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Effect of Ice Pack Application on Post-Extraction Pain and Swelling: A Randomized Clinical Study

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ABSTRACT

Background: Post-extraction pain and facial swelling are common complications following dental extraction and can adversely affect patient comfort. Cryotherapy using ice pack application is a simple, economical, and non-invasive method used to reduce postoperative inflammation; however, its clinical effectiveness needs further evaluation.

Aim: To evaluate the effect of ice pack application on postoperative pain and facial swelling following dental extraction.

Materials and Methods: This randomized clinical study included 30 patients requiring routine dental extraction. The patients were randomly allocated into two groups with 15 patients in each group. Group I (Ice Pack Group) received extraoral ice pack application intermittently for 20 minutes during the first postoperative hour, while Group II (Control Group) received standard postoperative care without ice pack application. Postoperative pain was assessed using the Visual Analog Scale (VAS) at 6, 12, and 24 hours, and facial swelling was evaluated using standardized facial measurements at 24 and 48 hours post-extraction. Statistical analysis was performed with the level of significance set at $p < 0.05$.

Results: Group I demonstrated significantly lower mean pain scores and reduced facial swelling at all postoperative evaluation intervals compared to Group II ($p < 0.05$). The reduction in pain and swelling was more pronounced during the first 24 hours following extraction.

Conclusion: Extraoral ice pack application is an effective adjunct in reducing postoperative pain and facial swelling following dental extraction. Its routine use can enhance patient comfort and postoperative recovery.

Introduction

Dental extraction is one of the most commonly performed procedures in oral and maxillofacial surgery.[1] Despite being a routine intervention, postoperative complications such as pain and facial swelling are frequently encountered and may significantly affect patient comfort and quality of life during the healing period. These inflammatory responses

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are primarily due to surgical trauma, leading to increased vascular permeability and subsequent edema in the surrounding tissues.[2]

Various pharmacological and non-pharmacological methods have been employed to control postoperative pain and swelling following dental extraction.[3] While analgesics and anti-inflammatory drugs are routinely prescribed, their use may be associated with adverse effects, contraindications, or patient non-compliance. Hence, simple adjunctive measures that are safe, economical, and effective are desirable.[3,4]

Cryotherapy, commonly applied in the form of ice packs, has been widely used in medical and dental practice to reduce inflammation, pain, and swelling. The mechanism of action of cryotherapy includes vasoconstriction, reduction in local blood flow, decreased metabolic activity, and suppression of inflammatory mediators, thereby limiting edema formation and providing analgesic effects. Although ice pack application is frequently recommended after oral surgical procedures, there is limited clinical evidence regarding its effectiveness following routine dental extractions.[5-8]

Therefore, the present randomized clinical study was undertaken to evaluate the effect of extraoral ice pack application on postoperative pain and facial swelling following dental extraction. The findings of this study may help establish evidence-based postoperative protocols to improve patient comfort and recovery.

Materials and Methods

Study Design: The present study was designed as a randomized clinical study to evaluate the effect of ice pack application on postoperative pain and facial swelling following dental extraction.

Study Setting: The study was conducted in the Department of Oral and Maxillofacial Surgery after obtaining approval from the Institutional Ethical Committee. Written informed consent was obtained from all participants prior to inclusion in the study.

Sample Size and Study Population: A total of 30 patients requiring routine dental extraction were included in the study. The patients were randomly allocated into two groups, with 15 patients in each group.

Inclusion Criteria

1. Patients aged 18–50 years
2. Patients requiring routine, uncomplicated dental extraction
3. Systemically healthy patients
4. Patients willing to participate and provide informed consent

Exclusion Criteria

1. Patients with systemic conditions affecting wound healing
2. Patients with acute infection at the extraction site
3. Patients requiring surgical or traumatic extractions
4. Patients on long-term analgesic, anti-inflammatory, or steroid therapy
5. Pregnant and lactating women

Randomization: Patients were randomly divided into two groups using a simple randomization method:

Group I (Ice Pack Group): Extraoral ice pack application

Group II (Control Group): Standard postoperative care without ice pack application

Surgical Procedure: All extractions were performed under local anesthesia using a standardized technique by the same operator to minimize procedural variability. Standard postoperative instructions were given to all patients.

Intervention Protocol: Patients in Group I were instructed to apply an extraoral ice pack over the operated area intermittently for 20 minutes (10 minutes on and 10 minutes off) during the first postoperative hour following extraction. Group II patients did not receive ice pack application.

Outcome Assessment

Pain Assessment: Postoperative pain was assessed using the Visual Analog Scale (VAS) at 6, 12, and 24 hours post-extraction.

Swelling Assessment: Facial swelling was evaluated using standardized linear facial measurements between predetermined anatomical landmarks at 24 and 48 hours post-extraction.**Statistical Analysis:** Data were tabulated and analyzed using statistical software. Mean and standard deviation were calculated, and intergroup comparisons were performed using appropriate statistical tests. A p value of < 0.05 was considered statistically significant.

Results: All 30 patients completed the study without any postoperative complications. The collected data were analyzed and compared between the two groups.

The mean Visual Analog Scale (VAS) pain scores were consistently lower in Group I (Ice Pack Group) compared to Group II (Control Group) at all postoperative time intervals. At 6, 12, and 24 hours post-extraction, the reduction in pain in the ice pack group was found to be statistically significant ($p < 0.05$). The greatest reduction in pain was observed within the first 24 hours following extraction **(Table 1)**.

Facial swelling measurements recorded at 24 and 48 hours post-extraction were lower in Group I when compared to Group II. The difference in swelling between the two groups was statistically significant at both time intervals ($p < 0.05$). Although maximum swelling was observed at 24 hours in both groups, a greater reduction was noted at 48 hours in patients who received ice pack application.

Table 1: Comparison of Mean Postoperative Pain Scores (VAS) Between the Two Groups

Time Interval	Group I (Ice Pack) Mean ± SD	Group II (Control) Mean ± SD	p value
6 hours	3.2 ± 0.8	5.1 ± 0.9	<0.05*
12 hours	2.4 ± 0.7	4.2 ± 0.8	<0.05*
24 hours	1.6 ± 0.6 |	3.1 ± 0.7	<0.05*

*Significant

Table 2: Comparison of Mean Facial Swelling Measurements (mm) Between the Two Groups

Time Interval	Group I (Ice Pack) Mean ± SD	Group II (Control) Mean ± SD	p value
24 hours	4.5 ± 1.0	7.2 ± 1.2	<0.05*
48 hours	2.1 ± 0.8	4.6 ± 1.0	<0.05*

Discussion

Postoperative pain and facial swelling are common inflammatory sequelae following dental extraction and may adversely affect patient comfort and quality of life. Various methods have been advocated to minimize these complications, among which cryotherapy remains a simple and widely used non-pharmacological approach. The present randomized clinical study evaluated the effectiveness of extraoral ice pack application in reducing post-extraction pain and swelling.

In the present study, patients who received ice pack application exhibited significantly lower postoperative pain scores at 6, 12, and 24 hours compared to the control group. This finding may be attributed to the analgesic effect of cryotherapy, which reduces nerve conduction velocity and suppresses the release of inflammatory mediators. Similar results were reported by Ribeiro et al.[9], who observed reduced postoperative pain following cryotherapy after dental extractions. Khan et al. also reported that early application of ice packs significantly reduced pain intensity during the immediate postoperative period.[10]

Facial swelling was significantly reduced in the ice pack group at both 24 and 48 hours post-extraction in the present study. Cryotherapy induces vasoconstriction, leading to decreased local blood flow and capillary permeability, thereby limiting edema formation. These findings are consistent with the observations of Holland and Hindle, who reported reduced facial swelling following cryotherapy after oral surgical procedures.[11] van der Westhuijzen et al. also demonstrated that ice pack application effectively minimized postoperative swelling following third molar surgery.[12]

Maximum swelling was observed at 24 hours post-extraction in both groups; however, a greater reduction was noted at 48 hours in patients who received ice pack application. This trend is in agreement with studies by Marković and Todorović, who reported that cryotherapy accelerates resolution of postoperative edema when applied during the early postoperative period.[13]

The findings of the present study further support the results of Laureano Filho et al., who emphasized that cryotherapy is an effective adjunctive method for controlling postoperative inflammation after oral and maxillofacial surgical procedures. The simplicity, cost-effectiveness, and absence of systemic side effects make ice pack application a practical option in routine dental practice.[8]

Despite the positive outcomes, the present study has certain limitations. The sample size was relatively small, and the follow-up period was limited to 48 hours. Additionally, swelling assessment was performed using linear facial measurements, which may be subject to minor operator variation. Future studies with larger sample sizes, longer follow-up periods, and advanced three-dimensional imaging methods may provide more definitive evidence regarding the long-term benefits of cryotherapy.

Within the limitations of the present study, extraoral ice pack application can be considered an effective adjunct in reducing postoperative pain and facial swelling following routine dental extraction and can be safely recommended to enhance postoperative patient comfort.

Conclusion

Within the limitations of the present randomized clinical study, it can be concluded that extraoral ice pack application is an effective, simple, and non-invasive adjunct for reducing postoperative pain and facial swelling following routine dental extraction. Patients who received ice pack application demonstrated significantly lower pain scores and reduced facial swelling when compared to those who received standard postoperative care alone. The maximum benefit of cryotherapy was observed during the first 24 hours post-extraction. Owing to its cost-effectiveness, ease of application, and absence of systemic side effects, routine use of ice pack application can be recommended as a part of standard postoperative instructions to improve patient comfort and enhance recovery.

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