

# Comparison of Pain between Tooth Extraction and Implant Surgery

Salman Abolfazli<sup>1</sup>, Ehsan Gravand<sup>1\*</sup>, Maryam Hedayatian<sup>1</sup>, Ali Rohani<sup>1</sup>, Kourosh Shakerian<sup>2</sup>

<sup>1</sup>Department of Periodontics, School of Dental Medicine, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran

<sup>2</sup>Department of Periodontics, School of Dental Medicine, Isfahan University of Medical Sciences, Isfahan, Iran

## ABSTRACT

**Background and Objective:** Despite the recent developments in pain diagnosis and management of pain mechanisms in dentistry, there is still a gap in understanding of the pain alleviation. The aim of the present study was to compare the pain level in patients with posterior teeth extraction and implant surgery.

**Materials and Methods:** In this cross-sectional study, a total of 27 candidates referred for tooth extraction and implant placement were selected randomly (simple) for the study. The patients underwent simple tooth extraction under local anesthesia using both lidocaine 2% and epinephrine 1:100,000. After teeth extraction, all patients received ibuprofen (400 mg) every 6 hrs. Two months after tooth extraction dental implant surgery was carried out. In order to reduce postoperative pain after implant surgery all patients received ibuprofen (400 mg) every 6 hrs. The level of pain was assessed by visual analogue scale immediately after procedure and in the interval time of 6 hrs, and 1, 3, and 7 days, respectively. Data were analyzed using paired sample t-test, paired Wilcoxon test, SPSS (Ver. 20).

**Results:** The level of postoperative pain after tooth extraction was more than implant surgery ( $p < 0.05$  except 7 days after tooth extraction and implant surgery).

**Conclusion:** This study showed that patients generally experience less pain after posterior implant surgery than simple tooth extraction.

**Key words:** Pain, Implant, Simple tooth extraction

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**Corresponding author:** Ehsan Gravand  
**e-mail** ✉: eh.gravand@iran.ir  
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## INTRODUCTION

Despite the recent developments in pain diagnosis and management of pain mechanisms in dentistry, there is still a gap in understanding of the pain alleviation. Many people are terrified of visiting a dentist due to painful experience. Patients who are prone to surgical procedure are generally experience fear, pain, and anxiety disorder [1]. Postoperative pain is one of the most common complications after surgery which causes the patient's discomfort, taking the pain medications, difficulty with daily activities, and reduction of responsive behaviors to oral care [2]. People may demonstrate different behavioral responses to dental surgery including: stress, anxiety and post-surgical complications such as pain, swelling, and limitation of mouth opening. Some patients reject surgery or treatment and sometimes this avoidance leads to irreparable complications [3]. Pain is a signal in the

nervous system cause unpleasant sensation, such as a prick, tingle, sting, burn, or ache. International Association for the Study of Pain (IASP) explains pain as a spiteful sensory and emotional experience associated with actual or potential tissue damage [4]. Pain has also been introduced as one of the defense mechanisms or body alarms that distinguishes it from the other sensory perception such as tactile sense, thermal sensation, and pressure [5].

In general, there are three types of pain receptor stimuli:

1. Pain receptor with mixed function: The anesthesia drug relieves pain by blocking ion channel.
2. Pain receptors sensitive to chemical and hormonal substances such as serotonin, histamine, prostaglandins, quinones: Steroids and nonsteroidal drugs are among the most commonly used medications in palliative care.
3. Synaptic pathways and inhibitory gates in the spinal cord: Narcotic pain relievers are used to manage chronic pain.

Pain and swelling are the most common side effects of surgery which can be controlled with medication and cognitive-behavioral treatment [6]. Some procedures like bone grafting may be necessary when it comes to insert a dental implant [7].

Since implant surgery interact with broad spectrum of bone and periosteum, postoperative pain and discomfort are to be expected, as well as, anxiety and fear contribute to patient pain [5,6]. Patients experience high levels of anxiety and pain immediately before the surgical procedure [7]. Patients who visit the dental clinic for implant surgery have many concerns, most notably fear of pain in the surgical procedure. Patients usually ask questions about the pain during implant surgery, so it is important to learn all about anxiety and pain during dental implant procedure [8]. The aim of the present study was to compare the pain level in patients with posterior teeth extraction and implant surgery.

### MATERIALS AND METHODS

The present study is an analytical cross-sectional study. A total of 27 patients referred to the oral and maxillofacial surgery and periodontal clinics, School of Dental Medicine, Ahvaz Jundishapur University of Medical Sciences, were selected randomly (simple) for the study. The required sample size was achieved through non probability sampling method. Patients were informed of the study during their enrollment and written informed consent was obtained from all the participants. Patients were also assured that the study would not have any risk or complication for them. Complete checkup was performed concerning oral and dental hygiene and systemic conditions. Panoramic radiography (PAN) and Cone Beam CT (CBCT) images were performed for uniformity of hardness across the entire test process.

The inclusion criteria included: patient satisfaction, indication of tooth extraction (severe caries, inflammation and infection of the dental pulp with no possibility of endodontic treatment), the need for single

tooth replacement using dental implants, having no systemic disease, sufficient jaw bone quality, and appropriate anatomy.

The exclusion criteria included: Uncontrolled systemic diseases (diabetes, cardiovascular disease, blood diseases, osteoporosis, malignancy, immunosuppressive diseases), inappropriate plaque control, pathological and periapical lesions in the area of the tooth that is to be extracted, pathological signs and symptoms surrounding dental implants, taking any pain medication 24 hrs before surgery, chronic pain in the head circumference (trigeminal neuralgia, unusual odontalgia, burning mouth syndrome, traumatic neuropathy, post-hemorrhagic neuralgia, and migraine), poor patient cooperation, patients with complications of tooth extraction (traumatic tooth extraction, post-operative infection, and dry socket), and pregnancy.

The patients underwent simple tooth extraction using local anesthesia block techniques (inferior alveolar nerve block and long buccal nerve block). Injection started from maxillary buccal infiltration and then followed by palatal injection using both lidocaine 2% (EXIR, IRAN) and epinephrine 1: 100,000 (EXIR, IRAN).

After teeth extraction, all patients received ibuprofen (400 mg) every 6 hrs. Prior to surgery, CBCT scanning was performed for bone assessment. Two months after tooth extraction dental implant surgery was carried out. In order to reduce postoperative pain after implant surgery all patients were received the same analgesic to relieve the symptoms of pain (ibuprofen 400 mg, every 6 hrs). The level of pain was assessed by visual analogue scale immediately after procedure and in the interval time of 6 hrs, and 1, 3, and 7 days, respectively. Patients were asked to score their level on the line between the two endpoints from 0 to 10 (0=No pain, 10=Severe pain) (Figure 1). Data were analyzed using paired-sample t-test, paired Wilcoxon test, SPSS (Ver. 20). The p-value=0.050 was considered significant.

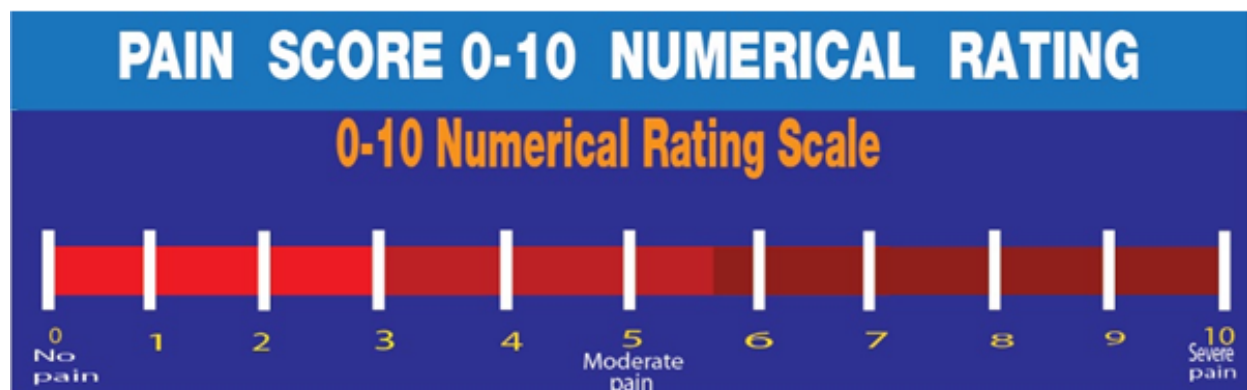


Figure 1: Visual analogue scale for pain assessment

### RESULTS

In the present study non-parametric Wilcoxon test was used to compare the patient's pain intensity, immediately

after tooth extraction and implant surgery according to the degree of pain intensity scale (from 0 to 10), the results of which are reported in Table 1.

**Table 1: Descriptive statistical analysis of patient's pain intensity, immediately after tooth extraction and implant surgery**

Pain Intensity	Pain Intensity				Wilcoxon test	
	After Tooth extraction		After Implant surgery		z-value	p-value
	Prevalence	Percentage (%)	Prevalence	Percentage (%)		
0	3	11.1	16	59.3	0.02	-2.33*
1	13	48.1	4	14.8		
2	3	11.1	3	11.1		
3	5	18.5	2	7.4		
4	0	0	1	3.7		
5	1	3.7	1	3.7		
6	1	3.7	0	0		
7	1	3.7	0	0		
Total	27	100	27	100		

\*p<0.05

According to the results of Wilcoxon test, significant difference was found between the immediate pain intensity of tooth extraction and implant surgery ( $p<0.05$ ). As well as, the percentage of immediate post-extraction pain was significantly higher than immediate postsurgical implant pain.

Non-parametric Wilcoxon test was used to compare the pain score of patients 6 hrs after tooth extraction and implant surgery within the severity of pain scale (from 0 to 10), the results of which are reported in Table 2.

**Table 2: Descriptive statistical analysis of patient's pain intensity, 6 hrs after tooth extraction and implant surgery**

Pain Intensity	Pain Intensity				Wilcoxon test	
	After Tooth extraction		After Implant surgery		z-value	p-value
	Prevalence	Percentage (%)	Prevalence	Percentage (%)		
0	0	0	1	3.7	0	-3.96
1	1	3.7	8	29.6		
2	2	7.4	8	29.6		
3	3	11.1	4	14.8		
4	3	11.1	1	3.7		
5	15	55.6	5	18.5		
6	1	3.7	0	0		
7	2	7.4	0	0		
Total	27	100	27	100		

According to the results of Wilcoxon test, significant difference was found between the pain intensity of tooth extraction and implant surgery in 6 hrs interval ( $p<0.05$ ). As well as, in the 6 hrs interval the percentage of post-

extraction pain was significantly higher than postsurgical implant pain. Table 3 shows the extent of post-extraction pain and postsurgical implant pain after 24 hrs using the 0-10 numeric pain scale.

**Table 3: Descriptive statistical analysis of patient's pain intensity, 24 hrs after tooth extraction and implant surgery**

Pain Intensity	Pain Intensity				Wilcoxon test	
	After Tooth extraction		After Implant surgery		z-value	p-value
	Prevalence	Percentage (%)	Prevalence	Percentage (%)		

0	6	22.2	23	85.2		
1	3	11.1	3	11.1		
2	13	48.1	1	3.7		
3	1	3.7	0	0	0	-4.03**
5	2	7.4	0	0		
6	1	3.7	0	0		
7	1	3.7	0	0		
Total	27	100	27	100		

\*\*p<0.01

According to the results of Wilcoxon test, significant difference was found between the pain intensity of tooth extraction and implant surgery in 24 hrs interval ( $p<0.01$ ). As well as, in the 24 hrs interval the percentage

of post-extraction pain was significantly higher than postsurgical implant pain. Table 4 shows the extent of post-extraction pain and postsurgical implant pain after 3 days using the 0-10 numeric pain scale.

**Table 4: Descriptive statistical analysis of patient's pain intensity, 3 days after tooth extraction and implant surgery**

Pain Intensity	Pain Intensity				Wilcoxon test	
	After Tooth extraction		After Implant surgery		z-value	p-value
	Prevalence	Percentage (%)	Prevalence	Percentage (%)		
0	22	81.5	26	96.3		
1	0	0	1	3.7		
2	2	7.4	0	0	0.042	-2.03*
3	1	3.7	0	0		
5	2	7.4	0	0		
Total	27	100	27	100		

\*p<0.05

According to the results of Wilcoxon test, significant difference was found between the pain intensity of tooth extraction and implant surgery in 3 day interval ( $p<0.05$ ). As well as, in the 3 day interval the percentage of post-

extraction pain was significantly higher than postsurgical implant pain. Table 5 shows the extent of post-extraction pain and postsurgical implant pain after 7 days using the 0-10 numeric pain scale.

**Table 5: Descriptive statistical analysis of patient's pain intensity, 7 days after tooth extraction and implant surgery**

Pain Intensity	Pain Intensity				Wilcoxon test	
	After Tooth extraction		After Implant surgery		z-value	p-value
	Prevalence	Percentage (%)	Prevalence	Percentage (%)		
0	25	92.6	27	100		
1	1	3.7	0	0	0	-4.03**
5	1	3.7	0	0		
Total	27	100	27	100		

\*\*p<0.01

According to the results of Wilcoxon test, no significant difference was found between the pain intensity of tooth extraction and implant surgery in 7 day interval ( $p>0.05$ ).

## DISCUSSION

Patient safety and patient centered care have emerged as a distinct healthcare discipline. This has led to a general agreement on the importance of assessments reported by patients on their oral health status in dental research and

education. Considering the evaluations (symptom and signs) reported by patients, priority is given to Oral Health-Related Quality of Life (OHRQOL). Moreover, there is considerable evidence in the literature that tooth loss and denture status affect OHRQOL. As well as, location and distribution of tooth loss affect the quality of OHRQOL [9]. Dental implant is a pioneering tooth replacement option that restores lost dental function.

Tooth extraction is a very common procedure over the years. Recently, implant surgery has become very common to replace missing teeth. Patients' assessment and outcomes of treatment has been the subject of many studies and inquiries. The decision for dental treatment depends on multitude factors including patient's attitude towards limitations, advantages and disadvantages of treatment. Therefore, comparison of different treatments (extraction, implant surgery) by patients is reasonable [10].

Providing clear and accurate information about expectable pain during treatment will optimize the understanding of patients and increase the resolution of treatment, which in turn will result in a better and more reliable communication between clinicians and patients. This trust will enable patients to have a more realistic expectation of therapeutic processes and reveals all risks that might influence patients' treatment decisions and reduces decision conflict [10].

Dental phobia is often closely linked to fear of injury or increased pain. Some studies reported that 77% of patients experienced the degree of pain during the treatment sessions, however; there is uncertainty or disagreement about pain among some dentists [11]. Oral postoperative pain is less than other surgical procedures. The perception of pain is changed during the period of treatment and depends on the context in which it occurs; different procedures reveal different degree of pain. According to previous studies, few patients experienced intense and longstanding pain after implant surgery. It is expected that most patients will experience mild to moderate pain and activity limitation for up to 5 days or less. In the first 3 days after surgery, interactions with everyday activities of people such as work or school may occur. Usually, within 6 days after surgery, postoperative pain level is reduced continuously. Patients also experience the most severe pain during the first 24 hrs after surgery. There is also no significant difference between the restoration patterns of patients who are candidates for implant surgery and those who are candidates for simple extraction. This encourages patients who are afraid of the dental implant procedure [11].

The present study indicated that the Visual Analogue Scale (VAS) of pain after a tooth extraction was higher than the pain level after implant surgery. Similarly, Yao *et al.*, compared the patient-centered outcome assessments over a 2 week period after five categories of dento-alveolar surgical procedures and simple tooth extraction. Patient-centered Outcome Assessments (POAs) in terms of bleeding, swelling, pain, and bruising were obtained on

each day of the first week and the 14<sup>th</sup> day postsurgery using VAS. The results of the study showed that the healing process of surgical implants was similar to simple extraction and concluded that the VAS for all POAs factors were generally low and reduced to nearly zero over the study period following all five surgical procedures which was consistent with the results of the present study [10].

Reissmann *et al.*, evaluated patients' perceptions during implant placement with other surgical procedures (apicectomies and surgical tooth removal). Patients' perceptions were assessed using the Burdens in Oral Surgery Questionnaire (BiOS-Q). The results of the study showed that the implantation group was perceived the minimum level of discomfort. The reason was explained due to lower burdens during bone and soft tissue manipulation during implantation compared to other surgical procedures. As well as, they concluded that implantation has a low overall perceived pain than tooth extraction which was in line with the results of the present study [12].

Weise *et al.* examined the effect of factors such as gender and surgery duration on anxiety and pain levels using a set of two questionnaires at different points of time. The results of the study indicated the negative impact of preoperative anxiety levels on pain perception and the recovery process. Moreover, Weise *et al.*'s study found that both anxiety and pain levels were highest on the day of surgery which was in agreement with the results of the present study. In the present study the pain scores were restricted to the first 24 hrs after surgery. From the third day onwards, in both types of surgery, most of the patients did not express a specific pain [13].

Tan *et al.*, in a study compared the patient-reported outcome levels after different dental surgical procedures over a 1 week post-surgical period. Patient-reported outcome levels on bleeding, swelling, pain, and bruising were obtained on days 0, 3, 5, and 7, post-operatively using VAS. The results of the study showed that, following all surgical procedures, the median VAS for all parameters were generally low and reduced to near zero over a week. Furthermore, on the day of implant surgery, all parameters including pain had the lowest median VAS. In the present study, the level of pain in the implant surgery in the first 24 hrs was less than that of the simple tooth extraction surgery [14].

Seferli *et al.*, examined the patients' experiences of oral implant surgery and the potential impact on patients' daily life using a study-specific questionnaire. The results of the study showed a trifling impact of implant surgery on daily living. Nevertheless, the perception of discomfort and pain during the surgical procedure was frequently reported. In the present study, most of the patients did not suffer from implant surgery during the first week, and only a small percentage of the patients had a mild pain which had not negative impact on daily activities [15].

AlGhamdi investigated the pre/post-surgical pain of implant surgery in the posterior mandible using ridge mapping, panoramic radiography, and infiltration

anesthesia. To assess the pain during anesthesia and implant surgery the patients were given a questionnaire. According to the results of the study, no pain was reported in the course of implant placement or bone grafting procedures which was consistent with the results of the present study [16].

### CONCLUSION

The present study specified that the level of pain immediately after tooth extraction, 6 hrs, one day, and three days after that was significantly higher than the pain level in the same period after implant surgery. Also, the level of pain after 7 days of tooth extraction was slightly more than implant surgery, but this difference was not significant, indicating that the patient's pain level regardless of the type of surgery periodically reduced to near zero over a week. Therefore, it can be concluded that patients experience less pain after posterior implant surgery than simple tooth extraction.

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### CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this manuscript.

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