

Effectiveness of cold therapy in reducing pain, trismus, and oedema after impacted mandibular third molar surgery: a randomized, self-controlled, observer-blind, split-mouth clinical trial[☆]

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M. Zandi, P. Amini, A. Keshavarz: Effectiveness of cold therapy in reducing pain, trismus, and oedema after impacted mandibular third molar surgery: a randomized, self-controlled, observer-blind, split-mouth clinical trial. *Int. J. Oral Maxillofac. Surg.* 2016; 45: 118–123. © 2015 International Association of Oral and Maxillofacial Surgeons. Published by Elsevier Ltd. All rights reserved.

Abstract. Cold therapy is a conventional and widely used modality for reducing pain, trismus, and oedema after dentoalveolar surgeries. However, information reported in the literature on its effectiveness is insufficient and controversial. This study was performed to evaluate the effect of local cold application in reducing pain, trismus, and swelling after impacted mandibular third molar surgery. Thirty patients (seven males and 23 females) with bilateral symmetrical mandibular impacted third molars were enrolled in this randomized, self-controlled, observer-blind clinical trial. The patients were aged between 18 and 30 years. After surgical removal of the tooth on one side (intervention), ice pack therapy was given for 24 h after surgery; for the other side (control), no cold therapy was given. The time interval between the two surgeries was at least 4 weeks. The amount of pain, trismus, and facial swelling was measured on days 2 and 7 postoperative, and patient satisfaction with the cold therapy vs. no cold therapy was assessed. The amount of pain, trismus, and facial swelling, and the extent of patient satisfaction were not significantly different between the intervention and control sides. Cold therapy had no beneficial effects on postoperative sequelae after impacted mandibular third molar surgery.

Key words: oedema; trismus; pain; cold therapy; impacted tooth.

Accepted for publication 23 October 2015
Available online 17 November 2015

[☆] The trial is registered at irct.ir, number IRCT201410214303N3.

The removal of impacted teeth is one of the most common surgical procedures carried out by oral and maxillofacial surgeons. However, despite the best preoperative preparation and operative procedure, some unavoidable problems such as pain, ecchymosis, facial swelling, and trismus may occur. Although these postoperative sequelae are expected and considered normal physiological responses to surgery, they are usually unpleasant and may adversely affect the daily activities and quality of life of the patient.

Several modalities to prevent or minimize the pain, trismus, and oedema resulting from impacted tooth surgery have been suggested in the published literature. These modalities include the use of medications such as corticosteroids and non-steroidal anti-inflammatory drugs (NSAIDs), laser, enzyme preparations, local compression, ice packs, and surgical drains.¹⁻⁵

The role of corticosteroids and NSAIDs in the prevention of the sequelae of third molar surgery has been studied extensively. NSAIDs, by inhibiting cyclooxygenase enzymes and reducing the production of prostaglandins, are considered to be one of the most useful medications to control postoperative morbidities. Corticosteroids, by preventing inflammatory mediator release from many of the cell types involved in inflammation and by reducing the production of various proinflammatory and inflammatory mediators such as prostaglandins, effectively minimize oedema, pain, and trismus after third molar surgery. Different routes of administration including oral, parenteral, and local injection have been used for these medications. Because of its maximal anti-inflammatory effects and minimal mineralocorticoid activity, dexamethasone is the most commonly used steroid in dental surgeries.⁶⁻⁹

The effectiveness of perioperative antibiotic therapy in preventing inflammatory and infectious complications after dentoalveolar surgeries has long been controversial. The proponents of this strategy believe that antibiotic administration prevents the postoperative oedema, trismus, and pain caused by infection. However, opponents have suggested that the rate of infection after third molar surgery is low and recommend the use of antibiotics only when a clear benefit is identified, because their inappropriate use may lead to bacterial resistance and increase the economic burden on the healthcare system.¹⁰⁻¹³

Cold therapy is a simple method that has traditionally been used to reduce pain and swelling after acute musculoskeletal injuries and various orthopaedic surgical procedures. In the published orthopaedic

literature, there is a plethora of studies including evidence-based research on the effect of cold therapy in reducing the complications after various orthopaedic procedures.¹⁴⁻¹⁸ However, despite the long history of cold therapy in the management of the postoperative sequelae of impacted tooth surgery, the effectiveness of this modality has not been sufficiently evaluated and the results of previous studies are not consistent.¹⁹⁻²⁴ In studies performed by Van der Westhuijzen et al.,²³ Forouzanfar et al.,¹⁹ and Nusair,²¹ it was found that the application of cold had no beneficial effect on reducing the sequelae of dentoalveolar surgeries. However, in the study by Forouzanfar et al.,¹⁹ only pain was evaluated, and in the animal study by Nusair,²¹ only facial swelling was evaluated. In contrast, an intra-individual, randomized clinical trial by Laureano Filho et al.²⁰ demonstrated that cold therapy reduced the oedema and pain but not the trismus after surgery. Nevertheless, the sample size in this latter study was small and the authors recommended further related research. A study by Rana et al.²² showed that cooling therapy using the Hilotherm system was more effective than the conventional method in reducing the sequelae of third molar surgery.

In previous investigations evaluating the effectiveness of cold therapy in minimizing the problems after dentoalveolar procedures, different cooling devices (ice bags, Hilotherm, chemical packs, etc.), cold therapy protocols (e.g., the initiation and duration of cold application), and study designs have been used. Because of the methodological differences between previous studies, which make the comparison of their results difficult, and the prevalent use of cold therapy after dentoalveolar procedures, the efficacy of this treatment requires further investigation. Although, textbooks on oral and maxillofacial surgery have advocated the use of ice packs after dentoalveolar surgeries, they have also stated that no evidence for its effectiveness exists.²⁵

The present randomized, self-controlled, observer-blind clinical trial was conducted to evaluate the effect of local cold application in reducing pain, trismus, and swelling after mandibular third molar surgery. It was hypothesized that the application of ice packs to the face would have a beneficial effect on these postoperative problems.

Materials and methods

The protocol of this investigation was approved by the research ethics committee

of the study university and written informed consent was obtained from all of the participants.

Thirty consecutive patients who were referred to the department of the oral and maxillofacial surgery for the extraction of bilateral mandibular impacted third molars were enrolled in this randomized, self-controlled, observer-blind, split-mouth clinical trial. The patients ranged in age from 18 to 30 years (mean age 23.2 ± 2.1 years); seven were male and 23 were female. Only healthy patients who had bilateral symmetrical bone impacted mandibular third molars on panoramic radiographs were included. Of the 30 patients who participated in this investigation, 19 had bilateral mesioangular impacted teeth and 11 had bilateral horizontal third molars. All of the impacted teeth needed bone removal for extraction.

Exclusion criteria were the presence of a pathology or a history of previous surgery/fracture in the mandibular third molar area, an intolerance to cold, and congenital anomalies of the mandible. Patients under treatment with analgesic and anti-inflammatory medications for various systemic diseases were also excluded from the study.

All of the impacted teeth were extracted under local anaesthesia by the same surgeon. After inferior alveolar nerve block and local infiltration of two carpules of lidocaine hydrochloride 2% and epinephrine 1:100,000, a triangular mucoperiosteal flap was elevated. The overlying bone was then removed and the tooth was sectioned (if required) with a fissure bur under continuous irrigation with normal saline solution. After removing the tooth, the flap was repositioned and sutured. The surgical removal of the tooth on the other side of the mandible was performed at least 4 weeks later (when pain, trismus, and swelling from the first procedure had recovered completely), using the same standardized surgical technique.

Preoperatively, no medication was prescribed for the patients. Postoperatively, all patients received the same medications consisting of amoxicillin 500 mg three times daily for 5 days, ibuprofen 400 mg three times daily for 2 days, and chlorhexidine gluconate 0.2% mouthwash three times daily for 7 days.

Following surgical removal of the tooth on one side of the mandible (study side), the patients were instructed to apply ice packs (ice cubes placed in a sealed plastic bag and wrapped in a cloth) on the operated side of the face for periods of 20 min followed by resting periods of 20 min during the first 24 h after surgery, when

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