

A comparative study of the clinical effects of delayed versus immediate restoration of dental implants after traumatic tooth injury

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Abstract. Objective: To compare and contrast the effect of delayed restoration and immediate restoration on the restoration after dental trauma. METHODS: Ninety patients with dental trauma admitted to our hospital from June 2021 to June 2022 were selected for the study and randomly divided into delayed group (n=45) and immediate group (n=45), which were treated with delayed and immediate dental implant restorations, and then compared the restorative effect, treatment period, aesthetics and complications of the two groups. Results: After the restoration, the restorative effect, treatment period and aesthetics of the immediate group were significantly better than those of the delayed group and the comparison was statistically significant ($P < 0.05$). Conclusion: The immediate restoration had better restorative effect than the delayed restoration, shorter treatment period, lower complication rate, and could improve the aesthetic appearance of teeth, which is worth promoting.

Keywords: dental trauma, delayed restoration, immediate restoration, clinical effect.

1. Introduction

Dental trauma is a dental disease with a high incidence in clinical practice. The incidence groups are diverse, and dental trauma can occur in children, the elderly and young people under the impact of strong external forces, so improving the effectiveness of dental trauma restoration treatment has become the main medical development goal of many hospitals. Dental implant restoration is a new type of dental trauma restoration method that has emerged in recent years. Compared to traditional restoration methods, dental implant restoration has a higher success rate and shorter healing time, which can meet the needs of different patient groups for dental trauma restoration treatment. However, the immediate restoration method is more effective than the traditional restoration method because it can improve the chewing function, improve the aesthetics of the teeth, shorten the treatment period, and reduce the incidence of complications, in addition to quickly repairing the damaged tooth tissue [1]. In this regard, the author compared and analyzed the clinical effects of delayed restoration and immediate restoration in 90 patients with traumatic dental injury in his hospital and reports the following.

2. Data and method

2.1. General data

Ninety patients with traumatic dental injury admitted to our hospital from June 2021 to June 2022 were selected as study subjects and randomly divided into delayed group (n=45) and immediate group (n=45). 48 males and 42 females were among the 90 patients; their ages ranged from 20 to 72 years old, with an average of (36.85 ± 4.12) years old, and the comparison of general data such as gender and age of all patients was not statistically significant ($P > 0.05$). ($P > 0.05$).

Inclusion criteria: patients diagnosed with dental trauma, patients who met the criteria and requirements for dental implants, and patients who signed the informed consent form.

Exclusion criteria: Patients who did not meet the criteria and requirements for dental implants, patients with severe mental illness, and patients who did not cooperate with the treatment were excluded.

2.2. Restoration method

2.2.1. Method of dental trauma restoration in the delayed group

Delayed dental implant restoration method was selected for all 45 patients as follows.

① Pre-operative preparation, dental radiographs, and observation of patient's vital signs should be done to quickly understand the patient's dental condition and physical quality status; ② Determine the affected area and clean the oral cavity, then apply local anesthesia to the affected area; ③ Extract the affected tooth, clean the soft tissue and debris of the tooth socket, and clean the wound using conventional methods; ④ Fix the bone graft, then wait for the patient to implant the implant after 3 months of maintenance. The dental implant restoration could be performed only after 6 months of implantation [1-2].

2.2.2. Immediate group dental trauma restoration method

Forty-five patients were selected for immediate implant restoration, as follows: ① Preoperative work was the same as that of the delayed group, which required surgical preparation and dental radiographs to better understand the dental situation before the later surgical treatment for dental implant restoration. ② Determine the traumatic site of the tooth, and clean and disinfect it, then apply local anesthesia to the traumatic site; ③ Extract the affected tooth, and clean the soft tissue and debris of the sockets around the affected tooth, then deepen and expand the socket; ④ Clean the debris near the socket and periodontal tissue, and expand the implant bed, and finally insert the implant [2].

2.3. Observation indexes

(1) Restorative effect: excellent (ISQ value > 75, good esthetics), good (ISQ value of 55-74, good esthetics), poor (ISQ value < 55, poor esthetics), the higher the excellent rate, the better the restorative effect [3].

(2) Treatment period (the shorter the better), ISQ score (implant stability coefficient value, the higher the score the better), VAS score (visual analogue scoring method, the lower the score the better).

(3) Aesthetics: 1 month after the treatment, the aesthetics of the patient's dental appearance was evaluated, and the indicators were the red aesthetic index (PES) and the white aesthetic index (WES), with a total score of 14 points, the higher the score the higher the aesthetics [4].

(4) Masticatory function and quality of life: patients' dental function and quality of life were evaluated 1 month after treatment with a total score of 100, the higher the score the higher the masticatory function and quality of life.

(5) Complication situation: periodontal tissue overflowing with pus, periodontal tissue redness and swelling, periodontal loosening, the incidence rate was calculated as follows.

$$\text{Incidence of complications} = \frac{\text{Periodontal tissue overflowing (with pus + inflamed + loosen)}}{\text{total cases}}$$

2.4. Statistical methods

SPSS25.0 software was selected for statistical analysis of the count and measurement data, expressed as "%" and " $\bar{x} \pm s$ " by χ^2 and t-test, respectively, and the statistical significance of the comparison was expressed as "P < 0.05" was indicated.

3. Result

3.1. Comparison of restoration effect

The excellent rate of restoration in the immediate group was higher than that in the delayed group ($P < 0.05$), as shown in Table 1.

Table 1. Comparison results of repair effect [n (%)]

Group	Excellent	Good	Poor	Excellent and good rate
Delayed group (n=45)	21(46.67)	18(40.00)	6(13.33)	39(86.67)
Immediate group (n=45)	28(62.22)	16(35.56)	1(2.22)	44(97.78)
χ^2				6.795
P				0.000

3.2. Comparison of treatment cycles, ISQ scores, and VAS scores

The treatment period, ISQ score, and VAS score of the immediate group were better than those of the delayed group ($P < 0.05$), as shown in Table 2.

Table 2. Comparison results of treatment cycle, ISQ score, and VAS score ()

Group	Treatment period (months)	ISQ (score)	VAS (score)
Delayed group (n=45)	9.12±4.01	68.64±4.34	4.86±1.21
Immediate group (n=45)	6.24±2.08	76.32±5.67	1.28±0.23
χ^2	5.124	6.082	12.483
P	0.001	0.000	0.000

3.3. Aesthetics comparison

PES and WES scores were higher in the immediate group than in the delayed group ($P < 0.05$), as shown in Table 3.

Table 3. Aesthetics comparison results ($\bar{x} \pm s$, points)

Group	PES	WES
Delayed group (n=45)	9.89±1.46	8.42±1.25
Immediate group (n=45)	13.65±2.12	12.36±2.01
χ^2	5.863	6.025
P	0.001	0.000

3.4. Comparison of masticatory function and quality of life

The masticatory function and quality of life scores of teeth in the immediate group were higher than those in the delayed group ($P < 0.05$), as shown in Table 4.

Table 4. Comparison of masticatory function and quality of life ($\bar{x} \pm s$, score)

Group	Masticatory function	Quality of life
Delayed group (n=45)	85.25±4.17	83.77±4.04
Immediate group (n=45)	96.42±6.75	93.68±6.12
χ^2	12.365	11.138
P	0.000	0.000

3.5. Comparison of complication occurrence

The incidence of complications in the immediate group was lower than that in the delayed group ($P < 0.05$), as shown in Table 5.

Table 5. Comparison of the occurrence of complications [n (%)]

Group	Periodontal tissue overflow pus	Periodontal tissue erythema	Periodontal loosening	Incidence
Delayed group (n=45)	2(4.44)	3(6.67)	2(4.44)	7(15.56)
Immediate group (n=45)	0(0.00)	1(2.22)	0(0.00)	1(2.22)
χ^2				8.216
P				0.000

4. Discussion

Dental trauma, also known as "dental trauma", refers to the acute trauma to the tooth caused by the impact of a great external force, not only the dental hard tissue damage, but also the pulp tissue damage, periodontal support tissue damage and other types of dental trauma, specific onset group diversification, many complications, long treatment period characteristics, collision, fall, etc. can cause dental trauma [5].

Dental trauma can also be divided into direct trauma and indirect trauma according to whether it is directly impacted by external forces, with direct trauma occurring mostly in the anterior region and indirect trauma occurring mostly in the premolar and posterior molar regions, including crown fractures, crown root fractures, condylar and median joint fractures in the molar region. Alveolar bone atrophy, food impaction, and mandibular joint lesions are all lesions caused by dental trauma, and in severe cases, they can lead to tooth loss, tooth extraction, and other serious diseases, which not only destroy the integrity of the patient's dental row, but also adversely affect the patient's physiological function and external image, and even reduce the patient's physical and mental health [6].

At this stage, dental implants, removable prostheses, and fixed prostheses are available for the treatment of dental trauma and are clinically effective, among which dental implants are the most widely used and less expensive, and are the preferred method for many patients [7].

Delayed restoration means that the patient is required to take care of the damaged area for at least 3 months before dental implantation (i.e., implant placement), and then wait 6 months before restoring the tooth. Immediate restorations can be performed immediately after the damaged area is cleaned and the tooth is extracted, i.e., cleaning, disinfection, anesthesia and extraction of the affected tooth, enlargement of the socket and implant bed, then implant placement and finally restoration. Compared to delayed restorations, immediate restorations not only shorten the treatment time, but also speed up the recovery of the patient's masticatory function and reduce the number of procedures and complications, thus promoting a rapid recovery [8]. Immediate restorations also have the advantages of high aesthetics, low dislodgement, and high comfort, which positively contribute to patients' postoperative physical and mental health and quality of life, making them one of the most popular restorative dentistry treatments today.

In this study, 90 patients with traumatic dental injuries were studied and different restorative dental treatments were tested and analyzed in comparison. The results showed that the excellent restoration rate of the immediate group with immediate restorative treatment was 97.78%, which was significantly higher than that of the delayed group (86.67% with delayed restorative treatment) and statistically significant ($P < 0.05$, see Table 1); the treatment period of the immediate group was shorter than that of the delayed group and the VAS score was significantly lower than that of the delayed group ($P < 0.05$, see Table 2); the aesthetic scores (PES, WES) of the immediate group were higher than that of the delayed group ($P < 0.05$, see Table 2).) were higher in the immediate group than in the delayed group ($P < 0.05$, see Table 3); the quality of life and masticatory function scores after restoration were higher in the immediate group than in the delayed group ($P < 0.05$, see Table 4); the complication rate in the immediate group was 2.22%, which was significantly lower than the 15.56% in the delayed group and was statistically significant ($P < 0.05$, see Table 5). The above results are consistent with the findings of many scholars and have a high degree of credibility and accuracy.

In conclusion, immediate restorations are more effective than delayed restorations and are worth promoting because of their shorter treatment period, lower complication rate, and ability to improve the aesthetics of the teeth.

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