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The Application of PDCA Nursing Mode in the Case of a Patient with Dentition Defect Undergoing Dental Implantation: A Case Study

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ABSTRACT

This study summarizes the nursing experience of dental implant restoration in a patient with cerebral palsy and dentition defect. We applied the PDCA nursing mode throughout the patient's treatment process and observed significant positive outcomes. The surgery and nursing care proceeded smoothly, with the patient's neurological functions remaining stable postoperatively. The dental implant showed good osseointegration, healthy surrounding soft tissues, and no signs of bone loss in radiographic examinations. The patient's oral hygiene remained consistent. This case highlights the effectiveness of the PDCA nursing mode in improving nursing quality, promoting patient recovery, and reducing complications in patients with dentition defects and cerebral palsy undergoing dental implant surgery. This approach holds significant clinical implications and merits wider adoption.

KEYWORDS

Dentition defect; Dental implant; PDCA nursing mode

1. INTRODUCTION

Dentition defects are prevalent oral health issues that not only impact aesthetics but can also lead to masticatory dysfunction, speech impediments, and compromise the overall well-being of the oral and maxillofacial system [1]. Dental implants have emerged as the preferred treatment modality for dentition defects, lauded as the "third set of teeth" for their ability to restore near-natural masticatory function and stability. However, the success of implant restorations relies not only on surgical expertise but also on meticulous postoperative care.

Dental implant surgery, a rapidly evolving and widely adopted treatment for dentition defects, offers excellent stability and minimal invasiveness. By implanting a supporting structure beneath the bone tissue, it provides support for the upper teeth, improving both function and aesthetics [2]. The success of this procedure hinges on active patient cooperation and stringent standards of nursing care. However, traditional nursing models often fall short in addressing the unique needs of individual patients, leading to suboptimal clinical outcomes.

In recent years, the PDCA (Plan-Do-Check-Act) nursing mode, a systematic and scientific approach, has gained traction across various medical fields, demonstrating remarkable efficacy [3]. This study aims to investigate the role of the PDCA nursing mode in enhancing the success rate of dental implant treatment. We present a case study of a patient with dentition defects undergoing dental implant restoration, utilizing the PDCA nursing mode to guide their care. By observing and documenting the patient's implant outcomes, psychological well-being, and postoperative complications, we aim to

elucidate the effectiveness of this nursing model and provide valuable insights for clinical nursing practice.

2. CASE REPORT

2.1. Patient History

The patient, who had a history of cerebral palsy diagnosed at 2 years old, presented with a missing right mandibular posterior tooth extracted three months prior at our hospital due to residual roots. The missing tooth was affecting the patient's ability to chew properly, prompting the need for implant restoration. The patient had undergone root canal therapy under sedation during childhood and had a medical history of fatty liver disease and appendectomy. They denied any other systemic diseases or drug allergies.

During two previous consultations, intraoral scans were taken, and 3D printed resin models were created for extraoral analysis. The analysis revealed sufficient gingival height for restoration. However, due to the patient's lack of cooperation in opening their mouth, it was challenging to assess the occlusion, determine the exact gingival height of tooth 6, and confirm adequate restorative space. Attempts to obtain a centric occlusion record were unsuccessful due to the patient's inability to cooperate. As intraoral scans had already been obtained, it was decided to analyze the occlusal space using the 3D printed models extraorally.

2.2. Diagnostic Process

Extraoral examination revealed a relatively symmetrical face with slight mandibular retrusion and underdevelopment. Intraoral examination showed a missing right mandibular posterior tooth, moderate alveolar ridge resorption, slightly red and swollen mucosa, and acceptable keratinized gingival width on the buccal and lingual sides of the ridge crest. The opposing maxillary teeth were elongated, but intraoral examination was limited due to poor patient cooperation. The intercuspal distance appeared normal. Extraoral model analysis revealed severe deep overbite, with the mandibular anterior teeth biting on the palatal root surface of the maxillary anterior teeth. There was evidence of gingival recession and root surface wear. The left posterior teeth were almost entirely in crossbite with no functional occlusion. Oral hygiene was poor with significant calculus buildup. CBCT examination showed significant motion artifacts, usable bone height of approximately 10mm, width of approximately 7mm, and low bone density.

2.3. Diagnosis

The patient was diagnosed with right mandibular posterior dentition defect and malocclusion.

2.4. Treatment Plan

Due to the anticipated difficulty in obtaining patient cooperation, it was decided to perform the implant surgery under general anesthesia.

3. NURSING INTERVENTIONS AND OUTCOME EVALUATION

3.1. Nursing Interventions

Plan Stage (P):

Preoperative Preparation and Assessment: A comprehensive neurological assessment, including motor, sensory, and reflex function, was conducted to establish a baseline. Given the patient's cerebral

palsy, assessments of balance, coordination, and fine motor skills were incorporated to tailor the nursing care plan.

Patient Positioning: Specialized positioning aids designed for individuals with cerebral palsy were utilized to support and protect vulnerable areas, minimizing muscle tension and pain associated with improper positioning.

Medical History Review: A thorough review of the patient's medical history, particularly neurological conditions and medications, was conducted to ensure appropriate precautions during surgery and anesthesia. Preoperative blood tests were reviewed to confirm surgical eligibility.

Anesthesia and Pain Management: Nasotracheal intubation was chosen for general anesthesia to minimize airway irritation and facilitate intraoperative management and postoperative recovery. Local infiltration anesthesia with 2% articaine with epinephrine was administered, ensuring thorough disinfection of the oral cavity to reduce infection risk [4]. A postoperative pain management plan was developed, selecting appropriate analgesics and dosages [6].

Addressing Communication Barriers: Recognizing potential communication challenges, alternative pain assessment tools like the Wong-Baker FACES Pain Rating Scale were prepared.

Non-Pharmacological Pain Management: Music therapy was introduced as an adjunct to traditional pain management strategies. Calming music, selected based on the patient's preferences, was played to divert attention from pain and induce relaxation.

Neurological Emergency Preparedness: Emergency equipment and medications were readily available to address potential neurological complications.

Do Stage (D):

Patient Education: Customized educational videos and animations were created to explain the dental implant procedure and postoperative care in a clear and engaging manner, fostering patient understanding and confidence [7].

Oral Hygiene: Thorough dental cleaning was performed to optimize periodontal health and minimize infection risk, creating a favorable environment for implant osseointegration.

Surgical Site Preparation: Meticulous attention was paid to maintaining a sterile surgical field, ensuring the patient's comfort during draping.

Surgical Precision: A digitally designed surgical guide was used to ensure accurate implant placement and minimize surgical errors.

Tissue Management: Incisions were made with meticulous care to protect surrounding nerves and blood vessels. Guided bone drilling and implant placement were performed according to the predetermined surgical plan. Intraoral scanning was conducted to verify implant position and morphology. Suturing was performed with appropriate tension to avoid tissue compromise.

Postoperative Monitoring: Continuous monitoring of vital signs was maintained, ensuring a smooth emergence from anesthesia. Neurological status was closely observed for any signs of complications [8]. Pain management was provided according to the prescribed plan. Oral hygiene instructions were given to the patient's family to maintain surgical site cleanliness and prevent infection.

Check Stage (C):

Radiographic and Clinical Evaluation: CBCT scans were reviewed to confirm optimal implant position and angulation. Soft tissue healing, oral hygiene status, and any signs of complications were assessed.

Neurological Function Assessment: Postoperative neurological assessments, including motor, sensory, and reflex function, were conducted and compared to the baseline to evaluate the effectiveness of the nursing interventions and detect any potential complications.

Pain Assessment: The Wong-Baker FACES Pain Rating Scale was used to assess the patient's pain level, allowing for adjustments to the pain management plan as needed.

Act Stage (A):

Family Feedback: Family members were consulted to gather feedback on the nursing care provided, identifying areas for improvement [9].

Family Education and Support: Family members received comprehensive education on postoperative care specific to the needs of individuals with cerebral palsy. A communication channel was established to facilitate ongoing dialogue and support between the healthcare team and the family.

Process Improvement: The entire nursing care process was reviewed, documenting successes, challenges, and areas for improvement. This information was used to refine future care plans and enhance the quality of nursing care for similar patients.

3.2. Nursing Outcome Evaluation

The application of the PDCA nursing mode in this case of a patient with cerebral palsy undergoing dental implant surgery under general anesthesia yielded positive results.

Plan Stage: Potential neurological complications were identified, and preventive measures were incorporated into the individualized care plan.

Do Stage: The surgery was successfully completed without complications, and the patient's comfort and safety were maintained throughout.

Check Stage: Postoperative vital signs remained stable, and neurological assessments confirmed no adverse effects from the surgery. The implant showed good healing, and no signs of bone loss were observed.

Act Stage: The nursing care process was thoroughly documented and reviewed, contributing to a continuous quality improvement cycle.

4. NURSING REFLECTIONS

This case highlighted the importance of individualized care plans and the PDCA nursing mode's effectiveness in addressing the unique needs of patients with cerebral palsy undergoing dental implant surgery. The collaborative efforts of the surgical and nursing teams, along with the anesthesiologist, ensured a safe and successful outcome. Patient-centered care, characterized by patience, empathy, and clear communication, played a crucial role in alleviating anxiety and promoting a positive surgical experience.

5. CONCLUSION

The PDCA nursing mode proved to be a valuable framework for providing comprehensive and patient-centered care in this complex case. By adhering to the principles of planning, implementation, evaluation, and action, the nursing team ensured the delivery of safe and effective care, ultimately contributing to a successful surgical outcome and positive patient experience. This case underscores the importance of continuous quality improvement in nursing practice, particularly when caring for patients with complex needs.

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