

Case study: A targeted approach to healing complex wounds using the geko™ device.

Authors:

Mr Sameh Dimitri
Consultant Vascular and Endovascular Surgeon MSc FRCS (Eng Edin)

Nikki Pavey
Physiotherapist at Stockport College Academy of Sport, Key Account Manager, Firstkind Ltd.

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Subject

87 years old male.

Wound type

Chronic left leg ulceration.

Relevant Clinical History

The patient was anaemic with a low iron level, otherwise healthy.

Clinical Presentation

In June 2015, two clinical biopsies were performed on the above patient, one on the forehead and the other on the anterior, medial aspect of the lower left leg. Both were reported as non-malignant. In August 2015, the biopsy site on the leg became infected and required a prolonged course of antibiotics, which included three days of hospital stay for the administration of intra-venous (IV) antibiotics. He was discharged and prescribed analgesia to control his pain but the medication did not provide any relief.

The initial biopsy site on the leg measured approximately 5mm x 5mm but it became infected, causing the wound site to expand across the anterior and posterior calf. The patient could not elevate his leg and was in severe pain which affected his ability to sleep.

The wound bed comprised of yellow slough and necrotic tissue which required regular debridement. The wound was producing exudate and at times blood, which leaked into the patient's clothing. Daily dressing changes were required to manage fluid loss and prevent further maceration of the peri-wound.

The leg was cleaned daily with normal saline. Emollient and barrier cream were also applied to protect the skin surrounding the wound. The wound was dressed with non-adherent antimicrobial dressings. No progress was observed in wound healing 17 weeks after the initial biopsy. Surrounding erythema persisted, and pain levels remained uncomfortable despite taking daily painkillers. The wound was managed by a Dermatologist and a Plastic Surgeon for the next few months but a further vascular

review was requested to determine compression therapy. In December 2015, the patient could not tolerate the pain any longer and was admitted to the Countess of Chester Hospital. The principal diagnosis was lower leg cellulitis from the chronic ulcer on the leg around the site of the previous punch biopsy. Doppler results showed normal flow and compression of the femoral, popliteal, posterior tibial and peroneal vein and no signs of deep vein thrombosis (DVT).

Ultrasound examination of the veins and arteries of the left leg showed normal flow and patent arteries. However, the left lower limb duplex US scan showed a low volume and mild reflux in the Sapheno-Femoral junction and the Long (Great) Saphenous vein. IV antibiotics were administered and inflammatory markers improved. Analgesia was prescribed for the pain and the patient was discharged 5 days later, once the pain had been controlled. Dressing changes were managed through the tissue viability/district nursing team.

By January 2016, the ulcer had spread over the lower posterior leg and heel, the patient had to be re-admitted into hospital due to the severe pain levels and the amount of fluid exuding from the ulcer. He was reviewed by the vascular team who suggested that the ulcer was of mixed aetiology; however other members of the team suggested that it could be a venous ulcer, but there were no signs of DVT on the duplex US scan of the leg. The ulcer was being exacerbated by dependent oedema caused by the patient sleeping in a chair. He was treated with a course of IV Clindamycin and advised to start reduced compression.

Rationale for treating with the geko™ device

Chronic wounds, including venous, arterial and diabetic ulcers have impaired blood flow^{1,2}. Increasing blood circulation increases Transcutaneous Oxygen Tension (TCpO₂)³ which is a predictor of tissue viability and ischaemic wound healing⁴.

The geko™ device increases venous, arterial and microcirculatory blood flow in the lower limbs^{5,6,7}, prevents and reduces oedema⁸ and maintains TCpO₂ – promoting conditions favourable for wound healing^{7,9}.

In February 2016, the wound was not showing any signs of healing and the patient was unable to tolerate compression. The geko™ device was introduced as an adjunct to the existing treatment regime (in week 35) to aid in the healing process. The usage was controlled to 6 hours a day, five days a week until wound closure was achieved (at 23 weeks post treatment with geko™).

Clinical Assessment

<p>Figure 1 Posterior aspect of the left leg</p>	<p>Week 26</p>
	<p>Lower limb compromised by oedema and infection.</p>
<p>Figure 2 Posterior aspect of the left leg</p>	<p>Week 29</p>
	<p>The wound bed consisted of yellow slough and necrotic tissue which required debridement.</p>

Figure 3 Anterior aspect of the left leg	Week 30
	
Figure 4 Anterior aspect of the left leg	Week 33
	No granulation tissue apparent, exudate appears green.

<p>Figure 5a Anterior aspect of the left leg</p> 	<p>Week 35</p> <p>Started to use the geko™ device.</p> <p>The wound was producing large amounts of exudate, at times blood, which leaked into the patients clothing.</p>
<p>Figure 5b Anterior aspect of the left leg</p> 	<p>Week 35</p> <p>Started to use the geko™ device.</p> <p>A neuromuscular electro-stimulation device, the geko™ was fitted and the user found it easy to operate.</p>

<p>Figure 6a Anterior aspect of the left leg</p> 	<p>Week 38</p> <p>Wound reduced in size, oedema eliminated but necrotic tissue was still present.</p>
<p>Figure 6b Posterior aspect of the left leg</p> 	<p>Week 38</p>

<p>Figure 7a Anterior aspect of the left leg</p>  A photograph showing the anterior aspect of a patient's left leg. The leg is positioned horizontally. There is a large, irregularly shaped wound on the lower calf area. The wound bed contains yellowish slough and some red, raw tissue. The surrounding skin is pinkish and appears slightly swollen. The leg is resting on a patterned rug, and a white plastic sheet is visible in the background.	<p>Week 58</p> <p>Wound reduced significantly on the anterior aspect of the leg. No signs of infection, slough or necrosis.</p>
<p>Figure 7b Posterior aspect of the left leg</p>  A photograph showing the posterior aspect of the patient's left leg. The leg is bent at the knee, and the heel and lower calf are visible. The skin on the heel and lower calf is covered with a thick, yellowish, crumbly material, which is granulation tissue. The surrounding skin is pinkish and appears slightly swollen. The leg is resting on a patterned rug, and a white plastic sheet is visible in the background.	<p>Week 58</p> <p>100% granulation achieved on the posterior aspect of the leg.</p>

Results

The patient observed a reduction in oedema after a few days of using the geko™ device. In March 2016, just one month into the geko™ treatment, the ulcer had reduced in size and there was marked improvement to the wound bed. Pain levels had improved; the patient was still taking regular analgesia and continued on reduced compression in conjunction with geko™ which was tolerated well. In April 2016, he was also delighted to sleep in his own bed again rather than in a chair because the pain had been eliminated. The posterior aspect of the leg showed 100% granulation following five months of using the geko™ device as an adjunct to compression and standard treatment of care.

Patient Feedback – July 2016

'I got invited to try the geko™ device in February by Mr. Dimitri, I took his advice as I was told that it would help with my problems. The application of six hours a day was no problem, as I could put it above the compression bandage. At that time, I was willing to try anything to help with my wound recovery. Various nurses have treated me and they are surprised by the recovery I have had, when I was discharged from the hospital they thought that I would never recover. However, now that the wound has healed, I am very pleased about how the geko™ device performed. I thought that my condition was irreparable from past experience but the geko™ device must have helped in my recovery.'

Conclusions

Wound healing for some patients is prolonged and can be accompanied by severe symptoms, such as pain and exudate which can adversely affect their quality of life. Early diagnosis of infection reduces the risk of complications, leading to improved outcomes¹⁰. The patient suffered immensely post biopsy. The wound bed had to be dressed daily due to the high levels of exudate. Different types of dressing were applied but they did not accelerate the healing process. The treatment regime also comprised of strong analgesia and antibiotics delivered intravenously requiring hospital stay.

Complementing the wound care regime with the geko™ device delivered significant reduction in the observed oedema and accelerated the wound healing process resulting in total wound closure. The patient reported improvements to his quality of life and verbal pain rating, going from severe pain to moderate to low pain following treatment.

On the anterior aspect of the leg, the wound reduced significantly and showed no signs of infection, slough or necrosis. When the geko™ device was added to the standard of care, the non - healing wounds closed, reaching 100% granulation on the posterior aspect of the left leg in 23 weeks.

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