Evidenced Based Critically Appraised Topic
 Does vitamin C prevent complex regional pain syndrome after wrist fractures?
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Clinical Scenario
A 25-year-old female patient presents to clinic after falling on the ice. She has pain, swelling, and obvious deformity to the left wrist. Radiographs reveal a distal radial fracture, which is treated with casting. Up to 25% of patients experience lingering pain after wrist fractures, also referred to as complex regional pain syndrome.

Clinical Question
In patients with wrist fractures, does vitamin C decrease the incidence of complex regional pain syndrome (CRPS) when compared to patients who do not receive vitamin C?

Articles:


Summary and Appraisal of Key Evidence
Study 1 Ingram, O’Neill, and Herrick (2009) conducted a review of 34 randomized control trials and quasi-randomized controlled trials evaluating vitamin C supplementation aimed at preventing CRSP-I in adults with wrist fracture. This provided a Level 1, Grade A level of evidence. They independently assessed and extracted data on methods, participants, interventions and outcomes that consisted of participants with documented wrist fractures, side effects and range of dosages of vitamin C observed, and adherence to therapy. Adults aged 18 and above who had sustained one or more wrist fractures participated. Individuals with multiple trauma or compound fractures were excluded. There were no serious adverse effects that occurred. The main outcomes measured included CRP-I defined by the International Association for the Study of Pain (IASP) criteria or used a nonstandard definition of CRPS-I. Secondary outcomes measured were pain with activity or pain with rest, functional assessment of range of motion of wrist in flexion and extension, grip strength and vasomotor responses, quality of life, and possible medications side effects.
Study 2 Stevermer and Ewigman (2008) conducted a randomized, multicenter, dose ranging, placebo-controlled trial of vitamin C as a prophylactic treatment option for CRPS in wrist fracture participants, providing Level 1, Grade A level of evidence. They independently assessed and extracted data on methods, participants, interventions and outcomes that consisted of participants with documented wrist fractures, side effects and range of dosages of vitamin C observed, and adherence to therapy. Any adult >18 years of age with a fracture of one or both wrists was invited to participate. The study included 416 patients, of which 82.4% were women, and the average age of all subjects was 62.4 years. Patients were randomized into 1 of 4 groups: placebo, vitamin C 200mg daily, vitamin C 500mg daily, or vitamin C 1500mg daily for 50 days. One year after fracture, 10% of placebo patients had CRPS. Rates of CRPS were 4%, 2%, and 2% in the 200mg, 500mg, and 1500mg daily dosing of vitamin C, respectively.

Results
The results of the studies indicate that vitamin C/antioxidant therapy in patients with wrist fractures may be effective in preventing or at least shortening the severity and duration of CRPS. Further research is recommended, due to study limitations. Limitations of the studies included that no men had CRPS so there is no evidence to show whether or not this intervention works in men. Further, the second study reported there is no universal agreement on the diagnostic criteria for CRPS. The Veldman’s criteria was used, which is the standard criteria in the Netherlands and has the best inter-rater reliability of the current criteria.

Clinical Bottom Line
According to these two studies, the use of vitamin C/antioxidant therapy should be recommended as prophylactic treatment for patients suffering from wrist fractures. CRPS symptoms are often missed or misdiagnosed. CRPS is still not treatable, but now we know that vitamin C can help prevent it, or at least shorten its severity and duration. These studies are relevant to practice today because up to 25% of patients experience lingering pain, or CRPS, after wrist fractures, and as many as 50% of cast complaints or post-cast complaints probably represent CRPS. By reducing oxidant stress in CRPS, it is possible that vitamin C may help reduce microvascular dysfunction following injury, thus helping prevent occurrence of CRPS following wrist fracture.

Implications for Practice
I would recommend the use of prophylactic vitamin C/antioxidant therapy 500mg per day for 50 days in patients with wrist fractures. Further, I would continue to recommend practices currently in place to improve post fracture pain and outcomes, such as analgesics, ice, heat, and range of motion of the arm and fingers. Physical and psychological therapy and adequate pain control are part of the guidelines on early intervention. By adding vitamin C, CRPS complications may be prevented or at least reduced. Although these studies did not address co-morbid conditions, I would be cautious in prescribing vitamin C to patients sensitive to ascorbic acid. More research on this topic would be beneficial.
References
