

Case study 2: Using the geko™ device to prevent oedema and promote functional activity following foot surgery

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Subject

61 year old female

Procedure

Right scarf lateral release Akin osteotomy

Relevant Clinical History

The patient reported a 10-year history of pain along the medial side of both feet. She was listed for sequential scarf lateral release Akin osteotomies after prolonged bilateral pain, locking of the 1st metatarsal and severe cramps. This case study describes the second procedure; four weeks previously the patient had a left scarf lateral release Akin osteotomy.

Clinical Presentation

On examination pre-operatively

- The right first metatarsal was significantly swollen and inflamed.
- There was reduced flexion and extension of the first metatarsal, and cosmetic adduction of the first metatarsal was prominent.
- Locking of the first metatarsal
- Cramping of the first metatarsal
- Pain on walking Visual Analog Scale for Pain (VAS) 7/10

Rationale for treating with the geko™ device

The aim of surgery was to relieve pain and improve the alignment of the big toe. Surgery to correct hallux valgus is a largely successful operation¹, with a good or very good outcome in 85% of patients¹.

However, the NHS Choices website advises patients that after bunion surgery, the foot and ankle may be swollen for three months or longer post-surgery. Oedema may occur because of the post-operative rehabilitation instructions that are necessary to ensure bone healing. Patients are advised to partial weight bear with a flat-soled shoe, and to walk with elbow crutches. This advice prevents the foot and ankle muscle pumps from working as normal, and leads to a frequent tendency towards swelling. In addition to swelling, impaired wound healing¹ may also occur in 2-4% of patients.

In this case the geko™ device was therefore chosen as a treatment modality to help accelerate the reduction of this oedema and also to increase blood flow. This is because Neuromuscular Electro-stimulation (NMES) has been found to be effective at increasing venous flow and reducing oedema in the lower limb. The geko™ device has also been used successfully to heal wounds². The small size and portability of the geko™ device means that it is ideal for providing treatment to patients continuously throughout the day whilst they are active and at rest. The geko™ device is effective at providing up to 70% of the blood flow achieved with maximal effort dorsiflexion movements³.

The geko™ device

The geko™ device was worn for 3 consecutive days for 10 hours per day, followed by 4-6 hours a day for the next 11 days. The patient was followed up at 7 days and 14 days post-operation.

Results

7- day follow up

The device was well tolerated by the patient and the patient was judged by the surgeon in charge to be progressing "extremely well".

Table 1. Comparison of VAS score at Day 0 and Day 7.

VAS Day 0 (Prior to procedure)	VAS Day 7
7/10	0/10

Swelling had reduced significantly following the operation, and the patient described no pain.

There was bruising as expected around the lateral and medial side of the foot (see Table 2). The wound was healing well with a lower level of bruising than expected (Picture 2). The patient had full AROM & PROM of the 1st metatarsal. Pain was limited but was tolerated by the patient. There were no reports of pins and needles and numbness in the toes

14-day follow up

The patient presented with no swelling and minimal bruising, no pain reported on full AROM and PROM, crutches were not required, and the sutures were removed to enable the patient to shower. The X-ray shown no abnormalities and wound healing was optimal.

Patient Feedback

From my experience using the device did not cause any inconvenience and I felt the benefits were all positive. I would have no hesitation in using the geko™ again. I would have been happy to wear it for a longer period as it did ease the pain. I had a much better recovery period compared to the previous operation. It was much easier to sleep at night, as my foot was more comfortable. I had no swelling after one week from the date of my operation. No numbness or pins and needles in my toes and foot compared to operation on the left foot 4 weeks earlier.

Table 2. Comparison of Day 0 and Day 7 foot after Right Scarf Akin Osteotomy procedure using geko™ device post-operatively.

Day 0	Day 7
Pre-operative (2 hours prior to surgery) 26/11/2013	The patient was partial weight bearing with a heel wedge shoe and walked with elbow crutches. 03/12/2013
<p><u>geko™ use pre-op</u> Patient did not use the geko™ device pre op</p> <p><u>Symptoms</u> Patient presented with</p> <ul style="list-style-type: none"> • Swelling • Stiffness • Inflammation • Pain VAS 7/10 • Cosmetic adduction • Reduced ROM of 1st Metatarsal • Locking • Cramping <p><u>geko™ use post-op</u> The geko™ device was applied to the patient in recovery 1-hour post op.</p> <p>No activity was taken during this time of using the device.</p>	<p><u>geko™ use</u> The geko™ device was worn for 10 hours per day for the first 3 days. The device was worn for a further 11 days for 4-6 hours.</p> <p>Limited activity was undertaken during this time</p> <p><u>Symptoms</u></p> <ul style="list-style-type: none"> • Reduction in swelling • Pain VAS 0/10- No Pain • No Locking • No pins and needles • No cramping • Cosmetic adduction corrected • AROM • PROM • Wound healing • Comfortable to sleep

Picture 1 shows operated foot on Day 0 after the operation before the geko™ was used.



Picture 2 shows operated foot on Day 7 (note the yellow colouring is mainly due to iodine).



Day 14

Symptoms

- No swelling
- No pain
- Minimal bruising
- Full AROM
- Full PROM
- Full cosmetic wound healing

Crutches were no longer required by the patient and the sutures were removed to enable the patient to shower. Post op x- ray shown no abnormalities.

Conclusions

This case study illustrates that the geko™ device may be useful in helping to reduce swelling and promote wound healing in patients recovering from foot surgery. The patient involved was impressed by the action of the device and thought that it was extremely beneficial. Further research is of course required in order to confirm the efficacy of the device in this patient group but this case study in conjunction with the previous work suggests the use of the geko™ device can reduce oedema after bunion surgery.

References

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3. Tucker AT, Maass A, Bain DS, Chen L-H, Azzam M, Dawson H, Johnston A: Augmentation of venous, arterial and microvascular blood supply in the leg by isometric neuromuscular stimulation via the peroneal nerve. Int J Angiol. 2010 Spring; 19(1): e31–e37. PMID: PMC2949997