

Management of acute cellulitis with the Eclipse Boot®

This article outlines the causes and management of cellulitis, comparing traditional treatment regimens with the use of the Eclipse Boot® (Advancis Medical). With rising healthcare costs, effective management of cellulitis is vital. The case report included identifies how the Eclipse Boot was both cost-effective and comfortable, and improved patient quality of life by controlling exudate, thereby preventing offensive odour and decreasing the risk of further infection. The number of dressing changes were also reduced with this treatment regimen, thus lessening nursing time and pain associated with twice-daily dressings changes.

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KEY WORDS

Cellulitis
Infection
Cost-effective treatment
Patient comfort
Eclipse Boot®

In the NHS, £373 billion is spent annually on wound dressings meaning that an understanding of the cause of wounds and their management is crucial, both in providing quality of life for patients and driving down costs (National Health Executive, 2006).

Cellulitis is one of the conditions that can adversely affect the progress of a wound. Clinicians need to be aware of the progressive onset of cellulitis and how, from a bacterial infection of the dermis and subcutaneous tissue, it can rapidly spread to other areas. Initially the inflammation is localised but can increase in size as the infection spreads.

Clinicians require a good understanding of the physiology of wound healing and how to treat cellulitis effectively, especially as there may be

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secondary cellulitis present around a wound, for example in diabetic foot ulceration (Clinical Resource Efficiency Support Team [CREST], 2005).

Cellulitis occurs following bacterial infection of the dermis and associated subcutaneous tissues. It presents as swollen, red areas that feel hot and tender and can spread rapidly. If left untreated, cellulitis can lead to systemic sepsis or necrotising fasciitis and be life-threatening (Price, 2009; CREST, 2005). Therefore, it is important that healthcare professionals can recognise the signs and symptom of cellulitis and initiate prompt medical treatment (Eagle, 2007). Clinicians need to understand how modern wound care products can be utilised to treat cellulitis in the most cost-effective manner to promote wound healing. This article reports the causes of cellulitis and how it can be managed using the Eclipse Boot® (Advancis Medical).

Cellulitis

Cellulitis is a common medical condition in adults with lower limb problems (CREST, 2005) and accounts for 2–3% of hospital admissions in the UK (Drugs and Therapeutics Bulletin, 2003). Average inpatient stays last approximately nine days (Department of Health, [DH], 2011), with 25–50% of patients suffering recurrence and other complications, e.g. leg ulceration and chronic oedema (Cox et al, 1998; Dupuy et al, 1999). Consequently, cellulitis represents an important healthcare issue

with substantial resource and financial implications for acute trusts (CREST, 2005). Cellulitis can occur anywhere on the body, but is frequently encountered on the lower legs, ankles and arms (Bickley, 2003).

Definition

'Cellulitis is an acute, spreading inflammation of the skin and subcutaneous tissues characterised by pain, warmth, swelling and erythema, which may spread rapidly' (British Lymphology Society [BLS], 2007). The infection may affect only superficial skin layers or deep tissues, the lymphatic system and blood stream. As mentioned above, if left untreated, it can lead to systemic sepsis (Price, 2007).

Cellulitis may be triggered by one or more bacteria, commonly, *haemolytic streptococci*, *G streptococci*, *Streptococcus pyogenes*, and *Staphylococcus aureus* (Baxter and McGregor, 2001; Cooper and White, 2009). Bacteria can enter through a wound or break in the skin, such as an insect bite or toe web fissure (Cox et al, 1998).

There are many risk factors for cellulitis, including (EL-Daher and Magnussen, 1996; Eriksson et al, 1996; Dupuy et al, 1999; Hughes and Van Onselen, 2001):

- ▶▶ Injuries or trauma that result in a break in the skin
- ▶▶ Insect bites and stings, and animal or human bites

- ▶▶ Chronic recurrent fungal infection of the feet and toes, such as athlete's foot, or tinea pedis
- ▶▶ Peripheral arterial disease
- ▶▶ Varicose eczema
- ▶▶ Leg ulceration
- ▶▶ Diabetes mellitus
- ▶▶ Lymphatic insufficiency, poor lymphatic drainage
- ▶▶ Liver disease such as chronic hepatitis or cirrhosis
- ▶▶ Obesity
- ▶▶ Chronic skin disorders such as eczema or psoriasis, which result in breaks or dry, flaky skin that may provide an entry point for bacteria
- ▶▶ Infectious diseases that cause skin lesions such as chicken pox
- ▶▶ Infections related to surgical procedures
- ▶▶ Burns
- ▶▶ Foreign objects in the skin, e.g. intravenous cannula, drainage tubes, percutaneous endoscopic gastrostomy (PEG) feeding tubes and orthopaedic pins
- ▶▶ Infection of the bone beneath the skin
- ▶▶ Weakened immune system or immunosuppressive or corticosteroid therapy may lead to more vulnerability to infection.

Patients with cellulitis may present with inflammation, heat, redness and pain (Nowak and Handford, 2000). Initially the inflammation is localised, but increases as the infection progresses. When this occurs, the patient can be systemically unwell and the skin appears to be tight and glossy (Price, 2009). *Table 1* outlines the four clinical classes of cellulitis (CREST, 2005).

Following an episode of lower limb cellulitis, around 7% of patients develop chronic oedema and some persistent leg ulceration. Twenty-nine percent of patients develop recurrence within a mean of three years, with venous insufficiency being the most common cause (CREST, 2005).

Management of cellulitis

There are four classes of cellulitis, although this can vary depending on whether cellulitis is wet or dry (see *Table 1*).

Table 1
Clinical classes of cellulitis

Class I	Class II	Class III	Class IV
Patients have no signs of systemic toxicity, or uncontrolled comorbidities and can be managed with oral antimicrobials on an outpatient basis	Patients systemically ill or systemically well, but have a comorbidity such as peripheral vascular disease, chronic venous insufficiency or morbid obesity which complicates or delays resolution of infection	Patients may have a significant systemic complication such as acute confusion, tachycardia, tachypnoea, hypertension or be unstable. Systemically well but have a comorbidity that may interfere with response to therapy, or have threatening infection due to vascular compromise	Patient develops sepsis syndrome or severe life-threatening infections, such as necrotising fasciitis

Dry cellulitis

Dry cellulitis should not be cleansed as, being erythematous, oedematous and acutely painful and inflamed, this will increase the risk of infection (Beldon and Burton, 2005). The demarcated area of the cellulitis should be outlined with an indelible pen to monitor progress or regression (Beldon and Burton, 2005; Eagle, 2007). The pen should always be thrown away in line with infection control policies.

Due to inflammation, cellulitis can be very painful and pain assessment is vital (McCaffery and Beebe, 1989). A detailed history and physical examination should also be performed by an experienced clinician and appropriate analgesia prescribed. Regular usage may need to be reinforced in elderly patients (Gloth, 2011). As oedema resolves, the skin becomes wrinkled and often sloughs away. Thus, it is important to apply simple emollients to moisturise the skin when any blistering has resolved (Beldon and Burton, 2005).

Wet cellulitis

The main complication with wet cellulitis is how to control the exudate and reduce the resulting maceration. The range of dressings and devices available for the treatment of grossly

oedematous limbs is limited, owing to the size of the limb and the amount of fluid leaking from the blistering. Dressings available include foams, alginates, Hydrofiber and composite dressings. However, with copious amounts of exudate being produced, these dressings quickly become saturated and heavy, which causes them to slip and pull on the skin resulting in more trauma and an increased risk of infection (Hodgson, 2010).

In the author's experience, an alternative dressing regimen would be to use a non-adherent contact layer, e.g. Urgotul® (Urgo Medical), with an inexpensive absorbent layer, such as a surgical dressing pad. The contact layer should be left *in situ* for four days, changing the outer layers when saturated to avoid an increase in the risk of infection and the development of odour, which can be unpleasant and embarrassing for the patient.

Elevation of the lower limb is essential for both dry and wet cellulitis, as is plenty of rest (Price, 2009). The foot of the bed should be elevated and the patient needs to understand the importance of this to reduce the swelling and oedema. Ideally, a profiling bed frame allows the patient to sit up

and elevate their lower legs. All patients should be encouraged to mobilise to and from the toilet to prevent deep vein thrombosis (DVT) and loss of mobility. Dorsiflexion foot exercises will also assist in reducing oedema by activating the calf pump (Hofman, 1998). Patients' pain must be managed with anti-inflammatories and paracetamol at regular intervals (four-hourly), to reduce pain and inflammation.

After a full assessment, antibiotic therapy is dependent upon the causative organism. Common treatment regimens use a combination of benzylpenicillin (unless the patient is allergic) and a broad-spectrum antibiotic such as flucloxacillin. Antibiotics may initially be given intravenously, and then orally once they take effect (Beldon and Burton, 2005). However, reference should always be made to the local and national antibiotic prescribing policies, for example, the BLS who recommend long-term use of prophylactic strategies to reduce the number and severity of infections in lymphoedema patients for those experiencing more than two episodes of cellulitis within 12 months (BLS, 2007; Badger et al, 2009).

Eclipse Boot

The Eclipse boot dressing is an innovative super-absorbent dressing ergonomically designed to fit around the lower limb area. It uses super-absorbent technology to allow for maximum fluid and exudate handling. The dressing contains a rapid wicking layer and 12 individual super-absorbent compartments, which lock away fluid into the dressing, reducing maceration and preventing infection from fluid leaking back onto the skin. This helps to further reduce unpleasant odour.

The backing layer is a water-resistant barrier which also prevents strikethrough. This, combined with a high moisture vapour transfer rate (MVTR), allows breathability and prolongs wear time. The pre-shaped boot allows easy application, which helps to reduce nursing time at dressing changes. The boot is secured with toe-to-knee bandaging, allowing the product

to fit most shapes and sizes of leg (Godar and Guy, 2010; Hodgson, 2010).

Case report of a patient with wet cellulitis

Mrs B presented on the 4 April, 2010 with cellulitis up to the inner thigh of her right leg. She was known to have atrial fibrillation, type 2 diabetes (for five years) and had been a smoker for 20 years, although she had now given up. Mrs B lived on a farm with her husband and son where she was exposed to insect bites, which may have been the source of the cellulitis infection.

At initial assessment four days after her admission (8 March, 2011), she had large purple blisters on her right lower leg and in some areas these were filled with fluid. Her cellulitis was recorded as being severe class III according to the CREST classification system (CREST, 2005) (*Figure 1*). Her foot was purple on the forefoot with cellulitis present in the demarcated area. It could be seen from the outlined area that the cellulitis had resolved a little since her admission four days previously. Blisters were leaking a great deal of fluid, the swab results demonstrated normal skin flora and her blood cultures were found to be negative. She rated her pain level as 7 (dreadful) on the McCaffery scale (McCaffery and Beebe, 1989). Her blood results included:

- ▶▶ Serum albumin 31
- ▶▶ Haemoglobin 10.8
- ▶▶ Raised white cell count of $15 \times 10^9/l$, indicating an infection (the normal level is $4-11 \times 10^9/l$).

She was being managed on a profiling bed frame to enable her to elevate her legs as high as possible, and pressure reduction was provided by an Alpha Xcell mattress (Arjo

Huntleigh) with regular 2–4-hourly repositioning.

The author advised the use of Urgotul dressings as a contact layer, with an Eclipse Boot secured with toe-to-knee bandaging. These were only removed if Mrs B became pyrexial, indicating that treatment was ineffective, for example, if she was on inappropriate antibiotics. The author advised changing the Eclipse boot dressing every four days as she found the dressing had the capacity to effectively manage the amount of exudate generated during this timescale.

Mrs B's lower legs were elevated on a profiling bed frame. Although the lower legs need to be elevated as high as possible above the heart, she had cardiac problems, therefore, her legs were only elevated as high as was clinically tolerated. The dietician also introduced a high protein diet to help promote wound healing.

On re-assessment at week seven (she was still in hospital), Mrs B felt considerably better and was mobilising around the ward and experiencing less pain. She could see that the cellulitis was resolving and that wound healing was taking place. She commented that once she had started treatment with the Eclipse Boot she had found the management of her cellulitis less painful and far more comfortable than with the previous conventional dressings. She was delighted not to be in a wet bed and the reduction in odour had restored her dignity and she was less embarrassed when she had visitors. She still had a purple blistered lower leg, filled in some areas with fluid, but this was starting to resolve. Her foot was dark pink on

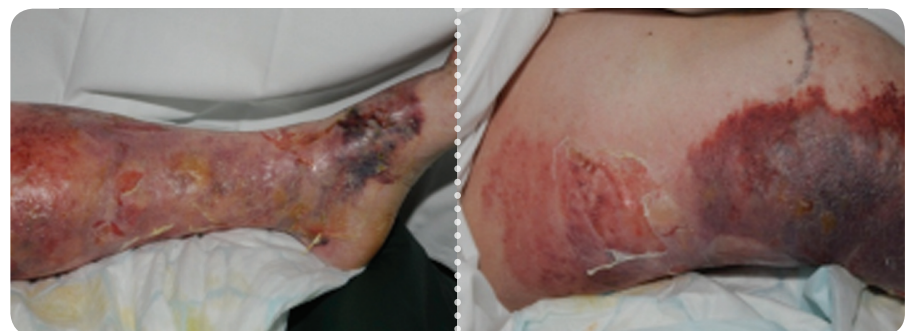


Figure 1. Cellulitis to the right leg at initial presentation.

the forefoot and the redness from the cellulitis had both substantially reduced in size and was now a paler red.

Two distinct small full-thickness ulcers were apparent:

- ▶ Left lateral malleolus: 50% pink and 50% yellow tissue, measuring 1 x 1 cm
- ▶ Mid-outer calf: 50% pink and 50% yellow tissue.

The surrounding flaky skin required washing to remove the dead skin cells and moisturising. Pain was now rated at level 3 on the McCaffery scale. Her blood results were:

- ▶ Serum albumin 32
- ▶ Haemoglobin 10.3
- ▶ White cell count $7 \times 10^9/l$.

These results indicated that the infection was resolving.

Mrs B remained on a profiling bed frame with her legs elevated to reduce the oedema, with an alternating mattress.

Patient review

On the 14 April, 2010, the care pathway was changed and only her lower leg was now soaked in a bowl, with aqueous cream being applied to the dry flaky skin. Aquacel® (ConvaTec) and Biatain®(Coloplast) were applied to the blistered area that was still wet.

The Eclipse was no longer required at this point as the exudate levels had been reduced. The Biatain foam was secured with toe-to-knee bandaging and reapplied every 48 hours.

The staff were advised by the author to continue to elevate Mrs B's legs and that she should be mobilised from the bed around the ward and not sat in her chair as her lower limbs would not be elevated high enough to aid venous return.

It was not possible to perform an ankle brachial pressure index (ABPI) assessment as there was still oedema present, which would have prevented a successful reading.

The complete dressing change time for treating both of the patient's legs was reduced from approximately one hour with the old regimen to 30 minutes or less as staff become more accustomed to using the Eclipse boot. The cost of care for the Eclipse boot dressing is shown *Table 2*

The previous dressing regime involved the patient undergoing changes twice a day, mainly due to strikethrough and the cost of this more labour intensive

method is shown in *Table 3*. Additionally, each time dressings are removed, this potentially increases the risk of secondary infection. This means that the traditional method may not be a cost-effective way of treating patients with cellulitis or leg ulcers. The labour cost-saving in the case reported here by using the Eclipse Boot of £854.36 is significant. In addition, the patient was not put through the discomfort of having twice-daily dressing changes.

Conclusion

It is important that clinicians are able to recognise the symptoms of cellulitis in order to instigate an effective treatment regimen. With today's financial constraints on the health service, it is important to employ cost-effective treatments that deliver high standards of nursing care and effective patient outcomes.

While this is only one case report, it demonstrates that the Eclipse Boot is both a cost-effective and comfortable treatment regimen for a debilitating and painful condition. In this case, the patient's dignity was restored with the decrease in offensive odour, resulting in a considerable improvement in her quality of life,

Table 2
Cost of the care pathway using the Eclipse Boot

Type of dressing	Number of days on treatment	Frequency of dressing changes	Number of dressings used at each dressing change	Unit dressing cost	Total cost of dressing	HCA costs, band 2 half-hourly rate	Nursing time, band 5, half-hourly rate	Grand total
Urgotul	39	Every four days	8 sheets	£3.10, 80 sheets @ £3.10	£248	10 dressing changes @ £5.15 per half-hourly rate = £51.50	10 dressing changes @ £8.56 = £85.60	
Eclipse Boot	39	Every four days	1 boot	£13.54, 10 @ £13.54	£135.40			
Biatain to upper thigh	39	Every four days	1 foam	£4.86, 10 @ £4.86	£48.60			
Total	39				£432	£51.50	£85.60	£569.10

Table 3
Traditional treatment regimens

Type of dressing	Number of days on treatment	Frequency of dressing changes	Number of dressings used at each dressing change	Unit dressing cost	Total cost of dressing	HCA costs, band 2 half-hourly rate	Nursing time, band 5, half-hourly rate	Grand total
Surgical pads 20x20x6cm	39	Twice a day	Six surgical pads	£0.22 each	£102.96	Two dressing changes per day x £5.15 = £10.30 x 39 days = £401.70	£668.07 8.56x2=17.12x39 =£667.68	
UrigoTul	39	Every four days	Eight sheets	£3.10 each	£248			
Total	39				£350.96	£401.70	£668.07	£1,420.73

and the distress and pain of constant dressing changes were reduced to every four days. **WUK**

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Key points

- ▶ Cellulitis is an acute, spreading inflammation of the skin and subcutaneous tissues.
- ▶ Clinicians need to understand how modern wound care products can be used to promote wound healing is therefore vitally important.
- ▶ The Eclipse Boot is a unique super absorbent dressing which is anatomically designed to fit around the lower limb area.
- ▶ Eclipse Boot allows for patient dignity as it prevents odour and decreases the risk of further infection.

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