

Recurrent Tibial Periostitis Due to Blunt Trauma

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Abstract

Periostitis is characterized by periosteal inflammation surrounding tubular bones. The pathophysiology is now considered to be multifactorial and a spectrum of disorders, recently being redefined as medial tibial stress syndrome (MTSS). Current treatment modalities include preventative and conservative measures, such as activity modification and footwear alterations. There is a paucity of literature for more invasive treatments, such as steroid injections. In conflict with the currently available limited literature, this study reports a case of recurrent tibial periostitis due to blunt trauma treated with steroid injections resulting in symptom resolution and no adverse events. While this case may suggest a therapeutic role for steroids in the treatment of MTSS from blunt trauma, it also highlights the need for additional studies to elucidate the safety profile and therapeutic efficacy of steroid injections.

Keywords

Periostitis, Medial Tibial Stress Syndrome, Trauma, Steroid Injections

Introduction

Periostitis, also known as periostalgia, is a condition characterized by inflammation of the periosteum around tubular bones, most commonly affecting the hands and feet.¹ In the tibia, it is colloquially known as shin splints or medial tibial stress syndrome (MTSS) and has traditionally been treated with anti-inflammatories and activity modification.² The pathophysiology is considered multifactorial. Recent studies have suggested a spectrum of injuries including muscle imbalance, abnormal tibial loading, and chronic repeated stress all contribute to a pathology now known as medial tibial stress syndrome.² A majority of the literature is solely based on expert opinion. The paucity of randomized controlled trials (RCTs) along with the lack of quality in existing RCTs suggest that high quality research is needed. Current treatment modalities are centered around preventative measures, such as footwear and activity modification. Even in refractory cases, treatment regimens remain limited and are primarily targeted towards symptom management.³ Rest, ice, elevation, compression, non-steroidal anti-inflammatories, massage therapy, dry needling, and various other techniques have been described for acute treatment.⁴⁻⁹ Beyond the acute phase, therapies include splinting, bracing, crutches, shockwave, and physiotherapy with proprioceptive training.^{6,7,10} Surgery is reserved for recalcitrant cases and may include posterior fasciotomy, procedures to address the tibial bone surface, and tibial nailing for stress fractures.¹¹

The role of steroids for treatment of MTSS has been described in the literature, though with a limited examination into effective-

ness, safety profile, and adverse effects. One study described the role of steroid treatment in a case series of 2 patients who were treated with steroids for recalcitrant MTSS. Neither patient had resolution of symptoms and both developed fat and muscle atrophy and hyperpigmentation. The authors recommended avoiding steroid use for MTSS, even in recalcitrant cases.^{12,13}

This study presents a case of traumatic periostitis refractory to conservative treatment, with subsequent improvement of symptoms after a series of steroid injections. To the authors knowledge, no such case of traumatic periostitis refractory to conservative measures has been reported in the literature. The patient's periostitis seemed to respond differently than what is described in the existing, albeit limited, literature on steroid use in periostitis and MTSS.

Case Report

A 58-year-old healthy male sustained blunt trauma to the distal medial aspect of his left tibia after a heavy object, weighing about 45 kilograms, fell onto his leg from a height of approximately 0.6 meters. The patient had no history of previous blunt trauma and no physical activity including exertion, running, or hiking as the patient led a sedentary lifestyle. He had no systemic symptoms in his initial presentation, denying fever, chills, local site infection, or recent illness. His past medical history was only significant for a bilateral hernia repair in the past and he was on no medications. Initial physical exam showed erythema, edema, faint ecchymosis, and tenderness to the distal medial tibia above the malleolus in an area measuring 12 by 5 centimeters. The patient was diagnosed with periostitis due to blunt trauma. Treatment revolved around conservative management with ice, elevation, and compression. Pharmacotherapy included celecoxib 400 mg initially followed by daily 200 mg for 10 days. Pain, erythema, and local tenderness gradually subsided over a period of 4 weeks. The edema diminished gradually in about 5-6 weeks.

A second episode of pain, swelling, and erythema subsequently occurred approximately 1 year later. The patient presented with similar symptoms and findings at the same location with no further history of trauma or exertion to the affected area. On physical exam, there was noted pain, redness, edema, and tenderness over the distal medial tibia. The patient was treated similarly with ice, compression, leg elevation and the same regimen of celecoxib as previously prescribed. The pain, local tenderness, and redness subsided within 3 weeks. The edema lasted about 5 weeks.

A third episode occurred about 6 months later. He presented with similar symptoms and findings of erythema, pain and tenderness in the same location (Figure 1). As in his previous recurrence, there was no history of repeated trauma or exertion to the affected area. Due to recurrence and symptoms refractory to traditional treatment regimens including ice, anti-inflammatories and activity modification, a decision was made to expand treatment modalities, including the use of steroid based therapy. One mL of a triamcinolone 10 mg/mL suspension was diluted with 5 mL of a lidocaine 1% with 1:100,000 epinephrine solution and was injected immediately above the periosteum in the affected area at 5 different sites approximately 2 cm apart. A 30 gauge needle was used with direct bone contact during injection to minimize infiltration into subcutaneous fat and to avoid skin and subcutaneous soft tissue atrophy (Figure 2). The injected deposits were massaged over the entire area of affected periosteum. An elastic bandage was applied over the leg and the patient was encouraged to elevate the leg when not ambulating. No other activity or weight bearing restrictions were recommended at that time. Erythema, pain, and tenderness subsided

3 days after the triamcinolone injection but the edema did not subside until 10 days after injection (Figures 3 and 4). The patient reported that the pain, erythema, tenderness and edema of the recovery period was significantly reduced compared to previous conservative treatments.

There were 3 more recurrences, with identical signs and symptoms as the time of his initial injury, over the next 2 years. All of these recurrences were treated with the same steroid injections and the patient responded with symptom resolution after each treatment.

Since his last treatment approximately 6 years prior to the time of this writing, the patient has not had recurrence of symptoms and reports total resolution of edema, erythema, and pain to his medial distal tibia. At no time after steroid injections did the patient suffer adverse effects including skin or muscle atrophy, hypopigmentation, erythema, nerve injury, or injection site soreness.



Figure 1. Left medial distal leg at 24 hours after occurrence of pain, redness and tenderness.



Figure 2. Technique of injection with deposit of 1 mL of triamcinolone lidocaine combination directly on top of the periosteum with 30-gauge needle.



Figure 3. Three days after triamcinolone injection. Erythema has subsided. Edema is still present.



Figure 4. Seven days after triamcinolone injection: skin pinch shows absence of edema.

Discussion

To the authors' knowledge and literature review on the topic, there have not been similarly reported cases of recurrent tibial periostitis due to blunt trauma successfully treated with steroid injections. In a case series by Loopik et al, 2 patients without acute history of trauma to their tibias developed MTSS. The first patient was an 18-year old female who developed MTSS over her tibia with a remote history of prior trauma. She received 3 local injections of in total 1ml Kenalog and 3ml lidocaine 2%, with limited relief of pain and subsequent development of hypopigmentation and fat atrophy surrounding the injection sites. The patient also experienced refractory pain requiring surgical treatment including fasciotomy and posterior tibialis release. The second case was a 22-year old female who also developed MTSS without acute trauma. She received 2 injections of in total 1ml Kenalog, 40 mg/ml and 3ml lidocaine 2%, with minimal pain relief and subsequent fat atrophy and skin hypopigmentation surrounding the injection sites. Their pain associated with MTSS improved after injections, but was never fully alleviated. Both patients underwent lipofilling in the sites of fat atrophy by a plastic surgeon.¹⁴ Ultimately, the minimal pain relief, refractory pain requiring surgical intervention, and adverse effects of the injections led the authors recommending against steroid use in the treatment of MTSS. Likewise, Park et al reported a case in which a 46-year old female developed fat atrophy, hypopigmentation, muscle atrophy, and possibly nerve injury after receiving a single triamcinolone acetone 20 mg injection for wrist pain. All her symptoms resolved, and

she did not require further operative treatment.¹⁵ The clinical improvement in this case report without adverse effects from the steroids is in contrast to the previous reports, and may suggest therapeutic benefits of steroid injections for periostitis or MTSS due to more acute blunt trauma, a mechanism which was not present in the previous reports.

In this patient, no adverse effects were noted with the steroid use. Providers must carefully weigh the potential benefit of steroid use in refractory cases of periostitis against the risks. This case may suggest that steroids have a role in the treatment of refractory MTSS after an acute traumatic mechanism, though a full understanding of periostitis is still unknown. Periostitis is often used to describe multiple pathologies. Pathophysiologic differences in etiology of periostitis, for example from blunt trauma, repetitive microtrauma, or infection, could alter or dictate responses to treatment modalities. More research is needed to elucidate ideal imaging modalities, treatment options, and disease pathology to determine optimal treatment and patient care.

Conclusion

Periostitis is a condition characterized by inflammation of the periosteum around tubular bones and in the tibia, known as shin splints or MTSS. There is a paucity of literature around traumatic periostitis and the role of steroids for its treatment. Limited case reports have previously advised against steroid use for MTSS. This case presents a possible role for therapeutic

steroids in the treatment of MTSS from acute blunt trauma. Further studies are needed to elucidate the safety profile and effectiveness of steroid injections in the treatment of periostitis.

Conflict of Interest

None of the authors identify any conflict of interest.

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