

Post Sports Injury Burn Due to Inappropriate Use of Cryotherapy

Urgent message: PRICE (protection, rest, ice, compression, and elevation) treatment is often advised to patients as part of sports soft tissue injuries; however, incorrect use of cryotherapy may lead to complications.

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Introduction

Cryotherapy involves application of ice on acute soft tissue injuries in the form of ice cubes, ice packs, ice towels, ice massage, frozen gel packs, ethyl chloride, and other chemical devices. The goal is temperature reduction of 10-15° C¹ to decrease pain and swelling, accomplished by localized inhibition of nerve conduction and vasoconstriction with reduced metabolic need. Cryotherapy burns are uncommon,^{2,3} with most occurring due to prolonged exposure to cold or a thin barrier covering the ice or cool packs.

Case Discussion

A 55-year-old male was playing soccer, and after a sudden burst felt pain on the back of his right calf. He was limping and had difficulty in weight bearing. There was tender medial head of gastrocnemius with normal Achilles tendon. He had no drug allergies, and significant past medical history included ischemic heart disease, psoriasis, rosacea, and colon polyps. Regular medications consisted of atorvastatin, aspirin, ACE inhibitor, metoprolol, hydrocortisone ointment, and moisturizers. He was treated for a gastrocnemius sprain with PRICE, diclofenac, physiotherapy, and advised to follow up later in the week.

He returned to the clinic the next day with superficial blisters up to 6 x 6 cm surrounded by dark pigmentation on the right calf, thought to be due to direct application of ice for about 4 hours. (See **Figure 1**.)

Education on cryotherapy treatment was provided and he was advised to return in 2 days for a wound check, at which time his limping had worsened and the blister size increased to 10 x 11 cm with fluid collection. The bullous



lesion was drained, yielding 180 mL of serous fluid.

The wound was cleaned with normal saline and dressed with sterile dressing. Regular dressing changes and follow-up were advised. (See **Figure 2**.)

After a week of alternate day dressing in the clinic, he improved considerably, with only a residual small distal blister on his calf. He has been walking without a limp but some pain.

During the second week of injury, the superficial burn site increased to 17 x 10 cm, but there was no sign of infection and hence dressing continued. (See **Figure 3**.)

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Figure 1. Day 2 of cryotherapy burn, formation of a blister.



Photo courtesy of Dr. Amitesh Kumar.

Figure 2. Day 2 burn, post blister aspiration.



Photo courtesy of Dr. Amitesh Kumar.

Figure 3. Two weeks after burn (second-degree burn).

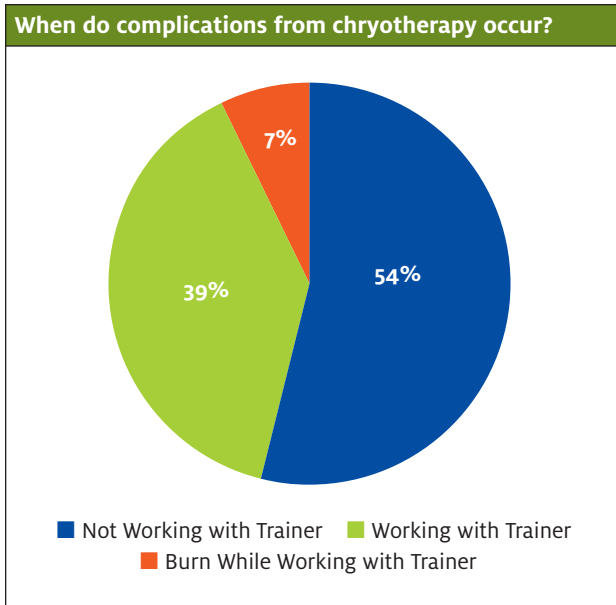


Photo courtesy of Dr. Amitesh Kumar.

Figure 4. Five weeks after burn; skin healing well with dark pigmentation.



Photo courtesy of Dr. Amitesh Kumar.



He improved within the next 2 weeks and continued his physiotherapy for calf strain. (See **Figure 4**.)

Discussion

Cryotherapy is common and widely accepted with orthopedic injuries. Though cryotherapy injuries may occur from home use, 42% of the complications occur in patients working with athletic trainers, of which 18% are burn related.⁴

Prolonged application and direct contact of ice on the skin are detrimental and could lead to burns, which further delays the rehabilitation of the injured soft tissue. Scenarios could be more challenging if burns occur on joints, which can lead to contractures and further hinder rehabilitation of the injured soft tissue. Cryotherapy leads to reduced blood flow and metabolism and prolonged exposure causes tissue necrosis and resultant burn.

Effectiveness of Cryotherapy

Though it is commonly practiced, a systemic review of 22 randomized controlled trials found marginal benefit of cryotherapy after soft tissue injuries.^{5,6} Few of those studies had good methodology, and further well-controlled trials are necessary for better guidelines on cryotherapy with various types of injuries. Cryokinetics, which is cryotherapy plus exercise, has been gaining momentum. It has shown to be more effective than cryotherapy alone in treating soft tissue injuries.

There are various cryotherapy guidelines,⁷ generally

recommending use in acute setting for 3-10 days. Commercial ice packs are available. If using homemade ice packs, they should be well wrapped to avoid direct contact on skin. Recommended use is for 10-20 minutes, 3-4 times per day.⁸

Burns from such a common treatment modality signify that better education and awareness of PRICE and cryotherapy are needed. In busy urgent care clinics, face-to-face counseling can be further emphasized with written information.

Take-Home Points

Proper use and application of cryotherapy should be explained to patients as to minimize the risks of adverse events like burns. ■

References

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Summary

- When employing PRICE treatment for a sports injury, cryotherapy may be administered via ice cubes, ice packs, ice towels, ice massage, frozen gel packs, ethyl chloride, and other chemical devices.
- The goal of cryotherapy is to reduce site temperature by 10–15° C to decrease pain and swelling.
- While use of cryotherapy in orthopedic injuries is common, cryotherapy burns are uncommon. Most occur due to prolonged exposure to cold or because a barrier covering the ice or cool packs is too thin.
- Cryotherapy leads to reduced blood flow and metabolism; prolonged exposure causes tissue necrosis.
- A review of 22 randomized controlled trials revealed marginal benefit of cryotherapy after soft tissue injuries, though few of those trials had good methodology.