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 BIOLOGIC COMPLICATIONS OF DENTAL IMPLANTS WITH BRUXER PATIENTS
 IN THE POSTERIOR MANDIBULAR AREA

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მარიამ ხიტირი, დავით ხიტირი, ვლადიმერ მარგველაშვილი

**ქვედა ყბის უკანა მიდამოში დენტალური იმპლანტების ბიოლოგიური გართულებები
 ბრუქსიზმით დაავადებულ პაციენტებში**

ივანე ჯავახიშვილის თბილისის სახელმწიფო უნივერსიტეტი, თბილისი, საქართველო

რეზიუმე

როგორც ცნობილია, ბრუქსიზმი არ წარმოადგენს დენტალური იმპლანტაციის უკუჩვენებას, თუმცა გართულებების თავიდან აცილების მიზნით საჭიროა ისეთი მნიშვნელოვანი დეტალების გათვალისწინება, როგორებიცაა იმპლანტების სწორი რაოდენობა, სწორი პოზიცია, გადაბმული კონსტრუქციების გამოყენება, კონსოლების თავიდან არიდება, ჰიგიენის სწორად დაცვა და ა.შ. საკუთარ პაციენტებზე ჩვენს მიერ წარმოებულმა კვლევამ აჩვენა, რომ ბრუქსიზმით დაავადებულ პაციენტებში, ქვედა ყბის უკანა ნაწილში განხორციელებული დენტალური იმპლანტაციის ბიოლოგიური გართულებების პროცენტული მაჩვენებლები დიდად არ განსხვავდებოდა ბრუქსიზმით დაავადებულ პაციენტებსა და საკონტროლო ჯგუფის პაციენტებს შორის, ბიოლოგიური გართულებები ძირითადად მოიცავდა რბილი ქსოვილების ანთებას, პათოლოგიური ჯიბის ფორმირებას, ძვლოვანი ქსოვილის ატროფიას. რიგ შემთხვევებში საკმარისი აღმოჩნდა ჰიგიენის გამოსწორება და გვირგვინების მონესრიგება, ხოლო შედარებით უფრო მძიმე გართულებების დროს (პათოლოგიური ჯიბე, ძვლის ქსოვილის ატროფია) საჭირო გახდა იმპლანტების რაოდენობის გაზრდა ან იმპლანტის შეცვლა.

Introduction: Bruxism, defined as the habitual grinding and clenching of teeth, places significant stress on dental structures. Although it is more pronounced during sleep, it can also occur during waking hours, often triggered by stressful situations [1,2,3]. In individuals with bruxism, the posterior mandibular teeth, such as molars and premolars, are subjected to increased lateral and vertical forces. These teeth are essential for maintaining proper occlusion and distributing chewing forces effectively [4,5]. The posterior mandible, despite its higher alveolar bone density compared to the maxilla, remains vulnerable to damage under excessive forces, particularly in proximity to critical structures like the inferior alveolar nerve. Dental implants in the posterior mandibular region are especially susceptible to biological complications in patients with bruxism. These complications can include peri-implant mucositis, peri-implantitis, and implant failure due to bone loss or poor osseointegration. The chronic excessive forces associated with bruxism can compromise the stability of implants and exacerbate inflammatory responses. During our research, we investigated biological complications following dental implantation in bruxer patients within the posterior mandibular region, emphasizing the impact of bruxism-induced stress on peri-implant tissues and overall implant success [6,7].

Research goal and Methods: Study Type was Prospective observational study with a 6-year follow-up period. A total of 72 patients (40 females, 32 males) who were diagnosed with bruxism (51 with night bruxism and 21 with both day and night bruxism). All patients had defects in the 3rd and 4th quadrants of the posterior mandibular region. The study also included a control group consisting of 30 non-bruxer patients who had similar defects in the posterior mandibular region.

Inclusion Criteria:

1. Patients with bruxism (night and/or day).

2. Patients requiring dental implants for defects in the posterior mandibular region.
3. No prior bone augmentation or other significant dental procedures that could affect implant placement.

Exclusion Criteria:

1. Severe systemic conditions contraindicating dental implantation.
2. Insufficient bone volume requiring bone grafting.

Orthopedic Construction. The prosthetic restorations were non-removable, fixed with metal structures, and covered with zirconium dioxide crowns or bridges. The number of implants placed per patient varied: 1 Implant: 36 cases; 2 Implants: 82 cases; 3 Implants: 132 cases; 4 Implants: 68 cases. Bone augmentation procedures (e.g., bone grafting, sinus lifts) were not performed in any of the patients.

Implant Placement. Grade 4 titanium implants (diameter: 3.75–4.1 mm; length: 8–11.5 cm) were used in all patients. A two-step surgery was performed: First stage was Incision and flap formation for implant placement and the Second stage was itself Implant placement.

The orthopedic constructions were divided into several groups based on their configuration and support:

1. Single Crown: One implant supporting a single crown.
2. Connected Crowns: Multiple crowns connected to one another.
3. Bridges without Cantilevers: Fixed bridges supported by implants without the use of any cantilevered elements (no distal or medial extensions).
4. Bridges with Distal Cantilevers: Fixed bridges with distal cantilever extensions (extensions from the last implant).
5. Bridges with Medial Cantilevers: Fixed bridges with cantilever extensions at the middle (medial) of the bridge.

Observation and Follow-up. Patients were monitored for 6 years after implant placement. All patients underwent regular follow-up examinations in every 3–4 months. This included Clinical Examination - Physical assessments to check for signs of implant mobility, peri-implantitis, or any other clinical issues. Also Radiographic Evaluation: X-ray imaging was performed regularly to evaluate bone status, implant positioning, and the condition of the surrounding tissues. Data about biological complications were collected and statistically studied.

Biological Complications after dental implantation. Biological complications refer to adverse reactions in the peri-implant tissues or systemic factors affecting the implant site, which can compromise the stability, function, and longevity of dental implants. These complications can occur due to surgical, prosthetic, or patient-related factors. The most common biological complications include:

1. Peri-implant Mucositis Inflammation of the soft tissues surrounding the implant without bone loss. Causes: Poor oral hygiene, plaque accumulation, and improper prosthetic contours. Management: Professional cleaning, improved patient hygiene, and correction of prosthetic designs [11,12].
2. Peri-implantitis Inflammation involving both soft and hard tissues, leading to progressive bone loss. Causes: Untreated peri-implant mucositis, excessive mechanical stress, and systemic conditions (e.g., diabetes, smoking). Management: Mechanical debridement, antibiotic therapy, regenerative procedures, and improving implant positioning [13,14].
3. Bone Atrophy Around the Implant Resorption of bone around the implant, leading to instability and potential failure. Causes: Improper implant angulation, insufficient primary stability, and bruxism-related occlusal forces. Management: Repositioning implants, additional implant placement, and occlusal adjustments [15,16].

4. **Soft Tissue Inflammation** Localized redness, swelling, and discomfort around the implant site. Causes: Inadequate crown contours, hygiene issues, or poor tissue compatibility with implant materials. Management: Correction of prosthetic components, soft tissue grafting, and hygiene reinforcement [16,17]
5. **Recession of Gingival Tissue** Exposure of the implant due to gingival margin recession. Causes: Thin biotype, poor prosthetic fit, and traumatic brushing habits. Management: Connective tissue grafts, proper prosthetic contouring, and patient education [18,19].
6. **Implant Failure Due to Osseointegration Issues** Failure of the implant to integrate with the surrounding bone. Causes: Poor surgical technique, infection, excessive loading, or systemic factors like osteoporosis. Management: Bone grafting, implant replacement, and modifying occlusal forces [20,21].
7. **Systemic Complications** Rare but include allergic reactions to implant materials or systemic infections. Causes: Patient sensitivity to titanium or other materials, or compromised immune status. Management: Material testing before implantation and addressing systemic health conditions [22,23].

Study Results. In our study, we observed several biological complications associated with dental implantation, including soft tissue inflammation, pathological recess formation, and bone atrophy around the implant. These complications were documented in 53 cases, each with specific etiological factors and management strategies.

1. **Soft Tissue Inflammation** Soft tissue inflammation was identified in 25 cases, primarily within 3–6 months post-implantation. The main contributing factors included inadequate oral hygiene and improper contouring of the crown neck. Management involved improving oral hygiene practices, including the use of oral irrigators, and correcting the crown neck contour to restore normal soft tissue conditions.
2. **Pathological Recess Formation** Pathological recess formation occurred in 20 cases, typically 1–3 years after implantation. Contributing factors included poor oral hygiene, incorrect neck contouring, and the presence of medial or distal cantilevers. Treatment involved deep curettage, connective tissue grafting from the soft palate, antibiotic therapy, and cleaning with a vector apparatus. Additionally, modifications to cantilever structures were made, supplementary implants were placed, and connected bridges were constructed. Notably, implant replacement was not required in these cases.
3. **Bone Atrophy Around the Implant** Bone atrophy was observed in 8 cases, generally within 2–4 months post-implantation. This complication was attributed to improper implant angulation (exceeding 15 degrees from Wilson's line) and incorrect implant positioning, such as medial or distal cantilevered loads. Management strategies included repositioning implants perpendicular to Wilson's line in four cases and increasing the number of implants while eliminating cantilevered structures in the remaining four cases. Connected bridges were utilized to enhance stability.

The rate of biological complications was not significantly different in bruxer patients compared to non-bruxer control patients.

Conclusion. Biological complications in bruxer patients highlight the critical importance of maintaining proper oral hygiene, optimizing prosthetic design, and ensuring precise surgical technique. While the incidence of complications was not significantly higher in bruxer patients compared to non-bruxers, careful planning and timely interventions were essential for successful outcomes.

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POSTERIOR MANDIBULAR AREA**

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SUMMARY

The posterior mandible, despite its higher alveolar bone density compared to the maxilla, remains vulnerable to damage under excessive forces, particularly in proximity to critical structures like the inferior alveolar nerve. Dental implants in the posterior mandibular region are especially susceptible to biological complications in patients with bruxism. These complications can include peri-implant mucositis, peri-implantitis, and implant failure due to bone loss or poor osseointegration. Biological complications in bruxer patients highlight the critical importance of maintaining proper oral hygiene, optimizing prosthetic design, and ensuring precise surgical technique. While the incidence of complications was not significantly higher in bruxer patients compared to non-bruxers, careful planning and timely interventions were essential for successful outcomes.

Keywords: dental implants, bruxer, posterior, mandibular, biologic complications

