



Original Contribution

DOES INTERMITTENT PNEUMATIC COMPRESSION AFFECT TIME TO SURGERY IN MALLEOLAR FRACTURES?

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ABSTRACT

PURPOSE: The aim of this study is to investigate the influence of Intermittent Pneumatic Compression (IPC) on the time from diagnosis to surgery in adult patients with internally fixated ankle fracture.

METHODS: The 1st of February 2014 IPC was introduced in our department and implemented as a standard of care. IPC was prescribed 30 minutes 3 times daily until surgery. All patients with an unstable ankle fracture or lateral malleolar displacement more than 4 mm underwent standard surgical care. Intermittent pneumatic compression (IPC) is a system which enhances venous circulation and reduces edema. It consists of an air pump and a boot for the lower leg. In theory IPC compresses the edema and thereby preventing a surgical delay.

RESULTS: Patients managed with IPC had a statistically significant 50% reduction in time from presentation to surgery compared to those managed without, and had a reduced hospital stay. This resulted in a net saving for both patients and the hospital.

CONCLUSION: We conclude that foot pumps reduce the time to surgery and total hospital stay of patients requiring ankle Open Reduction and Internal Fixation (ORIF), and are cost effective.

Key words: Ankle Fractures, Swelling, Recovery Time, Intermittent Pneumatic Compression.

INTRODUCTION

When admitting patients with ankle fractures for surgical treatment the soft tissues are very important in terms of wound healing, infections, and surgical delay. If the soft tissues are too swollen the surgery is delayed and the patients typically lie with an elevated leg until the swelling has come down. This results in prolonged admission for the patients which also means a more expensive stay. Intermittent pneumatic compression (IPC), **Figure 1.** is a system which enhances venous circulation and reduces edema and. It consists of an air pump and a boot for the lower leg. In theory IPC compresses the edema and thereby preventing a surgical delay, pulmonary embolism and deep vein thrombosis. (1-5).

MATERIALS AND METHODS

The 1st of February 2014 IPC, **Figure 1.** was introduced in our department and implemented as a standard of care. IPC was prescribed 30 minutes 3 times daily until surgery. All patients with an unstable ankle fracture or

lateral malleolar displacement more than 4 mm underwent standard surgical care.

This study is a historical cohort comparison of the time to surgery 1 year prior and after the implementation of IPC. A search on admitted patients with ankle fracture diagnosis codes in the hospital database was conducted and data on age, gender and time for surgery was extracted. Health records were reviewed for diagnosis verification and exclusion criteria's, whereas x-ray images were reviewed for time of diagnosis and fracture classification.

Exclusion criteria's were:

- Age less than 16.
- External fixation.
- Conservative treatment.
- Multi-trauma i.e. more than 1 fracture.
- Tibial fracture.
- Transfer from other hospitals.
- Fractures from other hospitals.
- Fractures initially conservatively treated and the secondary displaced.
- Pathological fractures.

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Figure 1. Intermittent pneumatic compression device. (IPC)

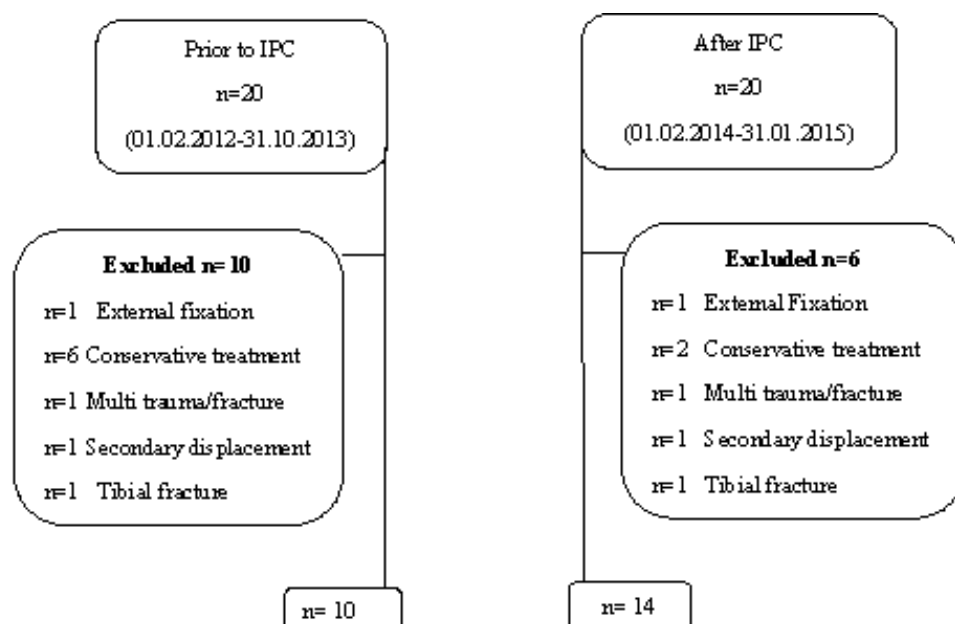
RESULTS

The cohort consists of 40 patients and the **Flowchart 1** shows the inclusion.

Prior to intermittent pneumatic compression (IPC) we had 20 patients from 01.02.2012-31.10.2013, 10 patients were excluded, 1 patient is treated with external fixation, 6 patients were treated conservatively, 1 patient had multi-trauma/ fracture, 1 patient with secondary displacement and 1 patient had a tibial fracture. So 10 patients were treated prior to IPC. 6 males and 4 females aged between 40-64 years old, types of fractures according to AO classifications were: (44 A1-A3) 2 patients, (44 B1-B3) 6 patients, (44 C1-C3) 2 patients. Surgical delay in median hours was (11-49).

After intermittent pneumatic compression (IPC) we had 20 patients from 01.02.2014-31.10.2015, 6 patients were excluded, 1 patient is treated with external fixation, 2 patients were treated conservatively, 1 patient had multi-trauma/ fracture, 1 patient with secondary displacement and 1 patient had a tibial fracture. So 14 patients were treated after IPC. 10 males and 4 females aged between 35-62 years old, types of fractures according to AO classifications were: (44 A1-A3) 2 patients, (44 B1-B3) 10 patients, (44 C1-C3) 2 patients. Surgical delay in median hours was (9-44).

After using the intermittent pneumatic compression (IPC), the inclusion number of patients has increased by 4. **Table 1** shows the results and there were no differences in gender or age in the two groups.



Flowchart 1. Results of the Cohort study. The flowchart shows the inclusion

Table 1. The results and there were no differences in gender or age in the two groups.

	w/out IPC	IPC
Gender		
Male	6	10
Female	4	4
Age		
Median (IQR)	53(40-64)	51(35-62)
AO		
44 A1-A3	2	2
44 B1-B3	6	10
44 C1-C3	2	2
Surgical delay		
Median hours (IQR)	22(11-49)	23(9-44)

DISCUSSION

There was a difference in fracture classification with more complex fractures in the IPC group. The use of IPC separately or concomitantly, has become standard practice in the management of ankle fractures. These methods are directed at reducing edema based on principles affecting the lymphatics system, skeletal muscle contractions, local pressure gradients and the influence of gravity.

CONCLUSION

There does not seem to be any benefit from IPC on time to surgery in patients with acute ankle fracture in our setting. However, this may be due to an already short waiting time for surgery and IPC may have a beneficial effect in a different setting. Thus; preventing deep vein thrombosis and pulmonary embolism. (6-9).

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