



Analysis of Clinical Application of Minimally Invasive Technique in Alveolar Surgery

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Abstract: Objective To explore the clinical effect of minimally invasive techniques in the treatment of alveolar surgery. Methods 80 patients who underwent dental surgery from March 2023 to March 2024 were selected as study samples and randomly divided into two groups. The control group (40 cases) underwent the traditional extraction method, and the observation group (40 cases) underwent the minimally invasive technique. The integrity rate of tooth extraction, pain rate, postoperative infection rate and treatment effect were compared between the two groups. Results The integrity rate of tooth extraction, pain rate and postoperative infection rate in observation group were lower than those in control group ($P < 0.05$). The therapeutic effect of observation group was significantly higher than that of control group ($P < 0.05$). Conclusion Minimally invasive technique has a significant effect in the treatment of alveolar surgery, which can reduce the degree of pain and the probability of infection and improve the integrity of the alveolar.

Keywords: minimally invasive technology; alveolar surgery; clinical effect

1. Introduction

In the field of alveolar surgery, the traditional extraction methods mainly rely on lever force, wheel shaft force and wedge force, and lever force is the most commonly used means. However, traditional tooth extraction methods may cause varying degrees of damage to bone and soft tissue during tooth extraction, and then produce tissue stress reactants, which may stimulate nerve endings and cause severe pain [1]. In addition, there is a risk of damage to adjacent teeth, alveolar bone, and nerves, resulting in significant post-operative swelling that is often unbearable for patients. With the development of society, people have put forward higher requirements for the comfort of medical treatment, which needs to ensure minimally invasive and safe while treating diseases. Traditional extraction methods are no longer suitable for alveolar surgery. Minimally invasive technology is a treatment method to reduce surgical trauma. In alveolar surgery, delicate instruments and standard instruments can be used for treatment, which has the characteristics of reducing tooth extraction trauma, pain and psychological pressure [2]. Based on this, this paper mainly studies the clinical application of minimally invasive technology in alveolar surgery, as reported below.

2. Data and methods

2.1 General information

A total of 80 patients undergoing dental surgery from March 2023 to March 2024 in this hospital were selected as study samples and randomly divided into two groups. In the control group (40 cases), 21 males and 19 females, aged from 18 to 40 years old, with an average age of (25.14 ± 5.71) years, underwent traditional tooth extraction. Observation group (40 cases) were treated with minimally invasive techniques. There were 24 males and 16 females in the group, ranging in age from 20 to 44 years old, with an average age of (30.27 ± 5.66) years old. There was no significant difference in the general information of patients in the groups ($P < 0.05$). Inclusion criteria: (1) meet the indications for tooth extraction; (2) preoperative opening degree was normal; (3) No contraindications of tooth extraction; (4) Patients with good compliance to the experiment. Exclusion criteria: (1) patients with abnormal immune function; (2) poor periodontal health; (3) Patients with mental illness or cognitive impairment who cannot communicate normally; (4) Patients judged by more than two senior doctors to be unable to participate in this experiment.

2.2 Research method

X-ray images were taken to observe the oral conditions of the two groups of patients, and comprehensive observation and assessment were made on the root tip, wisdom tooth impacted and alveolar neural tube, the resistance was observed, the treatment risk and complications were evaluated, and the oral disinfection and cleaning were also performed. In this study,

the observation group used minimally invasive techniques for tooth extraction. The procedure is as follows: First, the soft tissue of the gum is cut and separated for subsequent operations. Then, the steps of bone removal and space enhancement were carried out in the buccal and distal parts in order to divide the crown and root. Then, the proximal and distal parts of the teeth were separated by a tooth brace, and the proximal and distal teeth were protruded separately. After the tooth extraction is complete, the extraction cavity is thoroughly cleaned and the soft tissue is closely sutured to ensure good healing of the wound. The whole operation process is rigorous and stable, in line with the standard operation requirements of dental surgery. The control group underwent traditional tooth extraction surgery.

2.3 Observation indicators and judgment criteria

(1) The integrity rate of tooth extraction, pain rate and postoperative infection rate were observed in the two groups.

(2) The therapeutic effect of the two groups was observed. Class I indicates that the patient did not have any adverse reactions within three days after surgery, and the pain was mild or no significant pain. Grade II indicates that the patient has mild pain within three days after surgery, and the opening of the mouth is limited to a certain extent, but it does not have a significant impact on daily life. Grade III indicates that the patient's recovery did not meet the above grade I and Grade II criteria.

2.4 Statistical analysis

SPSS 26.0 software was used for data processing, measurement data were presented in the form of ($\bar{x} \pm s$), and T-test was used for comparative analysis between different groups. For counting data, percentage (%) was used as the expression, and the difference between groups was compared by 2 test. In this study, if $P < 0.05$, the difference was considered statistically significant.

3. Results

3.1 The integrity rate of tooth extraction, pain rate and postoperative infection rate were observed in the two groups

The rate of tooth extraction integrity, surgical pain and postoperative infection in observation group were lower than those in control group ($P < 0.05$).

Table 1. Differences in the rate of tooth extraction cavity integrity, surgical pain rate and postoperative infection rate between the two groups [n, %]

| Group | Number of cases | Extraction cavity integrity rate | Operative pain rate | Postoperative infection rate |
|-------------------|-----------------|----------------------------------|---------------------|------------------------------|
| Control group | 40 | 13 (32.50%) | 12 (30.00%) | 9 (22.50%) |
| Observation group | 40 | 34 (75.56%) | 4 (10.00%) | 3 (7.50%) |
| <i>T-value</i> | | 8.734 | 6.214 | 3.437 |
| <i>p-value</i> | | 0.015 | 0.046 | 0.005 |

3.2 The therapeutic effect of the two groups was observed

The therapeutic effect of observation group was significantly higher than that of control group ($P < 0.05$).

Table 2. Comparison of treatment effect between the two groups [n, %]

| Group | Number of cases | Level I | Level II | Level III |
|-------------------|-----------------|-------------|-------------|------------|
| Control group | 40 | 20 (50.00%) | 11 (27.50%) | 9 (20.00%) |
| Observation group | 40 | 26 (65.00%) | 12 (30.00%) | 2 (5.00%) |
| <i>T-value</i> | | 2.571 | 1.668 | 3.189 |
| <i>p-value</i> | | 0.005 | 0.027 | 0.036 |

4. Conclusion

With the continuous progress of minimally invasive tooth extraction technology, many innovative instruments have been widely used in the field of oral surgery. These devices can achieve efficient tooth extraction while significantly reducing soft tissue and bone damage, and their clinical application shows significant advantages. The results of this study showed that the treatment effect of patients in the observation group was significantly higher than that in the control group, and the postoperative cavity integrity rate, surgical pain rate and postoperative infection rate were reduced ($P < 0.05$). During the

operation, the minimally invasive extraction technique was adopted, and the alveolar bone was properly squeezed to loosen the affected tooth, and the tooth extractor was used to pull it out smoothly. During the whole procedure, the tapping operation is avoided, which significantly reduces the degree of damage to the alveolar bone. In addition, this method also helps to reduce the occurrence of infection and further improve the safety and effect of surgery, which is consistent with the research results of Chen Yuyun [3].

In summary, the application of minimally invasive technology in alveolar surgery can improve the pain of patients in treatment, reduce postoperative infection, and preserve alveolar bone to the greatest extent, with significant clinical effects.

References

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