The influence of vitamin C on the outcome of ankle fractures
a Protocol of Double-blind, Randomized Controlled Trial.

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AOFAS2017
No disclosure
1. Intro/Background

- Ankle fracture is one of the most common orthopedics injuries [1,2]

- Poor functional outcome, residual pain and discomfort is a major burden to the patients daily activities
1. Intro/Background

- Complex regional pain syndrome (CRPS) is one of serious complication after orthopedics injuries [3]

- The incidence of CRPS is 0.3% after foot and ankle surgery [4]

- CRPS is well studied in wrist fracture [5,6]
1. Intro/Background

- Vitamin C has been proposed to improve outcomes after a distal radius fracture by:
  - promotion of bone and soft-tissue healing
  - reduction of the prevalence of complex regional pain syndrome (CRPS) [5,6]

- Literature search showed only one study looking for CRPS and foot and ankle fracture, and did not give clear answer about the effect of vitamin C in ankle fracture
2. Aims/Objectives

Primary Objective
To detect the effect of vitamin C on the functional outcome after an ankle fracture
- which will be measure by The American Orthopedic Foot and Ankle Score (AOFAS)
2. Aims/Objectives

Secondary Objective

The effect of vitamin C on:
- Post op pain **VAS score**
- Incidence of CRPS according to **IASP criteria**
- Wound healing
- Fracture healing

Dealy union 6m
Non union 9m
3. Materials/Methods

- **Study design**
  - Prospective
  - Double blind

**Randomized control study** (computerized randomization)

- **Sample size**
  - Assuming Type 1 statistical error is 5% and type 2 is 20%
  - We are planning to achieve a statistical power 80%
  - Based on the current evidence in literature the (AOFAS) score after ankle fracture is 57-74%.
  - The difference between the study and control group is 20%
  - Possibility of drop out 10%

We conclude the sample size is **110 patients**

<table>
<thead>
<tr>
<th>Study group</th>
<th>Control group</th>
</tr>
</thead>
<tbody>
<tr>
<td>55 patients</td>
<td>55 patients</td>
</tr>
<tr>
<td>500 mg vitamin C for 50 days</td>
<td>Placebo</td>
</tr>
<tr>
<td>standard of care</td>
<td>Standard of care</td>
</tr>
</tbody>
</table>

AOFAS2017
# 3. Materials/Methods

<table>
<thead>
<tr>
<th>Inclusion criteria</th>
<th>Exclusion criteria</th>
<th>Follow up plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>1- Age 18-50 y</td>
<td>1- open fracture</td>
<td>I. One week post op</td>
</tr>
<tr>
<td>2- closed ankle fracture</td>
<td>2- Peripheral vascular disease</td>
<td>II. 4 weeks post op</td>
</tr>
<tr>
<td>3- treated surgically</td>
<td>3- Allergy to Vitamin C</td>
<td>III. 12 weeks post op</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IV. 6 months post op</td>
</tr>
<tr>
<td></td>
<td></td>
<td>V. One year post op</td>
</tr>
</tbody>
</table>
3. Materials/Methods

- Primary and Secondary End Points:
  - Primary: Diagnosis of CRPS
  - Secondary: Failure of initial management

**Statistical plan**
- SPSS (version 19)
- mean, median, range, and standard deviation
- chi-square test, t test
- Logistic regression analyzes
- P value < 0.05
4. Expected Clinical Outcomes

- This study aims to improve the functional outcome after ankle fracture.
- Detect the effectiveness of vitamin C in improving:
  - The functional outcome
  - Wound healing
  - Fracture healing
- If the results are satisfactory, will try to implant as standard of care and HMC protocol.
5. Timeframe/Ethical Considerations

Timeframe

- The study will be conducted according to following timetable:

1. Ethics committee approval
   November/December 2016

2. Start of patient recruitment
   January 2017

3. End of patient recruitment
   January 2018

4. Last patient to be checked
   January 2019

5. Data analysis and Final study report
   February 2019
5. Timeframe/Ethical Considerations

Ethical Consideration

- IRP approval
- Informed consent
  - written in two languages (Arabic and English)
  - Translators will be involved if needed
- To avoid breach of patient confidentiality, data will be managed using password protected files saved on institutional computers with access to PI and co-investigators only
6. References

[4] Effect of vitamin C on prevention of complex regional pain syndrome type I in
Pubmed)
frequency of reflex sympathetic dystrophy in wrist fractures: a randomised
the outcome of distal radial fractures: a double-blind, randomized controlled
Thank You!!!