The geko™ Neuromuscular Electrostimulation Device Reduces Pre-Operative Oedema and Accelerates Readiness for Theatre in Patients Requiring Open Reduction Internal Fixation for Acute Ankle Fracture

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The Burden

- 15,000 ankle fractures treated surgically each year (9% UK T&O workload)[1,2]
- Soft tissue swelling can delay time to surgery due to fears about wound breakdown[3]
- While delayed fixation may help to reduce the risk of complications it can decrease patient satisfaction[4,5]
- Delays mean increased length of stay and associated healthcare costs[6,7]
- Current strategies to decrease ankle swelling include passive (elevation, ice) or active (arterio-venous foot pumps [AVFP], Intermittent Pneumatic Compression [IPC], however evidence for their efficacy is unclear[8]

Methods

- Case control feasibility study
  - Prospective cohort – 20 consecutive consenting patients meeting criteria
  - Retrospective cohort – Ankle fracture patients matched for age, gender, ethnicity, fracture pattern and dislocation at presentation
- Primary aim:
  (i) Ease of recruiting patients with ankle fractures in the MTC* setting.
- Secondary aim:
  (i) Assess time to 'readiness for theatre'
  (ii) Assess tolerability of device

INCLUSION CRITERIA
Age 18-60
Ankle fracture requiring fixation
Able to understand patient info and complete consent
Able to follow protocol requirements

* MTC – Major Trauma Centre

What is the geko™ device?

- Small, disposable, internally powered, transdermal neuromuscular stimulator
- Self-adhesive, applied to the posterolateral aspect of the knee
- Deemed effective if causes discernible dorsiflexion
- Clinically proven to increase blood flow in the deep veins of the calf[9]
- The increase in blood flow is equal to 60%[10] of walking without a patient having to move or exert energy

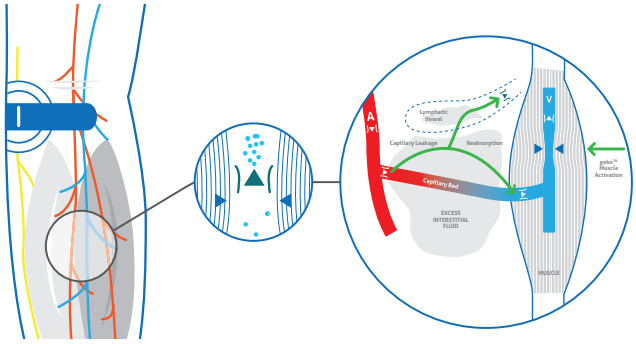

Figure 1. geko™ device mechanism of action – oedema reduction

Results

	geko™ group n=15	Retrospective matched group n=15	P-value
Readiness to theatre	1.66 days	3.66 days	0.001
Time to theatre	3.87 days	4.00 days	0.89
Tolerability	95% compliance	N/A	

Conclusion

- The geko™ is a safe and effective device for reducing pre-operative oedema in ankle fractures
- Reducing the time to theatre by 2 days could provide a saving of £569 per patient[11]
- Reducing oedema via this method provides an opportunity to optimise theatre schedules, release savings and has the potential to accelerate the patient recovery pathway

SAVING £569[11]

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References: 1. Lash N, Horne G, Fielden J, Devane P. Ankle fractures: Functional and lifestyle outcomes at 2 years. ANZ Journal of Surgery 72(10):724-730, 2002 doi:10.1046/j.1445-2197.2002.02530.x. 2. Singh R, Kamal T, Roulohamin N, Maoharan G, Ahmed B, Theobald P. Ankle Fractures: A Literature Review of Current Treatment Methods. Open Journal of Orthopedics 04(11):292-303, 2014. doi:10.4236/ojo.2014.411046. 3. Hoiness P, Stromsoe K. The influence of the timing of surgery on soft tissue complications and hospital stay. A review of 84 closed ankle fractures. Ann Chir Gynaecol 89:6–9, 2000. 4. Sukeik M, Qaffaf M, Ferrier G. Ankle fractures: impact of swelling on timing of surgery, length of hospital stay and the economic burden. Injury Extra 41(12):133-134, 2010. doi:10.1016/j.injury.2010.07.419. 5. Ashton F, Hamid K, Sulieman S, Eardley W, Baker P. Factors Influencing patient experience and satisfaction following surgical management of ankle fractures. Injury 48(4):960-965, 2017;. doi:10.1016/j.injury.2017.02.017. 6. Stull JD, Bhat SB, Kane JM, Raikin SM. Economic Burden of Inpatient Admission of Ankle Fractures. Foot & Ankle International. 38(9):997-1004, 2017;. doi:10.1177/1071100717709576. 7. Pietzik P, Qureshi I, Langdon J, Molloy S, Solan M. Cost Benefit with Early Operative Fixation of Unstable Ankle Fractures. The Annals of The Royal College of Surgeons of England. 88(4):405-407, 2006;. doi:10.1308/003588406x106504. 8. Clarkson R, Mahmoud SS, Rangan A, Eardley W, Baker P. The use of foot pumps compression devices in the perioperative management of ankle fractures: Systematic review of the current literature The Foot. 31:61-66, 2017;. doi:10.1016/j.foot.2017.03.002. 9. Nicolaides A, Griffin M. Measurement of blood flow in the deep veins of the lower limb using the geko™ neuromuscular electro-stimulation device. Journal of International Angiology August 2016-04. 10. Tucker A, Maass A, Bain D, Chen LH, Azzam M, Dawson H, et al. Augmentation of venous, arterial and microvascular blood supply in the leg by isometric neuromuscular stimulation via the peroneal nerve. The International journal of angiology: official publication of the International College of Angiology, Inc. 2010 Spring; 19(1): e31-7. 11. Health economic analysis performed subsequent to the completion of the study by MTECH Access Ltd, Bicester UK, 2017.

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