

Evidence Based Critically Appraised Topic

Vitamin C Used in Preventing Complex Regional Pain Syndrome

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## Vitamin C Used in Preventing Complex Regional Pain Syndrome

### **Clinical Scenario**

A 21-year old male presents to the orthopedic clinic for a scaphoid fracture following a minor motor vehicle accident (MVA). The fracture is diagnosed based on physical examination and x-ray. It is understood that treatment will include an open reduction internal fixation of the scaphoid bone and bracing after this. You have recommended vitamin C supplementation. Is there any way to reduce the chance of this young man suffering from this painful syndrome?

### **Clinical Question**

In patients suffering from scaphoid and wrist fractures, does Vitamin C therapy, compared to no Vitamin C supplemental therapy aide in prevention of complex regional pain syndrome type 1 (CRPS I)?

### **Articles Reviewed:**

1. Besse, J., Gadeyne, S., Galand-Desme, S., Lerat, J., & Moyen, B. (2009). Effect of vitamin C on prevention of complex regional pain syndrome type 1 in foot and ankle surgery. *Foot and Ankle Surgery*, 1, 179-82.
2. Zollinger, P., Tuinebreijer, W., Breederveld, R. and Kreis, R. (2007). Can vitamin C prevent complex regional pain syndrome in patients with wrist fractures? A randomized, controlled, multicenter dose-response study. *The Journal of Bone & Joint Surgery*, 89, 1424-1431.

### **Summary and Appraisal of Key Evidence**

#### Study 1:

This research was conducted via a quasi-experimental “before-and-after” study. Two chronologically sequential groups were either given prophylactic vitamin C or no supplemental vitamin C therapy. Both groups involved patients that were having foot or ankle surgery, which were all conducted

by the same surgeon. Members of both groups had suffered either an ankle or foot fracture rendering them to surgery. Group 1, having surgery from July 2002 to June 2003, consisted of 177 patients (44 males, 133 females) was not given vitamin C. Group 2, having surgery from July 2003 to June 2004, consisted of 215 patients (49 males, 166 females) was given 1 gram of prophylactic vitamin C every day postoperatively for 45 days. Compliancy for both groups was examined post-operatively at 3 weeks and 3 months. Ultimately, this evidence was examined for indications of vitamin C use in the prevention of CRPS I.

This trial is considered a Level 1, Grade a level of evidence based on the Strength of Recommendation Taxonomy (SORT). The basis of this level of evidence rating is that the study is a quasi-experimental study with consistent results, an ample control group, and a decisive conclusion (Newhouse, Dearholt, Poe, Pugh, & White, 2005).

### Study 2

This trial was designed as a multicenter, randomized, controlled study based on information from participants in three hospitals in the Netherlands. Patients presenting to the ER with wrist fractures were asked to participate in the study and if consented they were given a box of medication containing either placebo or vitamin C. The study trial is double-blind and randomized (Zollinger, Tuinebreijer, Breederveld, & Kreis, 2007).

Randomization of this study involved 416 patients from the three medical centers, of that there were 317 patients with 328 fractures who received vitamin C and 99 patients with 99 fractures received placebo. The final outcome of evaluation consisted of examining the clients for the presence of CRPS I at any time within one year post-fracture.

This trial is also considered a Level 1, Grade A because it is randomized, controlled and does not impose on predetermined eligibility. Again, the study also had an adequate cohort size, adequate control group, and a definitive conclusion with relevant statistical data.

## Study Results

### Study 1

CRPS I occurred in 9.6% of Group 1 as opposed to 1.7% of Group 2. The p value was  $p < 0.0001$  which suggests statistical significance in this study and that the null hypothesis *may* be rejected and a difference is likely to exist supporting the use of vitamin C in the reduction of CRPS I.

### Study 2

CRPS I occurred in 2.4% in the vitamin C group and in 10.1% of the placebo group. The p value was calculated at 0.002. Again, this p value shows strength in the research and statistics indicating that the null hypothesis (no vitamin C supplementation) *may* be rejected.

## Clinical Bottom Line/Relevance

CRPS is a syndrome of pain and autonomic dysfunction associated with trauma. CRPS type I does not include obvious nerve damage to the affected area of the body. This syndrome is underdiagnosed and associated with chronic pain and possibly other psychological comorbidities (Stevermer & Ewigman, 2008). There is not a lot of clinical research circulating regarding the prevention of CRPS I and currently there are no clinical guidelines, however it is still considered a major clinical problem in orthopedics along with other disciplines of practice (Roberto, Paul, Pieter, Ilona, Wouter, Kitty & Jan 2010). According to both of these studies, vitamin C can be safely and efficaciously recommended for the prevention of CRPS I, however additional research could further clarify this indication and level of efficacy.

## Implications for Practice

Based on the evidence in these two studies the simple addition of vitamin C for approximately 10-12 weeks following fractures may reduce the incidence of CRPS I substantially. Regardless if you plan for the client to get the additional vitamin C through daily intake or via supplement, the healing and

collagen formation benefits of vitamin C have been vastly researched and now there is strong evidence indicating the prevention of CRPS I. Appreciatively, vitamin C supplementation is considered mostly benign and very safe if taken following the indicated dosing.

## References

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