamed</td>
</tr>
<tr>
<td>No tenderness</td>
<td>Tenderness</td>
<td></td>
</tr>
<tr>
<td>Vesicles</td>
<td>One or a few bullae</td>
<td></td>
</tr>
<tr>
<td>Crusting</td>
<td>No crusting</td>
<td></td>
</tr>
<tr>
<td>Other lesions on body</td>
<td>No other lesions</td>
<td></td>
</tr>
<tr>
<td>Portal of entry</td>
<td>Not applicable</td>
<td>Usually unknown but may be ulceration or associated skin disease – eczema/tinea pedis</td>
</tr>
<tr>
<td>Investigations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White blood count normal</td>
<td>White blood count high</td>
<td></td>
</tr>
<tr>
<td>Blood culture negative</td>
<td>Blood culture usually negative</td>
<td></td>
</tr>
<tr>
<td>Skin swabs – <em>Staphylococcus aureus</em> common</td>
<td>Usually negative except for necrotic tissue</td>
<td></td>
</tr>
</tbody>
</table>

Source: Quartey-Papafio (1999)

» Less pressure on resources;
» Reduced waiting lists helping to achieve the four-hour wait target in accident and emergency;
» Early discharge/preventing admission;
» Patients are not exposed to hospital-acquired infections;
» Care in the community, with patients remaining closer to home;
» Prevention of recurrent episodes of cellulitis.

Studies have supported this change of clinical pathway and management of lower limb cellulitis. Seaton et al (2005) recognised high standards in nurse-led home IV services using ceftriaxone. They concluded that care is not compromised and the need for medical review is reduced. Corwin et al (2005) said home IV treatment is as effective as hospital inpatient treatment and is more acceptable to patients.

**Patient education**

Depending on the location of the affected area, patients may need to decrease physical activity and elevate the extremity, if possible. They may take over-the-counter pain medication such as ibuprofen or paracetamol if there are no contraindications. Where patients are started on oral antibiotics, review should take place after 5-7 days with the proviso that they contact the surgery or outpatient department if they have any of the following features:

» Raised temperature, especially when associated with rigors;
» Cellulitis with soft, fluctuant areas suggestive of abscess formation;
» A red streak from an area of cellulitis or a progressively fast-spreading area of redness;
» Significant pain not relieved by recommended analgesia;
» Inability to move an extremity or joint because of pain;
» Nausea and vomiting. Patients with diabetes, cancer or immunosuppression should be made aware that localised cellulitis may become serious.

**Conclusion**

Health professionals need to consider cellulitis as a multidisciplinary issue that requires more than just treating the infection. Assessment has to be all-inclusive to manage patient care effectively and, in many, the aim is to avoid recurrent episodes. Good background knowledge of common presenting skin disease is essential and practitioners should have adequate knowledge to diagnose, treat or refer. Awareness of risk factors is also important not only in the initial assessment but also to educate patients about ongoing management and prevention.

**References**


