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Comparison by Magnetic Magnetic Resonance Imaging of the Effects of Two Different Non-Steroidal Anti-Inflammatory Drugs on Edema Following the Surgical Extraction of Impacted Third Molars

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Abstract: Non-steroidal anti-inflammatory drugs are continuously being developed for use as therapeutic agents for inflammatory diseases. The NSAID agents are commonly used in the control of pain by their effects on suppressing the inflammatory reaction. Pain and edema are universal complications following the surgical extraction of impacted third molars. Felden (piroxicam) and Tilocil (felodipin) were used in this study for comparing the antiinflammatory effects of two different chemical agents on the control of pain and inflammation following the surgical extraction of bilaterally impacted mesio-angularly positioned lower third molars. A total of 10 patients aged from 20

to 24 attending our clinic for the extraction of third molars voluntarily were chosen. The purpose of this study was to evaluate the effects of two different NSAID drugs on the control of inflammation following the surgical extraction of third molars by MR imaging obtained on the pre-operative 1st and post-operative 3rd days. The statistical analyses were carried out by using the t-test in paired series ($t=0.02$, $p<0.05$). No statistical difference was found between the two NSAID drugs regarding their effects on the control of post-operative inflammation.

Key Words: Surgical extraction, impacted teeth, magnetic resonance images, piroxicam, tenoxicam.

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Introduction

Impacted teeth (1) can be defined as teeth which do not occupy their normal location on the dental arch and/or can not achieve functional occlusion during the physiological time period. Fully-impacted teeth which do not have their normal position and/or function should be extracted unless there is a contraindication (1). The surgical extraction of the third molars is a method carried out frequently in oral surgery. The pain, edema, and trismus caused by trauma and inflammation following the surgical extraction of impacted third molars are universal complications encountered in the early period after surgery. As a result of the trauma occurring during surgical extraction, edema, pain and trismus may occur after the operation in the masticatory muscles and the muscles carrying out the motion of the mandible (by the secretion of hormones such as prostaglandin and leukotriene) (1,2,3).

Today, the widespread and injudicious use of antibiotics leads to bacterial resistance to these agents. Therefore, the use of an efficient anti-inflammatory analgesic following surgical extraction will prevent the

long-term use of antibiotics by decreasing the complications occurring after the surgical intervention.

The vascular and cellular response of tissues to the destruction of cells and matrix in the bone following surgery is called inflammation. During the primary phase of cellular healing, called the inflammatory reaction (3), non-steroidal anti-inflammatory drugs act by inhibiting the prostaglandin synthesis. Therefore, they are frequently used after surgical procedures in order to reduce the soft tissue edema and pain by suppressing inflammation (3,4).

For years, the assessment of the edema after an operation has been carried out by various methods, including photometry, cephalostat, ultrasonography, physical measurements of given points on the face, and various imaging methods.

Magnetic resonance imaging has been preferred to imaging methods such as direct graphy, tomography and arthrography since it provides a higher soft tissue contrast, is noninvasive, does not contain radiation, can assess the changes in soft tissues, and can give images on the axial, cranial, and sagittal planes (5,6,7).

Materials and Methods

Our study included 10 patients who presented with the indication of extraction of the third mandibular molars and were admitted to the Department of Maxillofacial and Oral Disease and Surgery, Faculty of Dentistry, University of Istanbul. They had impacted teeth with bilateral, asymptomatic, and mesioangular positions. The ages of the patients (6 male and 4 female ranged from 20 to 24 years.

The subjects had no allergic reactions to drugs and were not using any drugs. They had no complaints regarding the gastro-intestinal system, no hepato-renal diseases affecting drug absorption and excretion, and no coronary artery diseases. All operations were performed by the same dentist using Prilocaine Hydrochloride Octopresin (Citanest) as a local anesthetic, and operational characteristics such as incision type, extraction, relief of bone retention, and irrigation were the same in all interventions, causing a minimum of trauma. For five post-operative days, 3x500mg of the antibiotic amoxicillin was administered to the patients. Piroxicam tablets were given as an anti-inflammatory drug after the surgical intervention on one side of the patients, and, after the third molar extraction which was performed at least 21 days later on the other side, tenoxicam tablets were given. MR images of the patients one day prior to and 3 days after the surgical operation were obtained with a 1.5 Tesla General Electric Sigma Hi-speed instrument. From the images obtained in the axial T1 image, length measurements of the straight lines were carried out passing through tuberositas occipitalis interna between lower central teeth, and through the distal part of mandibular ramus and the second molar. The values obtained are assessed by t-test in statistically matched series in order to investigate the effect of both non-steroidal anti-inflammatory drugs on the edema.

Results

The statistical assessment of the measurements of the effects of tenoxicam and piroxicam on the edema formed after the surgical extraction of third mandibular molars obtained from images taken preoperatively (Figure 1) and on the third day post-operatively (Figures 2, 3) by MR imaging was carried out by t-test in matched series ($t=0.02$, $p<0.05$).

No statistically significant difference was found between these two drugs regarding their anti-inflammatory effects (Tables 1,2).

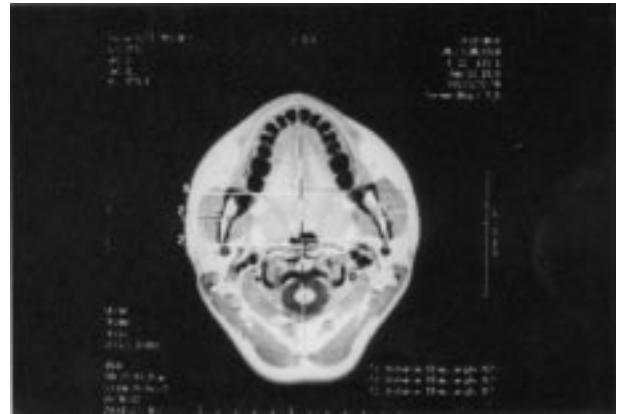


Figure 1. Sagittal MRI scan taken through the cervical margins of the mandibular teeth pre-operatively

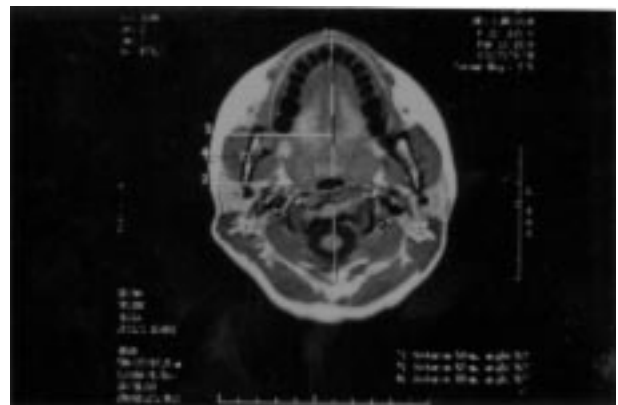


Figure 2. Sagittal MRI scan taken on the third day postoperatively (Tenoxicam) .



Figure 3. Sagittal MRI scan taken on the third day postoperatively (Piroxicam) .

Table 1. Statistical assessment of the measurement of the effects of Tenoxicam.

Tilcotil (Tenoxicam)	Mean ± Standard deviation	Mean difference ± Standard deviation	t	p
Preoperatively	51.56 ± 4.26	2.46 ± 3.46	t=2.24	p<0.05
Postoperatively	54.04 ± 4.09			

Table 2. Statistical assessment of the measurement of the effects of Piroxicam

Felden (Piroxicam)	Mean ± Standard deviation	Mean difference ± Standard deviation	t	p
Preoperatively	49.86 ± 4.15	2.42 ± 2.86	t=2.66	p<0.05
Postoperatively	51.1 ± 4.09			

Both anti-inflammatory drugs belonging to the oxycam group were found to have strong anti-inflammatory effects on the third post-operative day.

Discussion

Insufficient total alveolar arch length, a neighboring tooth, cyst, or tumor that covers the tooth, and such impediments as thick bone or soft tissues (1,2) are considered to be the major causes of impacted tooth formation.

The impacted third molars in the mandible, which are frequently encountered in oral surgery, should be extracted before the patient is 25 years of age. The reasons are that the complications of the impacted teeth increase in direct proportion to the patient's age, that surgical intervention postponed to the later periods of life may be more hazardous due to the potential systemic diseases, and that, according to the principle of preventive medicine, the problem should be dealt with before it appears (1,2).

Tenoxicam and piroxicam, which are non-steroidal anti-inflammatory analgesics, are used in the symptomatic treatment of painful inflammatory and degenerative diseases of the musculo-skeletal system. They are tienotiazin derivatives of the oxycam group and they suppress inflammation efficiently for 2 days after administration (3).

In Standel et al.'s studies, more signs of improvement in the pain and joint sensitivity of patients were found in the tenoxicam group than in the piroxicam group(8). In various investigations carried out on patients with rheumatism, Bird et al., Schemett et al, and Kircheiner et

al. reported that the analgesic effect of tenoxicam appeared faster than that of benzidine hydrochloride and that it had longer anti-inflammatory action (5, 9,10,11).

In our study, which is a comparative analysis of the effects of tenoxicam and piroxicam on the edema occurring after the surgical removal of impacted third molars, using MR imaging, no statistical significant difference between the two drugs' effects on edema on the third post-operative day was observed. However, the powerful anti-inflammatory effect of both drugs was noted.

The study of the dimensions of edema, which is a clinical indicator, is a frequently used method in the determination of the effect of anti-inflammatory drugs. Magnetic resonance imaging, which distinguishes the tissues by making use of their physical and biochemical characteristics, provides a higher soft tissue concentration and may give images in the axial coronal and sagittal planes (5,6,7,12), is a relatively new method. MR imaging, which is reliable and effective, was used in the determination of post-operative edema in our study.

It has been reported by Llewelyn et al. that MR imaging, a non-invasive technique in the measurement of post-operative swelling, is more objective and that it may be reliably used in order to compare the effect of non-steroidal anti-inflammatory drugs on the edema after the extraction (11). The costliness of the technique and the fact that the patient must be kept in a closed area for a period of approximately 45 minutes (12) are described as the main disadvantages of the method. It is a more reliable technique in edema assessment and does not have radiation.

In Holland's study (8), in order to assess the swelling which occurs after the surgical extraction of third molars, the physical measurement method, ultrasound, and portable stereophotogrammetry were used. It has been reported that ultrasound after the surgical extraction of third molars gave significant results regarding the edema as compared to other methods (5).

By using the MR imaging method, which provides higher soft tissue concentration, the effects of tenoxicam and piroxicam on the edema which occurs after the surgical extraction of impacted mandibular third molar were observed.

MR imaging was used by Llewellyn et al. in their study carried out in 1999. After the conclusion of the study, it was reported that, on the first and 7th post-operative days, when the pre-operative imaging of the edema that had formed on the labial side was compared to the pre-operative MR image, there was a significant difference (11, 12).

The authors have reported that in the assessment of the post-operative edema, which occurs after the surgical

extraction of the third molars, MR imaging is quite a reliable method in comparing the effects of anti-inflammatory drugs, used post-operatively.

We evaluated the effects of non-steroidal anti-inflammatory drugs (tenoxicam and piroxicam) on the edema occurring after the surgical extraction of third molars by using MR imaging.

Consequently, the edema occurring after the surgical extraction of third molars may cause pain because of the pressure it exercises by involving the masticatory muscles. Moreover, since the edema fluid creates an environment prone to infection, in order to relieve the post-operative swelling, anti-inflammatory drugs may be administered by the doctor. In our comparative study of different anti-inflammatory drugs' effects on edema, it was established that both drugs are effective on the edema and pain occurring after the surgical extraction of impacted third molars, and no statistically significant difference regarding their effects on the swelling was found.

References

1. Kruger GO. Textbook of Oral surgery. The C.V.Mosby Company Saint Louis, 1974: 84.
2. Petersons LJ. Contemporary oral and maxillofacial surgery. Principle of management of impacted teeth (1st Ed.) C.V. Mosby Company Boston, 1987, 223-256.
3. Dökmeci İ. Farmakoloji. ilaç uygulamalarında temel kavramlar. Nobel Tıp Kitapevi, 1992, 610-619.
4. Dekel S, Zenthall G, Franus MJO. Release of prostaglandins from bone end muscle after tibia fracture: an experimental study in rabbits. J. Bone Joint Surgery. 63: 185-189, 1981.
5. Bird HA, Francis RJ, Le Gallez P, Hill J, Dixon JS, Allen JG, Wright R. Single and multiple oral dose pharmacokinetics of tenoxicam in the elderly. Eur. J. Rheumatol.Inflamm. 8: 60, 1985.
6. Wilson IR, Cracker E. An introduction to ultrasonography in oral surgery. Oral Surg. 59: 236-241, 1985.
7. Stoller DW. Fost MR improves imaging of the musculoskeletal system. Diagnostic Imaging 98: 376-388, 1988.
8. Holland CS. The development of a method assessing swelling following third molar surgery. Br.J.OralSurg.17: 104-14, 1979.
9. Schmitt M, Kölle W, Stöckell K, Heizman P, Vetter A, Guentert TW. Pharmacokinetics profile of tenoxicam in elderly patients with rheumatoid arthritis. Lit. Rheumatol. 10: 24, 1988.
10. Kirchheiner B, Hollm P, Jensen EM, KRYGER J, Romberg O, Salveson A. A new long-acting antiinflammatory agent, tenoxicam in osteoarthritis of the knee and the hip: a randomised comparison with indomethacin. Curr. Ther. Res. 32: 627, 1982.
11. Llewellyn J, Ryan M, Santosh C. The use of magnetic resonance imaging to assess swelling after the removal of third molar teeth. British Journal of Oral & Maxillofacial Surgery. 34: 416-423, 1996.
12. Standel W, Josenhand G. Clinical evaluation of tenoxicam in osteoarthritis, rheumatoid arthritis and ankylosing spondylitis. Eur. J. Rheumatol İnflamm. 8: 28, 1985.