Effectiveness of Comprehensive Nursing Care in Dental Implant Surgery for Patients with Tooth Loss and Bone Deficiency (Postprint)

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Abstract

Objective To investigate the application effect of comprehensive nursing cooperation in dental implant surgery for patients with tooth loss combined with insufficient bone volume. Methods A total of 70 patients with tooth loss combined with insufficient bone volume who underwent dental implant surgery in the dental outpatient clinic from September 2020 to August 2021 were selected as the research subjects and divided into a control group and an observation group according to the random number method, with 35 cases in each group. The control group received conventional nursing intervention, while the observation group implemented comprehensive nursing cooperation based on the control group. The compliance, nursing satisfaction, and incidence of complications at 6 months postoperatively were compared between the two groups. Results The good compliance rate of patients in the observation group was 94.29% (33/35), which was higher than that of the control group at 80.00% (28/35), and the difference was statistically significant ($P<0.05$); the nursing satisfaction in the observation group was higher than that in the control group, and the difference was statistically significant ($P<0.05$); the incidence of complications at 6 months postoperatively in the observation group was 5.71% (2/35), which was lower than that of the control group at 22.86% (8/35), and the difference was statistically significant ($P<0.05$). Conclusion Implementing comprehensive meticulous nursing cooperation during the peri-implant surgery period can improve patient compliance and nursing satisfaction, and reduce the incidence of postoperative oral complications.

Full Text

Preamble

Title: Application of Whole-Process Nursing Cooperation in Dental Implant Surgery for Patients with Tooth Loss and Insufficient Bone Mass

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Abstract

Objective: To explore the effect of whole-process nursing cooperation in dental implant surgery for patients with tooth loss and insufficient bone mass.

Methods: A total of patients who underwent dental implant surgery in the dental clinic from September to August were selected as research subjects and divided into a control group and an observation group using the random number method, with cases in each group. The control group received routine nursing intervention, while the observation group received whole-process nursing cooperation based on the control group. Compliance, nursing satisfaction, and postoperative complication rates at months were compared between the two groups.

Results: The compliance rate of patients in the observation group (%) was significantly higher than that in the control group (%) (P<). The nursing satisfaction score in the observation group was higher than that in the control group (P<). The -month postoperative complication rate in the observation group (%) was lower than that in the control group (%) (P<).

Conclusion: Implementing whole-process refined nursing cooperation during the peri-implantation period, combined with postoperative health education and home care guidance, can improve patient compliance and nursing satisfaction while reducing the incidence of postoperative oral complications.

Keywords: loss of dentition; alveolar crest bone mass; implant technique; oral cavity; nursing cooperation

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Introduction

With improvements in living standards, oral health care has received increasing attention. Patients with missing teeth no longer limit their prosthetic restoration expectations to conventional methods, and novel oral implant restoration techniques have gradually become popularized [1]. When patients experience long-term tooth loss, continuous absorption and reduction of alveolar ridge bone mass occurs, ultimately affecting facial appearance and quality of life [2]. The key to successful dental implantation lies in sufficient bone volume in the implant area [3]. For patients with alveolar bone resorption and insufficient bone mass due to trauma or physiological reasons, bone grafting materials can be placed into the alveolar socket to increase bone volume and thickness, providing favorable conditions for implantation. Good nursing intervention helps improve patient compliance and prevent complications. This study primarily explores the application effect of whole-process nursing cooperation in dental implant surgery for patients with tooth loss and insufficient bone mass.

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1. Materials and Methods

1.1 Study Design and Participants

Patients who underwent dental implant surgery in the dental clinic from September to August were selected as research subjects. Inclusion criteria were: (1) age years; (2) insufficient bone mass at the implant site with residual bone height > mm and width > mm; (3) willingness to accept implant restoration surgery; (4) good mental and cognitive status with ability to complete questionnaires. Exclusion criteria included: (1) severe systemic diseases; (2) acute or chronic oral and craniofacial inflammation; (3) abnormal occlusal relationship; (4) bruxism; (5) pregnancy, lactation, or menstrual period; (6) inability to tolerate surgical trauma or unwillingness to cooperate with the treatment plan.

A total of eligible patients (implants) were randomly divided into a control group and an observation group using the random number method, with cases in each group. The control group received implants, while the observation group received implants. There were no statistically significant differences between the two groups in general characteristics including gender, age, tooth loss condition, duration of tooth loss, and smoking status (P>). This study was approved by the hospital ethics committee, and all patients and their families provided informed consent.

Comparison of General Data Between Two Groups of Implant Surgery Patients

1.2 Surgical Procedures

Control Group Surgical Method: Patients were placed in a supine position on the dental chair and received nerve block or local infiltration anesthesia. A

horizontal incision was made along the alveolar bone direction at the gingiva of the implant area. The gingiva was separated using a periosteal elevator to expose the alveolar bone. After locating and selecting an appropriate implant site on the exposed alveolar bone, drilling was performed to prepare the implant socket. The implant was then placed and fixed, bone graft material was filled in, the membrane was positioned, the healing cap was tightened, and the wound was sutured for hemostasis.

Control Group Nursing Intervention: Patients received routine nursing intervention, which included completing disease information forms, understanding patient health status, informing patients about preoperative examination contents, verbally explaining key points for dental implant cooperation, monitoring vital signs during surgery, and postoperatively informing patients about wound management methods, dietary restrictions, and oral hygiene practices. Educational brochures were provided when necessary, and patients were reminded to return for follow-up appointments on schedule.

1.3 Instruments and Materials

Implant Surgery Instruments and Supplies: NSK implant motor; oral implant surgical pack (including hemostat forceps, towel clamps, tissue forceps, metal measuring cups, periosteal elevators, curettes, needle holders, knife handles, scissors, steel rulers, periodontal probes, disposable treatment towels, hole towels, gauze, cotton balls, sterile blades); same-brand implant tool kit (box); oral large-hole pack (surgical gowns, treatment towels, wrapping cloths); surgical instrument table.

General Instruments: Sterilized oral examination kit (three-piece set: mouth mirror, probe, dental tweezers, treatment tray); electric suction unit; ice-cold physiological saline mL; disposable sterile water delivery tube; disposable sterile protective cover; disposable sterile suction tube extension.

Bone Grafting Materials: Maxillary sinus internal and external lift instrument kits; bone graft material filling instruments; bone chisels; bone curettes; bone files; bone rongeurs; Bio-Oss bone powder (g/box); Hai'ao bone membrane (cm); sterilized hammer.

Implants and Healing Caps (Cover Screws): NobelActive system implants.

Medications and Supplies: Anesthetic (articaine % or lidocaine % with epinephrine injection); topical medication (Vaseline); emergency medications (epinephrine, dopamine, atropine, balanced salt solution) and injection supplies; ice packs.

1.4 Whole-Process Nursing Cooperation (Observation Group)

Based on the control group intervention, the observation group implemented whole-process nursing cooperation as follows:

Preoperative Interview: Preoperative nurses assisted physicians in interviewing patients, introducing the surgical procedure and related precautions to patients and their families, understanding patients' systemic conditions, and inquiring about histories of heart disease, hypertension, diabetes, periodontal disease, osteoporosis, hemorrhagic or immune diseases [4]. Patients were asked about harmful oral habits such as smoking, unilateral chewing, nocturnal bruxism, biting hard objects, and preference for spicy foods. Routine periodontal scaling was performed, with emphasis on evaluating dentition defect conditions, jaw size, occlusal relationship, intermaxillary distance, alveolar bone height and density, bone wall integrity, bone mass, and oral hygiene status. Specialized dental implant case records (including examination records, stage I and II surgery records, implant restoration records, follow-up records, etc.) were completed, and informed consent forms for implant surgery were signed.

Preoperative Psychological Nursing: Nurses communicated with patients experiencing preoperative anxiety, fear, and tension, providing explanations and guidance. They patiently and accessibly explained implant methods, system types, routine costs, surgical procedures, treatment duration, and prognosis. Patients were informed about intraoperative precautions and cooperation points. For excessively nervous patients, psychological intervention was conducted using photos and images of previous successful cases to reduce negative emotions, gain patient trust, improve cooperation, and ensure patient safety and smooth surgical procedures [5].

Intraoperative Cooperation: Nurses needed to be familiar with the operative steps and surgical instruments for dental implantation and bone grafting, preparing surgical supplies in advance. Routine intraoral and extraoral disinfection and sterile draping were performed, with syringes and anesthetics prepared. The implant motor, ultrasonic bone knife, and suction device were connected, with handpieces and drills installed. Instruments were passed to assist with incision, flap elevation, and bone removal to fully expose the implant area. Saliva was suctioned promptly, and the mouth angle was retracted to assist with hemostasis, maintaining a clear surgical field. After implant socket preparation, the socket was repeatedly irrigated with physiological saline to prevent bone debris and foreign body retention. The implant was placed, and bone graft material was prepared according to the bone defect volume. The bone graft filling instrument was passed to assist in filling the bone powder, the membrane was positioned, the mucosal flap was repositioned and sutured, and the physician was assisted with hemostasis and suture cutting. After surgery, blood stains around the mouth were cleaned, supplies were cleared and disinfected for standby use. Throughout the procedure, nurses closely observed for any discomfort reactions and prevented foreign body aspiration [6]. Nurses strictly adhered to aseptic principles throughout the operation, avoiding contact with sensitive areas such as the soft palate to prevent discomfort. During intraoral procedures, patients were instructed to breathe through their nose.

Postoperative Nursing and Precautions: Patients' vital signs and general

conditions were observed, and patients were asked about any discomfort. They were instructed to bite down on gauze for minutes before spitting it out, and the incision was observed for bleeding, oozing, or swelling.

After completion of implant restoration, patients were informed that they might experience local swelling and pain after the anesthetic wore off. Cold compresses could be applied within hours to reduce edema and bleeding. Patients could eat after hours, consuming liquid or soft foods within week, chewing on the healthy side. They were advised to avoid foods that were too cold, hot, or hard, and to gradually increase chewing force to prevent implant fracture. Brushing should be avoided within hours postoperatively, and mouthwash should be used gently after meals within one week. When brushing, the wound area should be avoided. Oral hygiene should be maintained, and antibiotics were routinely prescribed postoperatively, with analgesics and hemostatic agents given when necessary. Patients were informed to return for suture removal after days and for stage II surgery after months.

Postoperative Health Education: The critical period for osseointegration between the implant and alveolar bone is the months following implant surgery, which determines the success of the implant [7]. Regular postoperative follow-up visits were conducted to remind patients to return for appointments and to observe wound healing. Patients were instructed to seek medical review promptly if they noticed implant loosening, detachment, or pain at the implant site. Patients were reminded to keep warm and prevent upper respiratory infections that could lead to secondary wound infection. After bone grafting surgery, patients should rinse gently, use soft toothbrushes, and avoid pressure on the bone graft area from food, tongue, or external forces. The hazards of poor oral habits were explained to patients, and they were helped to establish correct oral behaviors to promote implant wound healing [8]. Postoperative distribution of health education brochures improved patient awareness.

Home Oral Health Care Guidance: A WeChat follow-up group and public account were established to regularly send oral care videos and disease knowledge articles. Patients were informed about the importance of postoperative oral self-care and professional maintenance for long-term implant outcomes. Patients were encouraged to use the horizontal vibration brushing method at least times daily for at least minutes each time, combined with auxiliary tools such as dental floss, interdental brushes, and water flossers. For oral inflammation, patients could use toothpaste or mouthwash with antibacterial effects as prescribed. Patients with unilateral chewing, biting hard foods, smoking, and other poor lifestyle habits were advised to correct these behaviors, with medical treatment sought when necessary. Individualized and scientific follow-up schedules were developed based on specific conditions of implant patients. Regular oral examinations were conducted on schedule, including evaluation of occlusion and adjacent tooth relationships, gingival and papilla status, interproximal space size and morphology, probing depth, bleeding on probing, plaque index, implant stability, and imaging evaluation. Further guidance or

professional maintenance was provided based on examination findings. If severe plaque or calculus was present on the implant or natural tooth surfaces, regular periodontal scaling was performed. For peri-implantitis lacking keratinized attached gingiva, local flap transfer or grafting could be performed to reconstruct keratinized attached gingiva [9].

Quality Control: All patients underwent surgery in implant operating rooms with identical facility configurations, surgical instruments, and supplies, using the same oral implant system. All implant surgeries were performed by one physician (associate chief physician with > years of implant surgery experience) and one cooperating nurse (circulating and instrument nurses, with senior nurse practitioner or higher title and > years of implant surgery cooperation experience). The circulating nurse completed preoperative patient preparation, postoperative health education, and home care guidance, while the instrument nurse completed preoperative supply preparation and intraoperative cooperation.

1.5 Evaluation Indicators

Patient Compliance: Assessed using a self-designed questionnaire covering preoperative examinations, intraoperative cooperation, medication adherence, dietary management, and oral hygiene. Total score: points. Scores of were considered good compliance, as fair, and as poor. Higher scores indicated better compliance. Compliance rate = (number of good compliance cases + fair compliance cases) / total number of cases × %.

Nursing Satisfaction: Assessed using a self-designed patient satisfaction survey including nursing attitude, professional level, nursing effectiveness, health education, and humanistic care (dimensions, total items). Using a Likert -point scale from "very dissatisfied" to "very satisfied" (scored -), higher scores indicated higher nursing satisfaction.

-Month Postoperative Complication Rate: Patients were followed up at months postoperatively to record complications, mainly including gingivitis, excessive bone resorption (absorption diameter > mm) [10], implant loosening, and implant detachment. Complication rate = number of complication cases / total number of cases × %.

Data collection of general patient information and evaluation questionnaires was completed by research members who did not participate in surgical nursing cooperation. After obtaining informed consent, researchers provided explanatory guidance, and patients anonymously completed the questionnaires independently. The questionnaires were collected immediately after completion, with a recovery rate of %.

1.6 Statistical Methods

An Excel database was established with double entry to ensure data accuracy. SPSS software was used for statistical analysis. Measurement data were ex-

pressed as mean ± standard deviation (x ± s) and compared using t-tests. Count data were expressed as rates (%) and compared using ^{2} tests. The test level was $\alpha =$, with P< considered statistically significant.

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2. Results

2.1 Comparison of Patient Compliance Between Two Groups

The compliance rate in the observation group (%) was significantly higher than that in the control group (%) (P<).

Comparison of Compliance Between Two Groups of Patients [n(%)]

2.2 Comparison of Nursing Satisfaction Between Two Groups

Nursing satisfaction in the observation group was significantly higher than that in the control group (P<).

Comparison of Nursing Satisfaction Between Two Groups (x ± s)

2.3 Comparison of -Month Postoperative Complication Rates Between Two Groups

The -month postoperative complication rate in the observation group (%) was significantly lower than that in the control group (%) (P<).

Comparison of -Month Postoperative Complication Rates Between Two Groups [n(%)]

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3. Discussion

Whole-process nursing refers to the provision of continuous, comprehensive, high-quality nursing services by nursing personnel throughout the entire disease trajectory, from outpatient to inpatient, admission to discharge, and discharge to community rehabilitation [11]. This nursing model has been widely applied in the management of patients with chronic diseases such as cancer, cardiovascular and cerebrovascular diseases, and diabetes, as well as various surgical patients. Currently, research on the application of whole-process nursing in the field of oral implantology is limited. However, its patient-centered humanistic care philosophy and scientific, effective nursing processes can help patients overcome preoperative anxiety and fear, establish good trust relationships, improve self-maintenance awareness and oral management capabilities, enhance surgical success rates, and improve the effectiveness of postoperative extended nursing services.

Domestic and international oral implant technologies have gradually matured [12], but perioperative nursing quality can affect implant surgical outcomes to some extent. Health education and disease guidance from nursing personnel can promote positive psychological and behavioral development in patients [13]. The results of this study show that the observation group receiving whole-process nursing services demonstrated significantly higher compliance and nursing satisfaction compared with the control group, with a lower -month postoperative complication rate. These findings are consistent with research by Wang Hong [14] and Wang Xiaoqin et al. [15]. Wang Hong [14] implemented whole-process nursing combined with oral health education for dental implant patients, enhancing patient cooperation, improving implant success rates, and enhancing the quality of implant use. Wang Xiaoqin et al. [15] applied whole-process high-quality nursing in diabetic patients undergoing oral implantation during the perioperative period, effectively improving patients' oral cleaning compliance, controlling blood glucose levels, and increasing implant retention rates.

This study applied whole-process nursing to dental implant surgery for patients with tooth loss and insufficient bone mass. Nursing personnel provided comprehensive, high-quality nursing services tailored to patients' oral conditions throughout all stages—from preoperative interview to intraoperative guidance to postoperative health education and care instruction. The approach was oriented toward patients' physical and psychological needs, comprehensively implementing nursing responsibility systems with emphasis on psychological nursing and humanistic care. Under whole-process nursing intervention, nurse-patient communication became closer, and patients' needs for psychological counseling, disease treatment, and health guidance were largely met. The nursing process also gained patients' active cooperation. Patients recognized and accepted postoperative education and disease guidance from nursing staff, demonstrating stronger willingness for postoperative oral health care and implant maintenance. Consequently, patient compliance and satisfaction with nursing services significantly improved, effectively avoiding adverse outcomes such as postoperative gingivitis, implant loosening, and excessive bone resorption.

Patients with insufficient bone mass require bone augmentation procedures before implant restoration, resulting in longer treatment cycles and more risk factors. Some patients lack adequate understanding of implant restoration techniques and oral self-maintenance methods, easily developing negative emotions such as anxiety, fear, and tension preoperatively. Conventional nursing interventions are brief in process, simple in content, and monotonous in form, with insufficient attention to patients' psychological needs and oral management capacity assessment, leading to suboptimal implant outcomes. Comprehensive, holistic, and refined nursing cooperation has a positive effect on implant surgery success [16]. Adequate preoperative preparation ensures efficient surgery and determines personalized treatment plans. Enhanced preoperative psychological counseling alleviates patient anxiety, improves compliance. Intraoperative close observation of patient consciousness status, frequent communication, preparation of emergency supplies, strict aseptic technique, and standardized operative pro-

cedures effectively prevent adverse events, ensuring patient safety and smooth surgery. Timely postoperative nursing care and health education enhance patients' awareness of postoperative oral health maintenance, promote good behavioral habits, enable correct and effective home-based oral self-management, reduce implant complications, and postoperative follow-up supervision ensures timely professional oral maintenance—all effective approaches to help patients extend implant lifespan. Therefore, comprehensive perioperative nursing care is one of the key factors for successful implant surgery.

In conclusion, implementing whole-process refined, high-quality nursing cooperation combined with postoperative health education and home care guidance during the peri-implantation period helps improve patient compliance and nursing satisfaction while reducing postoperative complication rates.

Conflict of Interest Statement: The authors declare no conflict of interest in this article.

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Note: Figure translations are in progress. See original paper for figures.