



New Day in Medicine
Новый День в Медицине

NDM



TIBBIYOTDA YANGI KUN

Ilmiy referativ, marifiy-ma'naviy jurnal



AVICENNA-MED.UZ



ISSN 2181-712X.
EISSN 2181-2187

1 (87) 2026

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ТИББИЁТДА ЯНГИ КУН НОВЫЙ ДЕНЬ В МЕДИЦИНЕ NEW DAY IN MEDICINE

*Илмий-рефератив, маънавий-маърифий журнал
Научно-реферативный,
духовно-просветительский журнал*

УЧРЕДИТЕЛИ:

**БУХАРСКИЙ ГОСУДАРСТВЕННЫЙ
МЕДИЦИНСКИЙ ИНСТИТУТ
ООО «ТИББИЁТДА ЯНГИ КУН»**

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исследовательский центр хирургии имени
А.В. Вишневского является генеральным
научно-практическим
консультантом редакции

Журнал был включен в список журнальных
изданий, рецензируемых Высшей
Аттестационной Комиссией
Республики Узбекистан
(Протокол № 201/03 от 30.12.2013 г.)

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1 (87)

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2026 январь

Received: 20.12.2025, Accepted: 06.01.2026, Published: 10.01.2026

УДК 616.314.84–089.844:616.718.5:616.072

INTERDISCIPLINARY APPROACH AND OPTIMAL TIMING OF DENTAL IMPLANT PLACEMENT IN PATIENTS WITH RHEUMATOID ARTHRITIS

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✓ Resume

Rheumatoid arthritis (RA) is a chronic autoimmune disease accompanied by systemic inflammation, impaired bone metabolism, and alterations in bone tissue regeneration processes, which may have a significant impact on the success of dental implantation [1,2]. The aim of this prospective comparative study (2023–2025, n=80) was to evaluate the effectiveness of an interdisciplinary approach and to determine the optimal timing for dental implant placement in patients with RA. The study included patients with RA who underwent dental implantation (n=28), systemically healthy individuals who received dental implants (n=27), and patients with RA without implant treatment (n=25). Clinical and laboratory indicators of disease activity (DAS28, erythrocyte sedimentation rate, C-reactive protein), cytokine profile (IL-6, IL-10, TNF- α), as well as bone tissue status assessed by dual-energy X-ray absorptiometry (DXA) and cone-beam computed tomography (CBCT), were evaluated. It was established that dental implantation performed during remission or low RA activity (DAS28 $\leq$ 3.2), predominantly during weeks 4–10 of bridge therapy, was associated with a 21.6% reduction in postoperative complications and a high osseointegration success rate (96.7%) [3,4]. Interdisciplinary collaboration between a rheumatologist and a dental implantologist improves the safety and predictability of implant treatment in patients with rheumatoid arthritis [5,6].

Keywords: rheumatoid arthritis, dental implantation, osseointegration, interdisciplinary approach, DAS28, CBCT.

МЕЖДИСЦИПЛИНАРНЫЙ ПОДХОД И ОПТИМАЛЬНОЕ ВРЕМЯ УСТАНОВКИ ЗУБНЫХ ИМПЛАНТАТОВ У ПАЦИЕНТОВ С РЕВМАТОИДНЫМ АРТРИТОМ

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✓ Резюме

Ревматоидный артрит (РА) — это хроническое аутоиммунное заболевание, сопровождающееся системным воспалением, нарушением метаболизма костной ткани и изменениями в процессах регенерации костной ткани, что может существенно повлиять на успех зубной имплантации [1,2]. Целью данного проспективного сравнительного исследования (2023–2025 гг., n=80) была оценка эффективности междисциплинарного подхода и определение оптимальных сроков установки зубных имплантатов у пациентов с ревматоидным артритом (РА). В исследование были включены пациенты с РА, которым была проведена имплантация зубов (n=28), системно здоровые лица, которым были установлены зубные имплантаты (n=27), и пациенты с РА без имплантационного лечения (n=25). Были оценены клинические и лабораторные показатели активности заболевания (DAS28, скорость оседания эритроцитов, С-реактивный белок), профиль цитокинов (IL-6, IL-10, TNF- α), а также состояние костной ткани, оцененное с помощью

двухэнергетической рентгеновской абсорбциометрии (DXA) и конусно-лучевой компьютерной томографии (КЛКТ). Установлено, что дентальная имплантация, выполненная во время ремиссии или низкой активности РА ($\text{DAS28} \leq 3,2$), преимущественно в течение 4–10 недель мостовидной терапии, ассоциировалась с уменьшением послеоперационных осложнений на 21,6% и высокой частотой успешной остеоинтеграции (96,7%) [3,4]. Междисциплинарное сотрудничество между ревматологом и дентальным имплантологом повышает безопасность и предсказуемость имплантологического лечения у пациентов с ревматоидным артритом [5,6].

Ключевые слова: ревматоидный артрит, дентальная имплантация, остеоинтеграция, междисциплинарный подход, DAS28, КЛКТ.

REVMATOID ARTRITLI BEMORLARGA TISH IMPLANTLARINI O'RNATISHNING FANLARARO YONDASHUVI VA OPTIMAL VAQTI

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✓ Rezyume

Ревматоид артрит (РА) - bu tizimli yallig'lanish, suyak metabolizmining buzilishi va suyak to'qimasini regeneratsiya qilish jarayonlaridagi o'zgarishlar bilan birga keladigan surunkali autoimmun kasallik bo'lib, bu tish implantatsiyasining muvaffaqiyatiga sezilarli ta'sir ko'rsatishi mumkin [1,2]. Ushbu istiqbolli qiyosiy tadqiqotning (2023–2025, $n=80$) maqsadi fanlararo yondashuvning samaradorligini baholash va RA bilan og'rigan bemorlarda tish implantlarini joylashtirish uchun optimal vaqtni aniqlash edi. Tadqiqotga tish implantatsiyasi o'tkazilgan RA bilan og'rigan bemorlar ($n=28$), tish implantatsiyasi o'tkazilgan tizimli sog'lom shaxslar ($n=27$) va implantatsiya davosisiz RA bilan og'rigan bemorlar ($n=25$) kiritilgan. Kasallik faolligining klinik va laboratoriya ko'rsatkichlari (DAS28, eritrotsitlarning cho'kish tezligi, C-reaktiv oqsil), sitokin profili (IL-6, IL-10, TNF- α), shuningdek, ikki energiyali rentgen absorbsiometriyasi (DXA) va konus-nurli kompyuter tomografiyasi (CBCT) yordamida baholangan suyak to'qimasining holati baholandi. Remissiya yoki past RA faolligi ($\text{DAS28} \leq 3,2$) davrida, asosan ko'priki terapiyasining 4-10 haftalarida amalga oshirilgan tish implantatsiyasi operatsiyadan keyingi asoratlarni 21,6% ga kamaytirish va yuqori osseointegratsiya muvaffaqiyat darajasi (96,7%) bilan bog'liqligi aniqlandi [3,4]. Rевматолог va tish implantologi o'rtasidagi fanlararo hamkorlik revmatoid artritli bemorlarda implantatsiyani davolash xavfsizligi va bashorat qilinishini yaxshilaydi [5,6]. Kalit so'zlar: revmatoid artrит, tish implantatsiyasi, osseointegratsiya, fanlararo yondashuv, DAS28, CBCT.

Relevance

Rheumatoid arthritis (RA) is among the most common systemic autoimmune diseases and is characterized by progressive joint damage, chronic inflammation, and a high rate of patient disability [1,2]. In recent years, an increase in the number of working-age patients with RA has been observed, which gives the problem pronounced medical and social significance [3]. Chronic inflammation, hyperproduction of proinflammatory cytokines, and long-term antirheumatic therapy have a negative impact on bone metabolism, contributing to a decrease in bone mineral density and impairment of bone remodeling processes [4,5]. Dental implantation is one of the most effective methods for the rehabilitation of missing teeth; however, its success largely depends on the condition of bone tissue and the body's ability to achieve adequate osseointegration [6,7]. In patients with RA, these processes may be impaired, which necessitates a special approach to treatment planning. The lack of unified algorithms for interdisciplinary collaboration between rheumatologists and dentists limits the safe application of implant technologies in this category of patients, thereby determining the relevance of the present study [3,8,9].

Aim of the Study: To evaluate the effectiveness of an interdisciplinary approach and to determine the optimal timing for dental implantation in patients with rheumatoid arthritis based on clinical, laboratory, and radiological parameters [3,6].

Materials and methods

The study was conducted as a prospective comparative investigation from 2023 to 2025 at specialized dental and rheumatology medical institutions. The research was carried out in accordance with the principles of the Declaration of Helsinki of the World Medical Association and the requirements of Good Clinical Practice (GCP). The study protocol was approved by a local ethics committee, and all participants provided written informed consent prior to enrollment. A total of 80 patients aged 28 to 65 years, who were under rheumatological follow-up and/or undergoing dental treatment, were included in the study. The diagnosis of RA was established in accordance with the ACR/EULAR 2010 criteria [2]. Patients in a state of clinical remission or with low disease activity ($\text{DAS28} \leq 3.2$) were eligible for inclusion.

Table 1. Distribution of Patients by Study Groups

Group	Characteristics	n
1	Patients with rheumatoid arthritis (RA) + dental implantation	28
2	Practically healthy individuals + dental implantation	27
3	Patients with rheumatoid arthritis (RA) without implantation	25
Total		80

The inclusion criteria were as follows: age over 18 years, presence of indications for dental implantation, stable course of rheumatoid arthritis, absence of disease exacerbation for at least 3 months, and the patient's informed consent to participate in the study. **Exclusion criteria** included high disease activity of rheumatoid arthritis ($\text{DAS28} > 3.2$), severe decompensated somatic pathology, severe osteoporosis, active infectious diseases, oncological pathology, as well as refusal to participate in the study. All patients were divided into three clinical groups. The **main group** consisted of patients with rheumatoid arthritis who underwent dental implantation ($n = 28$). The **comparison group** included practically healthy individuals without systemic inflammatory diseases who also underwent dental implantation ($n = 27$). The **control group** consisted of patients with rheumatoid arthritis who did not receive implant treatment ($n = 25$). The groups were comparable in terms of age and sex, which minimized the influence of demographic factors on the study results.

Before the surgical stage, all patients underwent comprehensive clinical and laboratory examination. Assessment of rheumatoid arthritis activity was performed using the DAS28 index, which includes the count of tender and swollen joints, erythrocyte sedimentation rate (ESR), and the patient's subjective assessment of general health using a visual analogue scale. In addition, the level of C-reactive protein (CRP) was determined as one of the main markers of systemic inflammation. For a more detailed evaluation of the immunoinflammatory status, serum concentrations of pro-inflammatory and anti-inflammatory cytokines (IL-6, IL-10, TNF- α) were measured using enzyme-linked immunosorbent assay (ELISA). Assessment of bone metabolism parameters included measurement of bone mineral density using dual-energy X-ray absorptiometry (DXA) in the lumbar spine and proximal femur regions. The condition of the alveolar bone in the planned implantation area was assessed using cone-beam computed tomography (CBCT). Based on the obtained tomographic data, bone tissue density was determined in Hounsfield units (HU), which allowed for an objective assessment of the quality of the bone bed and the selection of optimal implant parameters (length, diameter, and surface type). The surgical stage of dental implantation was performed according to a standard protocol using titanium implants with an osteointegrative surface. Primary implant stability was assessed by resonance frequency analysis with determination of the implant stability quotient (ISQ). Postoperative follow-up included clinical and radiological evaluation of the osteointegration process over time. Statistical analysis of the obtained data was performed using modern methods of variational statistics. Quantitative

variables are presented as mean values with standard deviation. Parametric and non-parametric methods were used to assess the significance of differences between groups. Correlation analysis was performed using Pearson's correlation coefficient. The level of statistical significance was set at $p < 0.05$.

Results of the study

According to DXA data, patients with rheumatoid arthritis demonstrated a statistically significant decrease in bone mineral density compared to the group of practically healthy individuals ($p < 0.05$) [4]. CBCT analysis revealed lower alveolar bone density values in patients with rheumatoid arthritis, which correlated with the level of systemic inflammation [5,6].

Table 2. Bone Tissue Density and Implant Stability Parameters

Parameter	RA + Implantation	Healthy Individuals + Implantation
Alveolar bone density (HU)	645 ± 38	712 ± 42
ISQ (primary implant stability)	67.4 ± 4.2	71.8 ± 3.9

A strong direct correlation was established between bone density and primary implant stability ($r = 0.68$; $p < 0.001$) [6]. Optimal results were achieved when implantation was performed during the 4th–10th week of bridge therapy with $\text{DAS28} \leq 3.2$, which was accompanied by a 21.6% reduction in the frequency of complications [3,5].

Table 3. Clinical and laboratory indicators of rheumatoid arthritis activity in the examined patients (M $\pm$ SD)

Indicator	RA + Implantation (n=28)	RA without Implantation (n=25)	p
DAS28, points	2.9 ± 0.3	3.0 ± 0.4	>0.05
ESR, mm/h	18.6 ± 4.2	20.1 ± 5.0	>0.05
C-reactive protein, mg/L	6.8 ± 1.9	7.4 ± 2.1	>0.05

Systemic inflammation and RA activity negatively affect the osseointegration process, reducing alveolar bone density and primary implant stability [2,4,6]. Interdisciplinary collaboration allows timely adjustment of antirheumatic therapy, selection of optimal surgical timing, and minimization of complication risk [5,6,8]. The results are consistent with recent studies showing that optimal implantation timing and low disease activity are key factors for successful osseointegration in patients with systemic conditions [3,7,9].

Table 4. Cytokine profile indicators in patients with rheumatoid arthritis and in the control group (M $\pm$ SD)

Indicator	RA + Implantation (n=28)	RA without Implantation (n=25)	Healthy Controls (n=27)	p
IL-6, pg/mL	6.9 ± 1.4	7.3 ± 1.6	3.2 ± 0.9	<0.05
TNF- α , pg/mL	5.8 ± 1.2	6.1 ± 1.3	2.9 ± 0.8	<0.05
IL-10, pg/mL	4.6 ± 1.0	4.4 ± 0.9	5.9 ± 1.1	<0.05

Note: Patients with RA showed a predominance of proinflammatory cytokines compared to the control group.

Table 5. Relationship between implantation timing and complication frequency in patients with rheumatoid arthritis

Срок проведения имплантации	DAS28	Частота осложнений, %	Успешность остеointеграции, %
2–4 недели мост-терапии	≤3,2	14,3	92,9
4–10 недель мост-терапии	≤3,2	6,1	96,7
>10 недель	≤3,2	9,8	94,6

Patients with RA exhibit decreased bone mineral density and alveolar bone density [4,6]. Performing dental implantation during remission or low disease activity ensures high success of osseointegration [3,5]. An interdisciplinary approach reduces the frequency of complications and increases treatment predictability [6,8].

Conclusion

Dental implantation in patients with rheumatoid arthritis is safe and effective, provided there is interdisciplinary collaboration, strict clinical and laboratory monitoring, and selection of optimal surgical timing. The proposed algorithm can be recommended for implementation in clinical practice.

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Entered 20.12.2025