Cellulitis of the lower limbs: Incidence, Diagnosis and Management

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Introduction

Cellulitis is an inflammatory skin condition caused by acute infection of the dermal and subcutaneous layers of the skin, it refers to a superficial diffuse, spreading skin infection without underlying collection of pus. Cellulitis is a common diagnosis in both inpatients, outpatients as well as primary care settings, (Bailey and Kroshinsky, 2011). It accounts for 3% of attendance to Accident and Emergency departments within the United Kingdom (UK), (Haydock et al., 2007). The prevalence of cellulitis is increasing year on year, the aging population and increasing levels of obesity are thought to contribute to this rise, (Hirschmann and Raugi, 2012a). Many practitioners will encounter patients with suspected cellulitis, however, it's diagnosis is not always easy. The identification of cellulitis is based solely on clinical findings, and unfortunately there are several other common conditions that mimic the clinical signs of cellulitis, creating a potential for misdiagnosis and incorrect management, (Hirschmann and Raugi, 2012b). Hence it is essential that all practitioners are skilled in recognising cellulitis, confirming diagnosis and possess the ability and skills to set appropriate treatment plans. Therefore, ensuring all patients receive timely effective care to improve their health outcomes.

Cellulitis

Cellulitis is an inflammatory skin condition with an infectious origin, classically presenting itself through erythema, swelling, warmth, oedema and tenderness over the affected area. There is often poorly defined border separating the affected from the non-affected skin, (Ch'ng and Johar, 2016). It is commonly caused by Streptococcus Pyogenes or Staphylococcus Aureus, which resides in the interdigital spaces, and cellulitis most often affects the lower limbs, (Corwin et al., 2005). Hirschmann and Raugi (2012b) established that 30% - 80% of patients with cellulitis had an interdigital skin condition such as eczema, fissures or athletes foot. Any disruptions in the protective barrier of the skin surface will allow bacteria to invade the body and therefore patients will be at increased risk of developing cellulitis.

Incidence

The incidence and treatment of cellulitis places a significant burden on the National Health Service, both in terms of costs and resources. Lower limb cellulitis accounted for 69,576 hospital admissions in England during 2004-2005, with a mean hospital in patient length of stay of 10 days, (Department of Health, 2006a) (Halpern et al., 2008). This accounts for over 400,000 bed days a year, and annually the NHS spends £172-£254 million on the admission and treatment of patients with cellulitis, (Curtis, 2011, Department of Health, 2006b).

Risk Factors

Risk factors for developing cellulitis include older age, obesity, venous insufficiency, saphenous venectomy (vein harvest for bypass surgery), trauma, eczema, dermatitis, athletes foot and oedema, (Hirschmann and Raugi, 2012a). Patients with lymphoedema are especially at risk of developing cellulitis, due to the disturbances in lymph drainage and associated localised impaired host response to infection, (Soo et al., 2008). It is reported that within a one year period 28% of patients with lymphoedema will develop cellulitis, and one quarter of this group will required admission to hospital for treatment with intravenous antibiotics, (Soo et al., 2008). Typically the onset of cellulitis is between 40 and 60 years, (Ellis Simonsen et al., 2006), cellulitis occurs in equal frequency in men and women. The overall highest predisposing factor of developing cellulites is a previous episode of cellulitis, reported annual recurrence rates are between 8 – 20%, (Hirschmann and Raugi, 2012b).

Diagnosis

Cellulitis is one of the most common mis-diagnosed conditions, with as many as one third of patients are being diagnosed incorrectly, (Hirschmann and Raugi, 2012b). In the region of 132,000 bed days and £84.5 million pounds per year is wasted as a result of inaccurate diagnosis, (Levell et al., 2011). Levell et al. (2011) study also showed that a third of patients (33%) referred with lower limb cellulitis had an alternative diagnosis, and of the confirmed cases of cellulitis 28% had another skin condition which if treated simultaneously would speed recovery and reduce the risk of recurrence. This mis-diagnosis clearly has other impacts in terms of patient expectations, treatment delays and wider public health risks due to the potential inappropriate use of antibiotics. Other conditions that can mimic the clinical features of cellulitis include: varicose eczema, venous hypertension, and lipodermatosclerosis, vasculitis, necrotizing fasciitis, deep vein thrombosis, septic arthritis, acute gout and thrombophlebitis, (NICE, 2015).

Clinical signs of cellulitis include pyrexia, general malaise, pain, and patients often feel generally unwell reporting chills or sweating, (Gunderson, 2011, Wingfield, 2012). These systemic symptoms may accompany or precede the acute onset of skin changes. The affected area will be subject to

redness, warmth, swelling and localised tenderness, there is clear demarcated areas and the skin can be raised, tight and shiny, (Eagle, 2007, Opoku, 2015). Typically there is unilateral presentation, with bilateral leg cellulitis being very rare, (NICE, 2015).

Laboratory investigations can aid diagnosis, CREST (2005), state that although non-specific nearly all patients with cellulitis will have a raised White Cell Count (WCC) and elevated Erythrocyte Sedimentation Rate (ESR) or C-reactive protein (CRP) and that normal blood inflammatory markers make the diagnosis of cellulitis less likely. However, normal WCC does not exclude cellulitis. Lazzarini et al. (2005) found that only 50% of patients admitted with cellulitis had a raised WCC, and that ESR and CRP were much more sensitive markers with increases observed in 85% and 97% of patients respectively. The use of a diagnostic checklist can help prevent mis-diagnosis, the checklist produced by Opoku (2015) offers an excellent practical tool to aid accurate diagnosis, (Figure 1).

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Classification

Classification of severity can be useful in terms of admission and treatment decisions. The Eron classification (figure 2) is used within CREST Guidelines (2005) and NICE guidelines (2015).

Figure 2

Table adapted from CREST (2005).

Classification	Description	Treatment
I	Patients have no signs of systemic toxicity, have no uncontrolled co-morbidities and can usually be managed with oral antimicrobials on an outpatient basis	Oral antibiotic therapy Identification and management of underlying risk factors.
II	Patients are either systemically ill or systemically well but with a co-morbidity such a peripheral vascular disease, chronic venous insufficiency or morbid obesity which may complicate or delay resolution of their infection	Requires IV antibiotics. Admission may not be necessary if there are facilities and expertise in community

III	Patients may have a significant systemic upset such as acute confusion, tachycardia, tachypnoea, hypotension, or may have unstable co-morbidities that may interfere with a response to therapy or have a limb threatening infection due to vascular compromise	Admit to hospital for IV antibiotics and careful monitoring
IV	Patients have sepsis syndrome or severe life threatening infections such as necrotizing fasciitis	Admit to hospital for IV antibiotics and treatment of sepsis.

Treatment

Staph aureus is the most common cause of cellulitis, this has been found to be the causative bacteria in between 59% and 76% of cases, (Moran et al., 2006, Lee et al., 2015). Individualised bacterial identification from microbiology is often difficult due to the low recovery rate from needle aspirates, skin biopsies and blood cultures, (Jeng et al., 2010). The choice of which antimicrobial agent to use will be governed by the suspected bacteria involved and steered by local antibiotic guidelines. Commonly flucloxacillin is used as first line treatment (Clarithromycin if allergic to penicillin) as this covers both streptococcal and staphylococcal infections. In patients with known lymphoedema Amoxicillin by more effective if there is no evidence of folliculitis, pus formation or crusted dermatitis, (British Lymphology Society, 2015, NICE, 2015). Antibiotic should be used for a period of 7 days. Before commencing treatment, if possible, mark the area around the extent of infection with an appropriate skin marker, this can be useful to monitor responses from antibiotics, (NICE, 2015). All patients should be reviewed after 48 hours of commencing treatment, this can be face to face or by telephone, depending on clinical judgement, to assess effectiveness of the management plan.

Compression in Cellulitis

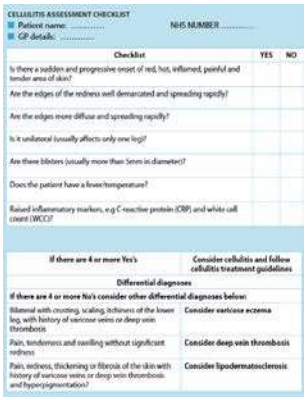
Patients with venous ulceration are at higher risk of developing cellulitis due to the breakdown of the protective barrier of the skin, and these patients are often in compression therapy to treat the underlying venous hypertension. It is commonly thought that it is contraindicated to continue compression therapy when patients have an acute infection, and in many patients compression therapy is routinely stopped if there is evidence of acute cellulites. This is not definitive, and in fact

there is an argument for the need of continued compression. In each episode of cellulitis the lymphatic system is challenged, and cellulitis can result in permanent damage to the lymphatics system leading to the development of chronic oedema or lymphoedema, (Cox, 2006). This results in an increased risk of recurrence of cellulitis as oedema, lymphoedema and cellulitis have been proven to be strongly associated, (Soo et al., 2008). The lymphatic changes results in the patients entering a continuous cycle of increased chances of oedema where the oedema predisposes patients to cellulitis. Additionally, cellulitis is a cause of persistent oedema and any episode of cellulitis predisposes to further episodes, (Cox, 2006). This all results in patients being at increased risk of recurrence and long term conditions. Compression therapy can help support the lymphatic channels during this acute episode so therefore does not need to be routinely stopped, however, many patients simply will not be able to cope with the compression due to the increased pain from the affected area. But the decision to stop compression should be one based on individual patient assessment as opposed standard practice.

Conclusion

Lower limb cellulitis is a common condition which has both significant morbidity and resource implications. There are many other conditions that mimic the clinical signs of cellulitis, but these can easily be distinguished with careful history taking and holistic patient assessment. Accurate diagnosis is vital to ensure effective patient management whilst protecting the limited resources of antibiotics. Additionally practitioners need to treat underlying or predisposing conditions in parallel, wherever possible, to optimise treatment, thus reducing the risk of recurrence and improving overall quality of care.

Figure 1



CELLULITIS ASSESSMENT CHECKLIST

Patient name: ..... NHS NUMBER .....

GP details: .....

Checklist	YES	NO
Is there a sudden and progressive onset of red, hot, inflamed, painful and tender area of skin?		
Are the edges of the redness well demarcated and spreading rapidly?		
Are the edges more diffuse and spreading rapidly?		
Is it unilateral (usually affects only one leg)?		
Are there blisters (usually more than 5mm in diameter)?		
Does the patient have a fever/temperature?		
Raised inflammatory markers, e.g C-reactive protein (CRP) and white cell count (WCC)?		

If there are 4 or more Yes's	Consider cellulitis and follow cellulitis treatment guidelines
Differential diagnoses	
If there are 4 or more No's consider other differential diagnoses below:	
Bilateral with crusting, scaling, itchiness of the lower leg, with history of varicose veins or deep vein thrombosis	**Consider varicose eczema**
Pain, tenderness and swelling without significant redness	**Consider deep vein thrombosis**
Pain, redness, thickening or fibrosis of the skin with history of varicose veins or deep vein thrombosis and hyperpigmentation?	**Consider lipodermatosclerosis**

Taken from Opoku (2015)

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