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МЕДИЦИНА, ПЕДАГОГИКА И ТЕХНОЛОГИЯ: ТЕОРИЯ И ПРАКТИКА



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ООО «ДОМ ИССЛЕДОВАНИЙ
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YUZ-JAG' SOHASIDAGI ODONTOGEN YALLIG'LANISH KASALLIKLARINI ZAMONAVIY TASHXISLASH VA DAVOLASH USULLARI

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ANNOTATSIYA

Ushbu maqolada yuz-jag' sohasidagi odontogen yallig'lanish kasalliklarini zamonaviy tashxislash va davolashning dalillarga asoslangan yondashuvlari tahlil qilindi. Tadqiqot adabiyotlar sharhi va analitik sintez dizaynida bajarilib, 2019–2026-yillarda e'lon qilingan klinik tavsiyalar, sistematik sharhlar va kuzatuv tadqiqotlari ustuvor ravishda ko'rib chiqildi. Diagnostikada klinik xavf stratifikatsiyasi, kontrastli kompyuter tomografiyasi, konus-nurli kompyuter tomografiyasi, ultratovush tekshiruvi hamda CRP, prokaltsitonin va neytrofil-limfotsit nisbatining o'rni baholandi. Davolashning asosiy tamoyili infeksiya manbasini bartaraf etish va adekvat drenaj ekanligi, antibiotiklar esa tizimli tarqalish yoki yuqori xavf holatlarida yordamchi vosita sifatida qo'llanishi ko'rsatildi. Chuqur bo'yin bo'shliqlari zararlanishi, nafas yo'li kompromissi va sepsis xavfi bo'lgan bemorlarda kontrastli KT, shoshilinch jarrohlik drenaji, nafas yo'lini himoyalash va individual empirik antibakterial terapiya muhim hisoblanadi. Antimikrob rezistentlikning ortishi klindamitsin va ayrim penitsillinlarga ehtiyotkor yondashishni, mahalliy rezistentlik ma'lumotlariga tayanishni talab qiladi.

Kalit so'zlar: odontogen infeksiya, yuz-jag' sohasi, absess, flegmona, kompyuter tomografiyasi, CBCT, biomarkerlar, drenaj, antibiotiklar, antimikrob rezistentlik.

АННОТАЦИЯ

В статье проанализированы современные доказательные подходы к диагностике и лечению одонтогенных воспалительных заболеваний челюстно-лицевой области. Работа выполнена в формате обзора литературы и аналитического синтеза с приоритетным включением клинических рекомендаций, систематических обзоров и наблюдательных исследований 2019–2026 гг. Оценены роль клинической стратификации риска, компьютерной томографии с контрастированием, конусно-лучевой компьютерной томографии, ультразвуковой диагностики, а также С-

реактивного белка, прокальцитонина и нейтрофильно-лимфоцитарного отношения. Основой лечения остается устранение одонтогенного очага и адекватное дренирование, тогда как антибактериальная терапия рассматривается как дополнение при системных проявлениях, распространении инфекции и высоком риске осложнений. При вовлечении глубоких клетчаточных пространств шеи, угрозе дыхательным путям и сепсисе необходимы срочная оценка дыхательных путей, контрастная КТ, хирургическое дренирование и индивидуализированная эмпирическая антибиотикотерапия. Рост антимикробной резистентности требует рационального назначения антибиотиков с учетом локальных данных чувствительности.

Ключевые слова: одонтогенная инфекция, челюстно-лицевая область, абсцесс, флегмона, компьютерная томография, КЛКТ, биомаркеры, дренирование, антибиотики, антимикробная резистентность.

ABSTRACT

This article analyzes contemporary evidence-based approaches to the diagnosis and management of odontogenic inflammatory diseases of the maxillofacial region. The study was designed as a literature review and analytical synthesis, prioritizing clinical guidance, systematic reviews, and observational studies published between 2019 and 2026. The diagnostic roles of clinical risk stratification, contrast-enhanced computed tomography, cone-beam computed tomography, ultrasonography, C-reactive protein, procalcitonin, and the neutrophil-to-lymphocyte ratio were assessed. Source control and adequate drainage remain the cornerstone of treatment, whereas antibiotics should be considered adjunctive therapy in patients with systemic involvement, spreading infection, or a high risk of complications. In suspected deep neck space infection, airway compromise, or sepsis, urgent airway assessment, contrast-enhanced CT, surgical drainage, and individualized empiric antimicrobial therapy are essential. Increasing antimicrobial resistance, including clinically relevant resistance to clindamycin and some penicillins, reinforces the need for antibiotic stewardship and consideration of local susceptibility patterns.

Keywords: odontogenic infection, maxillofacial region, abscess, phlegmon, computed tomography, CBCT, biomarkers, drainage, antibiotics, antimicrobial resistance.

KIRISH

Odontogen yallig‘lanish kasalliklari dental pulpa, periapikal to‘qimalar yoki periodontal tuzilmalardan kelib chiqib, alveolyar o‘simta, jag‘ suyaklari va yuz-bo‘yin fasial bo‘shliqlariga tarqalishi mumkin bo‘lgan polimikrob infeksiyalardir. Klinik spektr lokal periapikal absessdan tortib submandibulyar, sublingval va parafaringeal bo‘shliqlar flegmonasi, Lyudvig anginasi, nekrotik fassiit, mediastinit va sepsisgacha davom etadi. Zamonaviy antibiotiklar mavjud bo‘lishiga qaramay, kech tashxis, infeksiya manbasining bartaraf etilmasligi, immunosupressiya, qandli diabet va antimikrob rezistentlik og‘ir asoratlarni xavfini saqlab qoladi (Lou et al., 2024; Neal & Schlieve, 2022).

Odontogen infeksiyaning klinik boshqaruvida asosiy muammo — oddiy dentoalveolyar jarayon bilan chuqur fasial bo‘shliqlarga tarqaluvchi xavfli infeksiyani erta ajratishdir. Klinik ko‘rik ko‘pchilik bemorlarda yetarli boshlang‘ich ma‘lumot beradi, biroq trizm, bo‘yin shishi, disfagiya, odinofagiya, tilning ko‘tarilishi, ovoz o‘zgarishi, toksik ko‘rinish yoki nafas qisilishi mavjud bo‘lsa, chuqur tarqalishni istisno qilish uchun tasvirlash va tizimli baholash zarur. Chuqur bo‘yin infeksiyalarida kontrastli KT anatomik bo‘shliqlar, kolleksiya, gaz, mediastinal tarqalish va operativ kirishni rejalash uchun asosiy usul sifatida qaraladi (Sheikh et al., 2023).

Stomatologiyada CBCT yuqori fazoviy aniqlikdagi uch o‘lchamli dentoalveolyar tasvirni nisbatan past nurlanish yuklamasi bilan olish imkonini beradi. U periapikal destruksiya, ildiz–sinus munosabati, odontogen sinusit va noaniq endodontik patologiyalarda ayniqsa foydali, biroq yumshoq to‘qima va chuqur bo‘yin infeksiyalarini baholashda kontrastli tibbiy KTning o‘rnini bosa olmaydi (Patel et al., 2019; Rosen et al., 2022).

Ushbu maqolaning maqsadi — yuz-jag‘ sohasidagi odontogen yallig‘lanish kasalliklarida zamonaviy diagnostik vositalar, klinik-laborator risk baholash, jarrohlik manba nazorati va ratsional antibakterial terapiyaning o‘rnini tizimli ravishda tahlil qilish hamda amaliy klinik algoritmlarni taklif etish.

METODOLOGIYA VA ADABIYOTLAR TAHLILI

Ushbu ish narrativ adabiyotlar sharhi va strukturaviy analitik sintez ko‘rinishida bajarildi. PubMed/NCBI, ochiq kirishli ilmiy jurnallar va professional jamiyatlarning pozitsion hujjatlaridan 2019–2026-yillarda chop etilgan manbalar ustuvor tanlandi. Qidiruv tushunchalari sifatida “odontogenic infection”, “maxillofacial space infection”, “deep neck infection”, “contrast-enhanced CT”, “CBCT”, “biomarkers”, “procalcitonin”, “CRP”, “antibiotic resistance”, “incision and drainage” va “source control” terminlarining kombinatsiyalari qo‘llanildi.

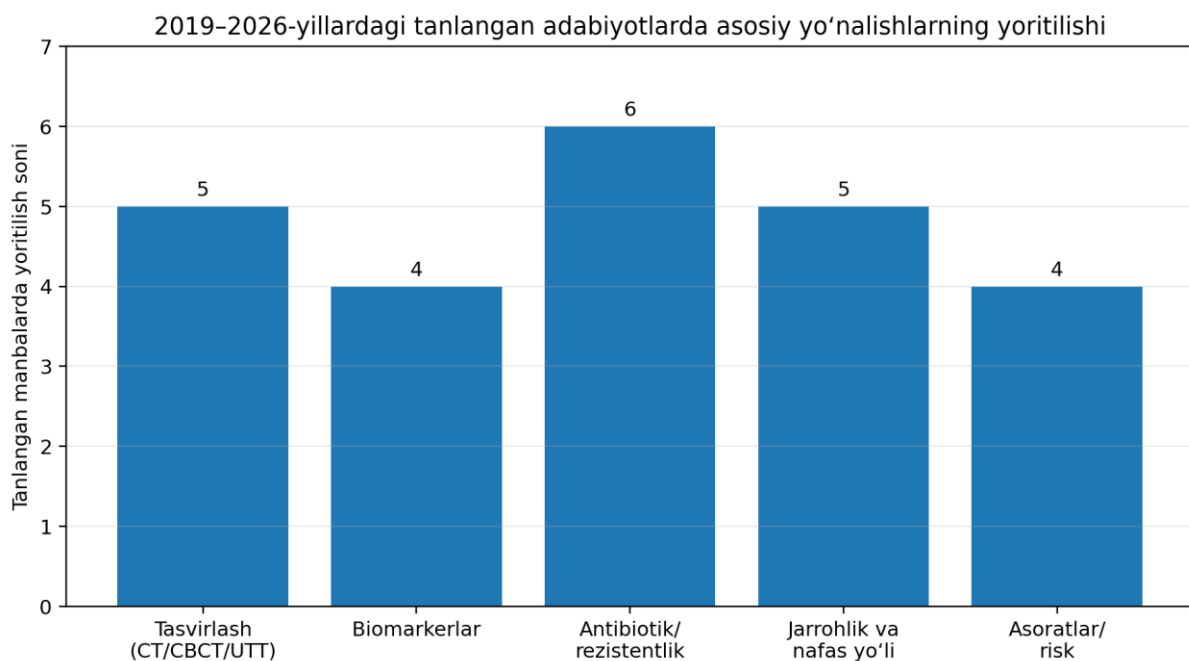
Kiritish mezonlari: (1) odamlar ishtirokidagi klinik tadqiqotlar, sistematik sharhlar yoki dalillarga asoslangan tavsiyalar; (2) odontogen yoki yuz-jag‘/chuqur bo‘yin

infeksiyalarining tashxisi, xavf stratifikatsiyasi yoki davolashga bevosita aloqadorlik; (3) diagnostik tasvirlash, biomarkerlar, jarrohlik yoki antibakterial terapiya haqida amaliy xulosa berishi. Faqat eksperimental hayvon tadqiqotlari, mavzuga bilvosita bog'liq ishlar va klinik qaror qabul qilishga ta'siri past bo'lgan manbalar chiqarib tashlandi.

Dalillar diagnostika, laborator risk baholash, jarrohlik manba nazorati, antibiotik tanlovi, antimikrob rezistentlik va og'ir asoratlarni boshqarish bloklariga ajratildi. Natijalar bo'limidagi diagramma tanlangan manbalarining mazmuniy tasnifini ko'rsatadi; bitta manba bir nechta klinik yo'nalishga tegishli bo'lishi mumkin. Ushbu maqolada birlamchi bemor ma'lumotlari yaratilmagan va soxta klinik statistikalar qo'llanilmagan.

NATIJALAR

Adabiyotlar sintezi klinik qaror qabul qilishning besh tayanch nuqtasini ko'rsatdi: xavfni erta stratifikatsiya qilish, anatomik tarqalishni to'g'ri tasvirlash, tizimli yallig'lanish og'irligini laborator baholash, infeksiya manbasini jarrohlik yo'li bilan nazorat qilish va antibiotiklarni maqsadli hamda qisqa muddatli qo'llash.



1-diagramma. Tanlangan zamonaviy adabiyotlarda asosiy klinik yo'nalishlarning yoritilishi.

Usul	Asosiy indikatsiya	Afzallik	Cheklov	Amaliy oʻrni
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Klinik ko'rik	Mahalliy shish, og'riq, trizm, disfagiya, qizil bayroqlar	Tez, nurlanishsiz, triage uchun zarur	Chuqur kolleksiyani to'liq ko'rsatmaydi	Har bir bemorda birinchi bosqich
Periapikal/panoramik rentgen	Dental manba va suyak o'zgarishlari	Keng mavjud, arzon	2D ustma-ust tushish, yumshoq to'qima cheklovi	Past xavfli lokal holatlar
CBCT	Noaniq periapikal o'choq, ildiz anatomiyasi, odontogen sinusit	Yuqori fazoviy aniqlik, 3D	Yumshoq to'qima kontrasti past; chuqur bo'yin uchun yetarli emas	Dentoalveolyar murakkab holatlar
Kontrastli KT	Chuqur fasial/bo'yin bo'shliqlari, absess, tarqalish	Kolleksiya, gaz va anatomik tarqalishni ko'rsatadi	Nurlanish va kontrast xavfi	Og'ir va tez tarqaluvchi infeksiyada asosiy usul
UTT	Yuzaki kolleksiya, punktatsiya yo'naltirish	Nurlanishsiz, bedside	Chuqur va havo/suyak ortidagi tuzilmalar cheklangan	Tanlangan yuzaki holatlarda yordamchi
CRP/PCT/NLR	Tizimli yallig'lanish va prognoz	Dinamik kuzatuv va risk baholash	Spetsifik emas, klinik/tasvirlashni almashtirmaydi	Og'irlikni qo'shimcha stratifikatsiya qilish

1-jadval. Odontogen yallig'lanishlarda zamonaviy diagnostika usullarining qiyosiy tavsifi.

Tasvirlash bo'yicha sintez shuni ko'rsatadiki, CBCT dentoalveolyar va maksillyar sinus bilan bog'liq patologiyada diagnostik aniqlikni oshiradi, ammo yumshoq to'qima infeksiyasining chuqur tarqalishida kontrastli KT ustun turadi. ESE pozitsion hujjati CBCTni indikatsiyaga asoslangan holda, odatiy 2D tekshiruv klinik savolga javob bermaganda qo'llashni tavsiya qiladi (Patel et al., 2019). Rosen et al. (2022) esa CBCTning klinik qaror qabul qilishga ta'siri mavjud bo'lsa-da, yuqori darajadagi dalillarda bias xavfi saqlanib qolishini ta'kidlaydi.

Ko'rsatkich	Klinik ma'nosi	Dalil	Talqin
CRP	Yallig'lanish yuklamasi va dinamik javob	Og'ir infeksiyada yuqori; davolash bilan pasayishi klinik yaxshilanishga mos	Yakka holda anatomik tarqalishni ko'rsatmaydi
Prokaltsitonin (PCT)	Tizimli bakterial javob/sepsis xavfi	2023-yil kohortida og'irlik va asoratlari bilan kuchli bog'liqlik; AUC 0.89	Yuqori xavfli bemorda qo'shimcha prognostik marker
NLR/SII/AISI	Arzon gematologik risk indeksleri	NLR va kompleks indekslar og'irlik bilan bog'liq; ayrim tadqiqotlarda yuqori klassifikatsiya aniqligi	Klinik va KT indikatsiyasini qo'llab-quvvatlovchi vosita
WBC	Leukotsitoz va tizimli javob	Keng mavjud, ammo spetsifikligi past	Boshqa markerlar va klinika bilan birga talqin qilinadi

2-jadval. Laborator biomarkerlarning risk stratifikatsiyasidagi o'rni.

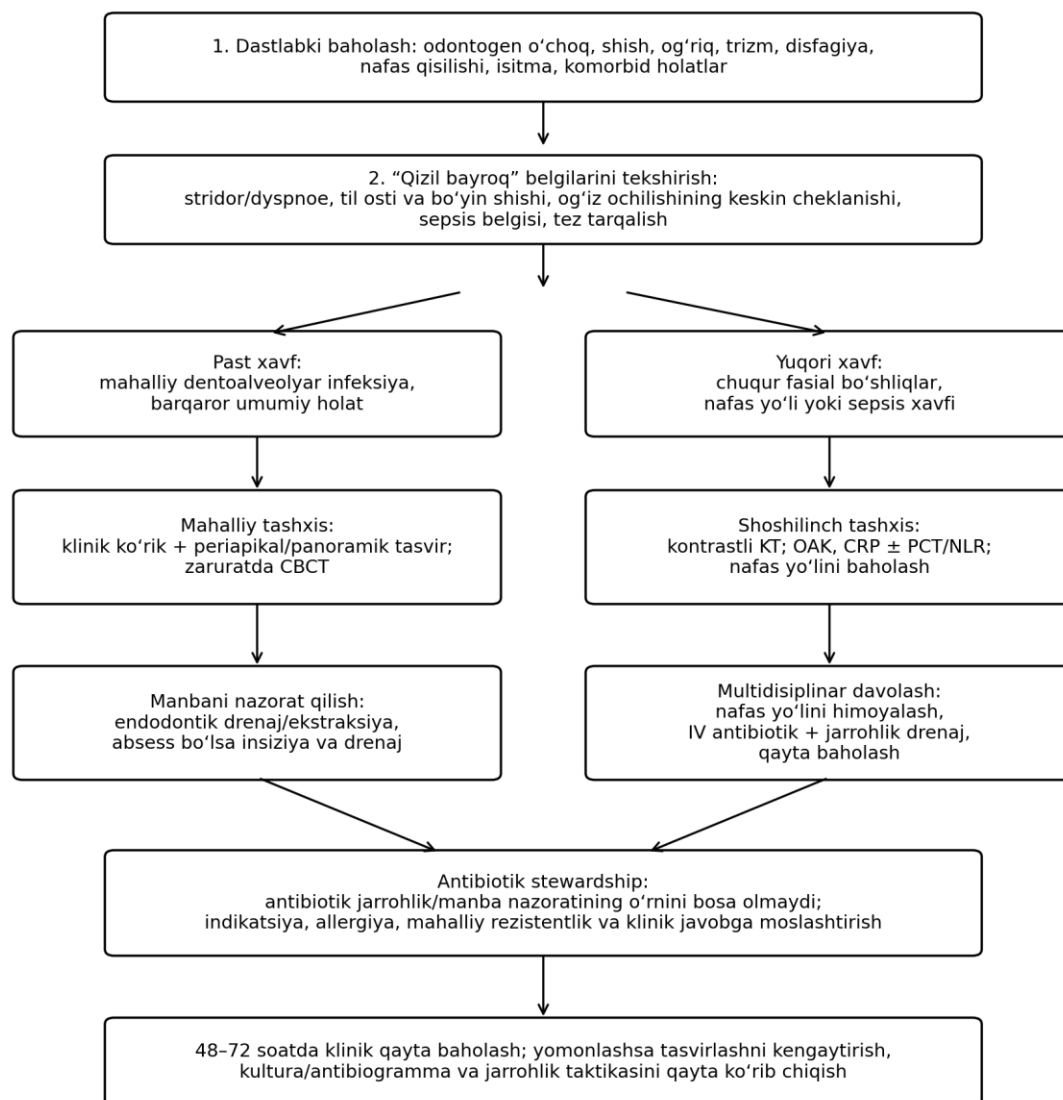
So'nggi tadqiqotlar an'anaviy WBC va CRP bilan birga PCT, NLR, SII va AISI kabi indekslardan foydalanish og'ir odontogen infeksiyani erta aniqlashga yordam berishini ko'rsatmoqda. 50 bemorli prospektiv kohortda PCT asoratlarni bashorat qilishda eng

yuqori diskriminativ ko'rsatkichlardan birini namoyon qilgan (AUC 0.89), NLR va CRP ham klinik og'irlik bilan sezilarli bog'langan. Boshqa retrospektiv tadqiqotda SII va CRP+NLR kombinatsiyasi og'ir guruhlarini ajratishda foydali bo'lgan. Bu markerlar KTni yoki klinik ko'rikni almashtirmaydi, lekin "kimga tezroq kengaytirilgan tekshiruv kerak?" savoliga yordam beradi.

Klinik holat	Manba nazorati	Antibiotik	Tasvirlash	Kuzatuv
Lokal absess, tizimli belgisiz	Endodontik drenaj yoki ekstraktsiya; absess bo'lsa drenaj	Har doim shart emas; klinik indikatsiyaga ko'ra	2D tasvir, zaruratda CBCT	24–72 soat
Sellulit/tarqaluvchi shish	Dental o'choqni bartaraf etish	Tizimli belgilar bo'lsa empirik terapiya	Tarqalish darajasiga ko'ra KT	48 soat ichida qayta baholash
Chuqur fasial/bo'yin absessi	Shoshilinch jarrohlik drenaji + o'choq sanatsiyasi	IV keng qamrovli, keyin kultura bo'yicha toraytirish	Kontrastli KT	Statsionar, serial klinik/lab nazorat
Nafas yo'li xavfi/Lyudvig anginas	Jarrohlik jamoa bilan zudlik bilan	IV terapiya, sepsis protokoli bilan uyg'un	KT faqat nafas yo'li stabil bo'lsa	Nafas yo'li birinchi o'rinda
Davoga javobsiz holat	Qoldiq o'choq/drenaj yetarliligini tekshirish	Kultura/antibiogramma, rezistentlikni hisobga olish	Takror KT/UTT klinik vaziyatga ko'ra	Taktikani qayta ko'rib chiqish

3-jadval. Og'irlik darajasiga qarab davolash strategiyasi.

Odontogen yallig'lanishlarda zamonaviy diagnostika va davolash algoritmi



1-rasm. Odontogen yallig'lanishlarda xavfga asoslangan diagnostika va davolash algoritmi (mualliflik sxemasi).

Davolashga oid dalillarning eng barqaror xulosasi — antibiotikning o'zi yetarli emas. Nekrotik pulpa, periodontal yoki periapikal o'choq saqlanib qolsa, infektsiya davom etadi; shuning uchun ekstraksiya, endodontik dekompressiya yoki insiziya-drenaj "source control"ning asosini tashkil qiladi. Sistematik sharhlar jarrohlik aralashuvi bilan birga qo'llangan antibiotik kurslarini ko'pincha qisqartirish mumkinligini, klinik javob va og'irlikka qarab 3–5 kunlik rejimlar ayrim holatlarda yetarli bo'lishi mumkinligini

ko'rsatadi. Biroq chuqur bo'yin infeksiyasi, immunosupressiya, sepsis va tarqaluvchi flegmonada parenteral terapiya va statsionar kuzatuv talab etiladi.

Antimikrob rezistentlik bo'yicha so'nggi sharhlar ayrim Streptococcus, Staphylococcus va anaerob turlarida penitsillinlar va klindamitsinga chidamlilik muammosini qayd etadi. Shu sababli empirik tanlov mahalliy antibiogramma, allergiya tarixi va infeksiya og'irligiga mos bo'lishi, og'ir holatda esa kultura olingach terapiya imkon qadar toraytirilishi kerak. Penitsillin allergiyasi qayd etilgan bemorlarda allergiyaning haqiqiylikini aniqlash ham klinik ahamiyatga ega, chunki noto'g'ri "allergiya" yorlig'i kengroq va ko'proq nojo'ya ta'sirli preparatlarga olib kelishi mumkin (Mahmoud et al., 2024).

MUHOKAMA

Natijalar odontogen yallig'lanishlarni boshqarishda "bir xil davolash hamma uchun" modeli samarasiz ekanini ko'rsatadi. Mahalliy vestibulyar absess bilan submandibulyar yoki parafaringeal bo'shliq infeksiyasi bir xil biologik kelib chiqishga ega bo'lishi mumkin, ammo ularning hayot uchun xavfi, tasvirlash ehtiyoji va davolash intensivligi keskin farqlanadi. Shuning uchun birinchi klinik qaror antibiotik tanlash emas, balki infeksiya qayerga tarqalganini va nafas yo'liga tahdid bormi-yo'qligini aniqlash bo'lishi kerak.

Kontrastli KTning kuchli tomoni — yumshoq to'qimalar va chuqur anatomik bo'shliqlarni xaritalashidir. Chuqur bo'yin infeksiyalarining sistematik sharhida amaliyotlar heterogen bo'lsa-da, tasvirlash, nafas yo'lini baholash, antibiotik va jarrohlik drenaji asosiy komponentlar sifatida takroran uchraydi (Sheikh et al., 2023). Katta uchlamchi markaz tajribasida chuqur bo'yin infeksiyalarining katta qismi odontogen kelib chiqishga ega bo'lgan va kontrastli KT operativ rejalashda kritik vosita sifatida qayd etilgan.

CBCTni esa og'ir bo'yin infeksiyasida KT o'rniga qo'yish xato bo'ladi. CBCT dentoalveolyar strukturalarda yuqori rezolyutsiyani beradi, biroq yumshoq to'qima kontrasti va keng anatomik qamrov bo'yicha cheklangan. Uning eng oqilona qo'llanishi — odatiy rentgenogramma yetarli bo'lmagan murakkab endodontik, periapikal yoki odontogen sinusit holatlaridir. Bu yondashuv keraksiz nurlanishni kamaytiradi va diagnostik savolga mos modalitet tanlash tamoyiliga javob beradi.

Biomarkerlar bo'yicha yangi ma'lumotlar klinik risk stratifikatsiyasini kuchaytiradi. CRP va WBC keng qo'llanadi, ammo PCT, NLR va kompleks immuno-yallig'lanish indeksleri og'irlik yoki asorat xavfini oldindan baholashda qo'shimcha qiymat berishi mumkin. Shunga qaramay, biror laborator marker absessning anatomik joylashuvini yoki

nafas yo'li xavfini ko'rsatmaydi. Shu bois biomarker “tasvirlash kerakmi?” degan qarorni qo'llab-quvvatlaydi, uni almashtirmaydi.

Antibiotik stewardship zamonaviy davolashning ajralmas qismidir. Odontogen absesslarda asosiy terapevtik harakat — yiringli kolleksiyaning drenaj qilish va sababchi tishni davolash yoki olib tashlash. Keraksiz antibiotiklar rezistentlikni, diareya va boshqa nojo'ya ta'sirlarni oshiradi. Aksincha, tizimli toksiklik, tarqaluvchi sellulit, chuqur bo'shliq infeksiyasi yoki immunitet pasaygan bemorda antibiotikni kechiktirish ham xavfli. Demak, minimal, lekin yetarli terapiya tamoyili eng oqilona yondashuvdir.

Maqolaning cheklovi shundaki, bu birlamchi klinik tadqiqot emas va turli dizayndagi manbalarni birlashtiradi. Antibiotik tanlovi mamlakat va muassasalar kesimida rezistentlik profiliga bog'liq; shu sababli aniq dori va doza rejimi mahalliy protokollar, bemorning buyrak-jigar funksiyasi, allergiyasi, homiladorligi va infeksiya og'irligiga moslashtirilishi lozim.

XULOSA

Yuz-jag' sohasidagi odontogen yallig'lanish kasalliklarida zamonaviy klinik boshqaruvning markazida uch tamoyil turadi: xavfli tarqalishni erta aniqlash, infeksiya manbasini tez va to'liq nazorat qilish hamda antibiotiklarni asosli qo'llash. Past xavfli lokal jarayonlarda klinik ko'rik va dental tasvirlash ko'pincha yetarli bo'lsa, chuqur fasial yoki bo'yin bo'shliqlariga tarqalishdan shubhalanganda kontrastli KT eng muhim tasvirlash usulidir. CBCT dentoalveolyar va odontogen sinus patologiyalarida yuqori diagnostik qiymatga ega, biroq chuqur yumshoq to'qima infeksiyasida kontrastli KTni almashtirmaydi.

CRP, PCT, NLR, SII va AISI kabi laborator markerlar infeksiya og'irligi va asoratlar xavfini baholashda yordamchi ahamiyatga ega. Nafas yo'li kompromissi, sepsis, tez tarqaluvchi shish va chuqur bo'shliq absessi shoshilinch multidisiplinar yondashuvni talab qiladi. Jarrohlik drenaji va odontogen o'choq sanatsiyasi antibiotik terapiyasining o'rnini bosmaydigan asosiy davolashdir; antibiotiklar esa ko'rsatmaga muvofiq, rezistentlik va bemorning individual xavf omillarini hisobga olgan holda tanlanishi kerak.

Kelajakdagi amaliyot uchun eng muhim yo'nalishlar — klinik risk ballarini biomarkerlar bilan integratsiyalash, tasvirlashning oqilona algoritmlarini standartlashtirish va mahalliy antimikrob rezistentlik monitoringini yo'lga qo'yishdir.

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YUQORI JAG' SINUSINING ODONTOGEN PATOLOGIYALARINI JARROHLIK YO'LI BILAN DAVOLASHNING ZAMONAVIY YONDASHUVLARI

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ANNOTATSIYA

Ushbu maqolada yuqori jag' sinusining odontogen kelib chiqishli patologiyalarini jarrohlik yo'li bilan davolashning zamonaviy yondashuvlari tahlil qilindi. Odontogen sinusit, oroantral aloqa va fistula, maksillyar sinusga siljigan tish ildizi yoki implant, odontogen kistalar va sinus ichidagi begona jismlar asosiy klinik holatlar sifatida ko'rib chiqildi. Zamonaviy boshqaruvning markazida dental infeksiya manbasini bartaraf etish, sinusning fiziologik drenajini tiklash va keraksiz keng jarrohlikdan qochish tamoyillari turadi. Endoskopik sinus jarrohligi (ESS/FESS) ostiomeatal kompleksni ochish, yiring va patologik to'qimalarni olib tashlash hamda sinus ventilyatsiyasini saqlash imkonini beradi. 2024-yilgi ekspert konsensusi odontogen maksillyar sinusitni stomatolog va otorinolaringolog hamkorligida boshqarishni tavsiya etadi. Klinik tadqiqotlarda kombinatsiyalangan dental va endoskopik yondashuv, ayniqsa surunkali va yuqori sinus yuklamali holatlarda, eng yuqori muvaffaqiyat ko'rsatkichlarini namoyish etgan. Klassik Caldwell–Luc operatsiyasining roli zamonaviy amaliyotda cheklangan bo'lib, u asosan katta begona jismlar, keng kistoz jarayon yoki endoskopik kirish yetarli bo'lmagan tanlangan vaziyatlarda qo'llanadi.

Kalit so'zlar: odontogen sinusit, yuqori jag' sinusi, endoskopik sinus jarrohligi, FESS, ESS, oroantral fistula, Caldwell–Luc, dental infeksiya, implant, maksillyar sinus.

АННОТАЦИЯ

В статье проанализированы современные хирургические подходы к лечению одонтогенной патологии верхнечелюстной пазухи. Рассмотрены одонтогенный синусит, oroантральное сообщение и свищ, смещение корней зубов или имплантатов в пазуху, одонтогенные кисты и инородные тела. Современная стратегия лечения основана на устранении стоматогенного источника инфекции,

восстановлении физиологического дренажа пазухи и минимизации хирургической травмы. Эндоскопическая хирургия околоносовых пазух (ESS/FESS) позволяет восстановить проходимость естественного соустья, удалить гной, патологические ткани и инородные тела при сохранении функции синуса. Экспертный консенсус 2024 года подчеркивает необходимость мультидисциплинарного взаимодействия стоматолога и оториноларинголога. Клинические исследования показывают, что комбинированное стоматологическое и эндоскопическое лечение особенно эффективно при хроническом одонтогенном синусите и выраженном поражении пазухи. Роль операции Caldwell–Luc в современной практике ограничена и сохраняется преимущественно при крупных инородных телах, обширных кистах или недостаточном эндоскопическом доступе.

Ключевые слова: одонтогенный синусит, верхнечелюстная пазуха, эндоскопическая хирургия, FESS, ESS, ороантральный свищ, Caldwell–Luc, стоматогенная инфекция, имплантат.

ABSTRACT

This article analyzes contemporary surgical approaches to odontogenic pathologies of the maxillary sinus. The main clinical entities include odontogenic sinusitis, oroantral communication and fistula, displaced tooth roots or implants, odontogenic cysts, and foreign bodies within the maxillary sinus. Modern management is based on three principles: elimination of the dental source, restoration of physiological sinus drainage, and avoidance of unnecessarily extensive surgery. Endoscopic sinus surgery (ESS/FESS) permits restoration of the natural drainage pathway, removal of purulence and pathological tissue, and treatment of selected foreign bodies while preserving sinus function. A 2024 multidisciplinary expert consensus emphasizes cooperation between dental/maxillofacial and otolaryngology teams. Clinical studies demonstrate that combined dental treatment and ESS provides particularly high success rates in chronic odontogenic sinusitis and in patients with a high sinus disease burden. The role of the classic Caldwell–Luc procedure is now limited mainly to selected cases involving large foreign bodies, extensive cystic lesions, or inadequate endoscopic access.

Keywords: odontogenic sinusitis, maxillary sinus, endoscopic sinus surgery, FESS, ESS, oroantral fistula, Caldwell–Luc, dental infection, dental implant.

KIRISH

Yuqori jag‘ sinusi anatomik jihatdan yuqori premolyar va molyar tishlar ildizlari bilan yaqin qo‘shnichilikda joylashgan. Shu sababli periapikal periodontit, periodontal kasallik, endodontik asoratlar, tish ekstraksiyasi, implantatsiya, sinus-lifting va boshqa

dentoalveolyar muolajalar Schneider membranasiining zararlanishi yoki infeksiyaning sinus bo'shlig'iga o'tishiga olib kelishi mumkin. Odontogen sinusit rinogen sinusitdan etiologiyasi, mikrobiologiyasi va davolash tamoyillari bilan farq qiladi.

Odontogen manba o'z vaqtida aniqlanmasa, bemor faqat antibiotik, nazal steroid yoki takroriy rinologik muolajalar olishi mumkin, biroq dental fokus saqlanib qolgani uchun kasallik qaytalanadi. Odontogen etiologiya ayniqsa bir tomonlama maksillyar sinus opasifikatsiyasi, yomon hidli ajralma, anamnezda yaqinda bajarilgan dental muolaja yoki yuqori jag' tishlarida periapikal patologiya mavjud bo'lganda faol izlanishi kerak. Zamonaviy sharhlarda bir tomonlama maksillyar sinusit holatlarining sezilarli qismi dental patologiya bilan bog'liq ekani qayd etiladi.

Diagnosticada kompyuter tomografiyasi sinusning shilliq qavati, ostiomeatal kompleks va boshqa sinuslarga tarqalishni baholashda asosiy tasvirlash vositasi hisoblanadi. CBCT esa tish ildizlari, periapikal o'choq, implant va sinus tubi o'rtasidagi munosabatni yuqori fazoviy aniqlikda ko'rsatadi. LOR endoskopiyasi o'rta burun yo'lida yiring va shilliq qavat o'zgarishlarini baholash imkonini beradi.

Jarrohlik davolashning tarixiy modeli keng transantral kirish va patologik shilliq qavatni radikal olib tashlashga asoslangan bo'lsa, zamonaviy model sinus fiziologiyasini saqlashga yo'naltirilgan. ESS/FESS tabiiy ostiumni kengaytirish, drenajni tiklash va maqsadli tozalash imkonini beradi. Shu bilan birga dental manbani bartaraf etmasdan bajarilgan ESSning muvaffaqiyati cheklanishi mumkin.

Maqolaning maqsadi — yuqori jag' sinusining odontogen patologiyalarini jarrohlik yo'li bilan davolashda dental jarrohlik, ESS/FESS, oroantral fistula plastikasi, transoral kirish va Caldwell–Luc usullarining zamonaviy o'rmini dalillar asosida tahlil qilish va amaliy davolash algoritmini shakllantirish.

METODOLOGIYA VA ADABIYOTLAR TAHLILI

Ushbu ish strukturaviy narrativ sharh va klinik dalillar sintezi sifatida bajarildi. PubMed/NCBI, ochiq kirishli ilmiy jurnallar va xalqaro ekspert konsensus hujjatlarida “odontogenic sinusitis”, “odontogenic maxillary sinusitis”, “endoscopic sinus surgery”, “dental treatment”, “oroantral fistula”, “Caldwell–Luc”, “foreign body maxillary sinus” va “multidisciplinary treatment” terminlari bo'yicha 2015–2026-yillardagi manbalar ustuvor ravishda ko'rib chiqildi.

Kiritish mezonlari sifatida odontogen maksillyar sinusit yoki boshqa odontogen sinus patologiyasida jarrohlik taktikasini baholagan sistematik sharhlar, ekspert konsensuslari, prospektiv yoki retrospektiv klinik tadqiqotlar tanlandi. Asosiy natija ko'rsatkichlari klinik simptomlarning yo'qolishi, endoskopik yiringning bartaraf bo'lishi, radiologik

regressiya, fistula yopilishi, qayta operatsiya zarurati va davolash tugashigacha bo'lgan vaqt bo'ldi.

Birlamchi bemor bazasi taqdim etilmagani sababli maqolada muallif tomonidan yaratilgan sun'iy klinik statistika ishlatilmadi. Diagrammadagi raqamlar zamonaviy klinik tadqiqotlardan olingan. Turli tadqiqotlarda "muvaffaqiyat" mezonlari heterogen bo'lganligi alohida hisobga olindi; 2024-yilgi sistematik sharh aynan ESS natijalarini o'lchash usullarining standartlashmaganini asosiy muammo sifatida ko'rsatgan.

Dalillar uch klinik savol bo'yicha sintez qilindi: 1) qachon dental davolashning o'zi yetarli; 2) qachon ESS/FESS qo'shish kerak; 3) qaysi hollarda transoral yoki Caldwell–Luc kirishi asosli. Shuningdek, bir bosqichli kombinatsiyalangan ENT–dental jarrohlikning natijalari tahlil qilindi.

NATIJALAR

Adabiyotlar tahlili odontogen sinus patologiyalarini jarrohlik boshqarishda asosiy determinant sinusning o'zidagi patologiya hajmi emas, balki dental manba bilan sinus drenajining bir vaqtda nazorat qilinishidir. Dental fokus saqlanib qolsa, sinusga qaratilgan izolyatsiyalangan operatsiya qaytalanish xavfini oshiradi; aksincha, ostiomeatal kompleks obstruksiyasi yoki surunkali diffuz sinusit mavjud bo'lsa, faqat dental muolaja sekin yoki yetarli bo'lmagan javob berishi mumkin.

Patologiya	Asosiy jarrohlik maqsad	Birinchi tanlov	Qo'shimcha yondashuv	Izoh
Apikal/periodontal manbali ODS	Dental fokusni bartaraf etish + drenajni tiklash	Endodontik davolash yoki ekstraktsiya	Sinus yuklamasi yuqori bo'lsa ESS/FESS	Dental manba nazorati shart
Oroantral aloqa/fistula	Og'iz-sinus aloqasini yopish	Bukkal/palatal flap yoki boshqa plastika	Faol sinusitda ESS qo'shiladi	Kichik yangi OAC ba'zan konservativ bitadi; epitelizatsiyalangan OAF

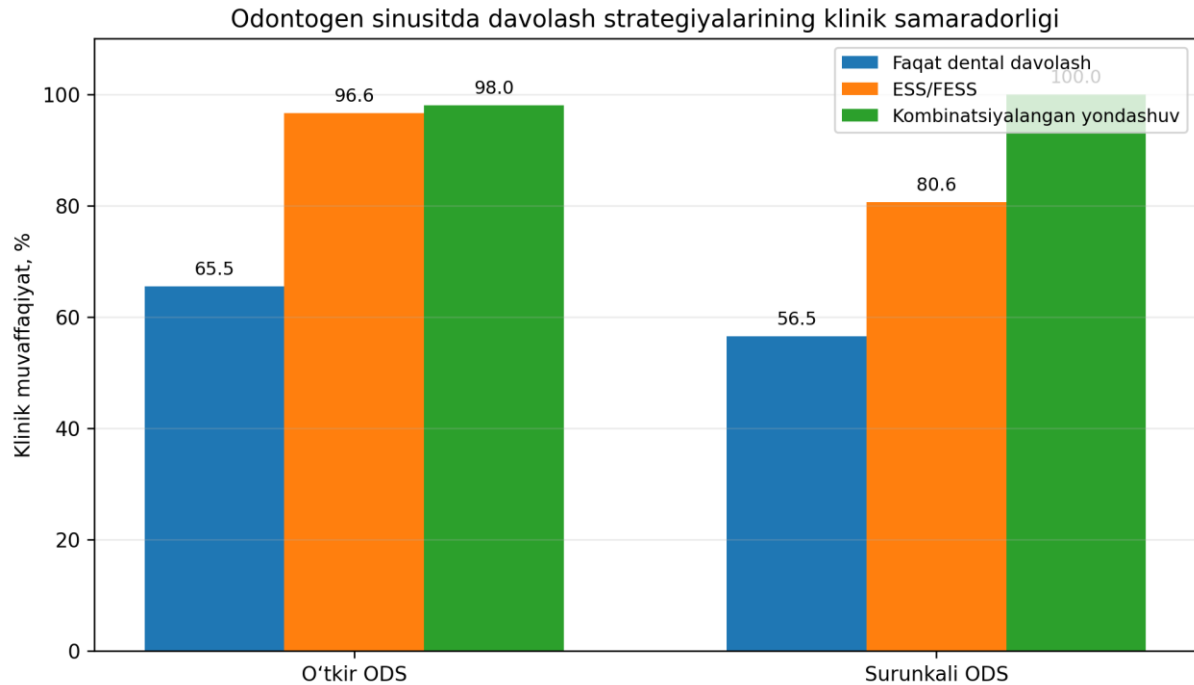
				odatda yopiladi
Sinusga siljigan ildiz/implant	Begona jismni olib tashlash	Endoskopik yoki transoral kirish	Kombinatsiya langan kirish	Hajm va joylashuvga qarab
Odontogen kista	Kistani olib tashlash va drenajni saqlash	Endoskopik/transoral/kombi natsiyalangan	Katta lezyonda kengroq kirish	Histologik tekshiruv zarur
Surunkali ODS + ostium obstruksiyas i	Ventilyat siya va mukosili ar klirensni tiklash	ESS/FESS + dental davolash	Bir bosqichli ENT-dental operatsiya	Eng kuchli zamonaviy klinik model
Katta begona jism yoki endoskopik kirish yetarli emas	To'liq eksplora tsiya va olib tashlash	Tanlangan transantral/Caldwell–Luc	Endoskop bilan kombinatsiya	Hozir rutinda emas

1-jadval. Yuqori jag' sinusining odontogen patologiyalarida jarrohlik taktikasini tanlash.

2024-yilda 172 bemorni qamrab olgan retrospektiv tahlilda o'tkir ODSda ESSning muvaffaqiyati 96,6%, dental davolashniki 65,5% bo'lgan. Surunkali ODSda esa ESS 80,6%, dental davolash 56,5% natija ko'rsatgan; kombinatsiyalangan ESS va dental davolash surunkali guruhda 100% muvaffaqiyatga erishgan. Bu natijalar kasallik davomiyligi va sinus yuklamasi ortgani sari ikki komponentli davolashning ahamiyati kuchayishini ko'rsatadi.

364 bemor ishtirokidagi prospektiv bir bosqichli ENT–dental jarrohlik seriyasida 94% holatda kombinatsiyalangan yondashuv bajarilgan va umumiy muvaffaqiyat 97% bo'lgan. Oroantral aloqa/fistula plastikasining muvaffaqiyati 98% qayd etilgan. Bu katta

klirik seriya sinus va dental manbani bir operatsion epizodda boshqarish tashkiliy va klinik jihatdan samarali bo'lishi mumkinligini ko'rsatadi.



1-diagramma. Odontogen sinusitda tanlangan zamonaviy klinik tadqiqotlardagi davolash muvaffaqiyati. Dental va ESS raqamlari 2024-yilgi 172 bemorli tadqiqotdan; kombinatsiyalangan yondashuv uchun surunkali ODSda 100% va katta bir bosqichli seriyada taxminan 97–98% natijalar qayd etilgan.

Usul	Asosiy afzallik	Kamchilik	Eng maqbul indikatsiya	Zamonaviy o'rni
Dental jarrohlik	Etiologik manbani bevosita yo'q qiladi	Sinus drenaj obstruksiyasini har doim tuzatmaydi	Periapikal/periodontal fokus, muammoli tish	Har doim etiologik baholashning markazida
ESS/FESS	Tabiiy ostium orqali drenaj, kam invaziv, sinus funksiyasini saqlaydi	Dental fokus saqlansa qaytalanishi mumkin	Ostium obstruksiyasi, surunkali/refrakter ODS	Asosiy sinus jarrohlik usuli

OAF plastikasi	Og'iz-sinus yo'lini yopadi	Faol sinusitda yakka o'zi yetarli bo'lmasligi mumkin	Persistiruvchi oroantral fistula	ESS bilan kombinatsiya ko'p hollarda optimal
Transoral antrotomiya	Pastki/anteri or sinus bo'limiga to'g'ri kirish	Mukozal travma va qo'shimcha morbidity	Katta begona jism, lateral joylashuv	Tanlangan holatlarda
Caldwell–Luc	Keng vizual kirish	Yuz shishi, paresteziya, sinus fiziologiyasi buzilishi	Katta lezyon yoki endoskopik kirish yetarli bo'lmagan holat	Cheklangan/res cue usul
Kombinatsiyalan gan ENT–dental	Bir bosqichda etiologiya + drenajni hal qiladi	Ikki mutaxassis va koordinatsiy a talab qiladi	Yuqori sinus yuklamasi, OAF, xorijiy jism, surunkali ODS	Eng zamonaviy multidisciplinar model

2-jadval. Zamonaviy jarrohlik usullarining afzallik va cheklovlari.

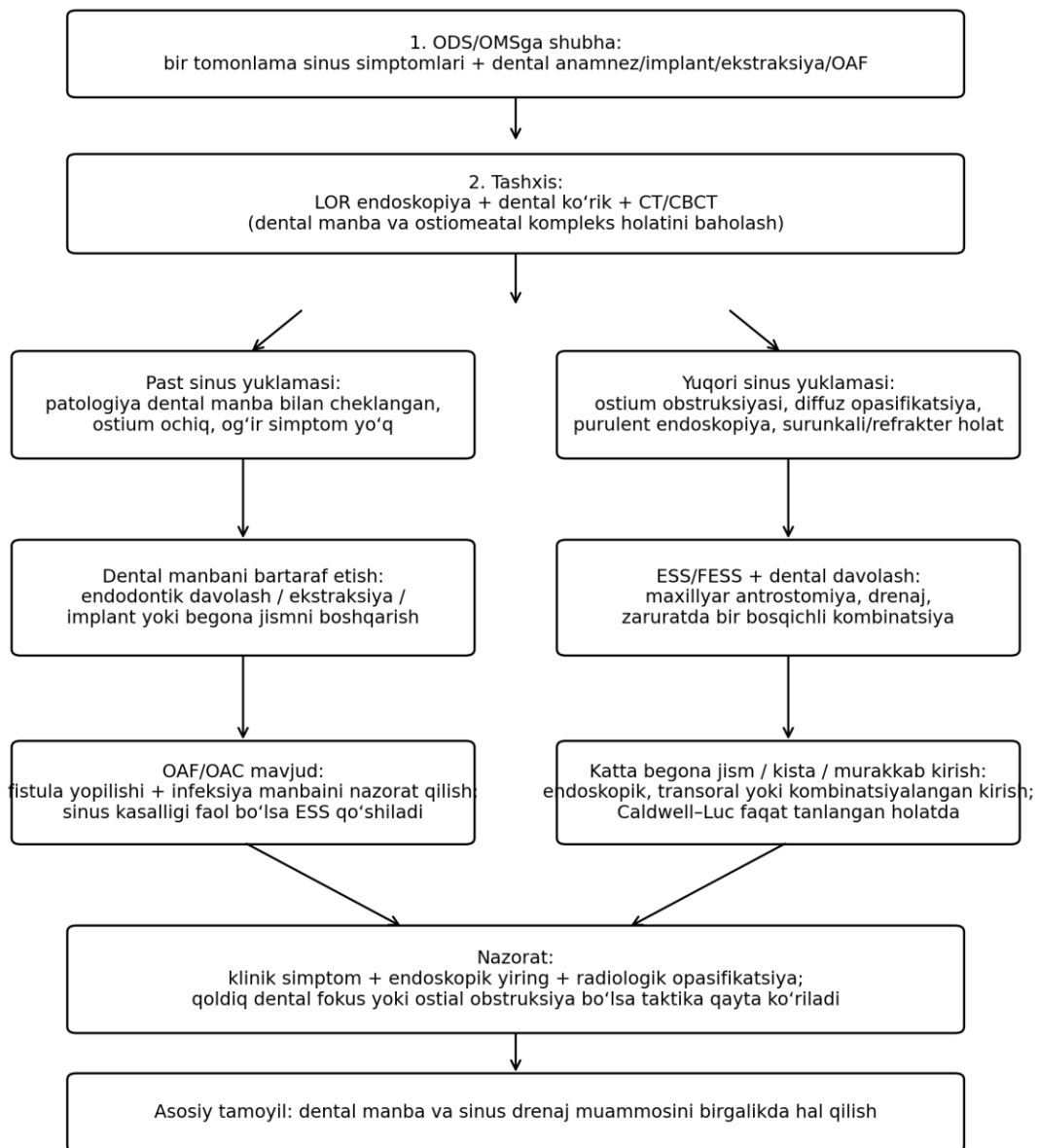
ESS/FESSning asosiy afzalligi sinus shilliq qavatini maksimal saqlab, tabiiy drenaj yo'lini qayta tiklashdir. Zamonaviy adabiyotlarda Caldwell–Lucga nisbatan kamroq morbidlik, qisqaroq statsionar davolash va fiziologik funksiyani yaxshiroq saqlash qayd etiladi. Shu sabab klassik radikal antrotomiya endilikda birinchi tanlov emas.

Biroq ESSning o'zi etiologik dental fokusni bartaraf etmaydi. Endodontik kasallik va oroantral fistulali bemorlarni tahlil qilgan klinik tadqiqotda faqat ESS bilan davolangan bemorlarda muvaffaqiyatsizlik 40% bo'lgan, dental davolash guruhida esa 4% bo'lgan. OAF yopilishiga ESS qo'shilganda bitish vaqti taxminan yarmiga — o'rtacha 10 kungacha qisqargan. Bu natija tanlangan etiologiyalarda dental manbani birinchi darajali nishon sifatida ko'rsatadi.

2023-yilgi 89 bemorli kohortda yakuniy simptomatik va endoskopik tuzalish 97,8% bo'lgan. Davolash tartibi ham muhim bo'lib, ESS birinchi bajarilib, keyin dental muolaja qilingan bemorlarda davolash yakunlanishigacha median vaqt 112 kun, dental muolaja birinchi bajarilib keyin ESSga o'tilganlarda 236 kun bo'lgan. Bu barcha bemorlarda

ESSni avtomatik birinchi qilish kerakligini anglatmaydi, ammo yuqori sinonazal yuklama bo'lganlarda kechiktirilgan ESS umumiy davolashni cho'zishi mumkinligini ko'rsatadi.

Odontogen yuqori jag' sinus patologiyalarini jarrohlik boshqarish algoritmi



1-rasm. Odontogen yuqori jag' sinus patologiyalarida risk va sinus yuklamasiga asoslangan jarrohlik algoritmi (mualliflik sxemasi).

Klinik mezon	Dental davolashning o'zi	ESS/FESS qo'shish	Kombinatsiyalangan/keng kirish
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Periapikal fokus + minimal sinus qalinlashuvi	Ko'pincha yetarli	Persistensiyada	Kamdan-kam
Bir tomonlama to'liq/katta opasifikatsiya	Yetarli bo'lmasligi mumkin	Ko'pincha kerak	Etiologiyaga qarab
Ostiomeatal kompleks obstruksiyasi	Yo'q	Ha	Murakkab patologiyada
Persistiruvchi OAF	Fistula plastikasi shart	Faol sinusitda foydali	Katta defektda transoral kombinatsiya
Sinusdagi implant/ildiz	Manbani olib tashlash	Joylashuvga ko'ra	Katta/lateral jismda transoral ± endoskopik
Katta odontogen kista	Faqat dental yondashuv yetmasligi mumkin	Endoskopik dekompressiya mumkin	Keng lezyonda kombinatsiya
Surunkali >3 oy ODS	Muvaffaqiyat pastroq	Muvaffaqiyat yuqori	Dental + ESS eng ishonchli

3-jadval. Klinik va radiologik yuklamaga ko'ra jarrohlik yondashuvini tanlash.

MUHOKAMA

Zamonaviy dalillar odontogen sinus patologiyalarida “sinus kasalligi” va “dental kasallik”ni ikkita alohida muammo sifatida ko'rish noto'g'ri ekanini ko'rsatadi. Ular bitta patofiziologik zanjirning ikki qismi hisoblanadi. Shuning uchun jarrohlik muvaffaqiyati dental etiologiyani bartaraf etish va sinonazal drenajni tiklash o'rtasidagi muvozanatga bog'liq.

2024-yilgi multidisiplinar ekspert konsensusi ODS tashxisi va davolashida stomatolog, yuz-jag' jarrohi va otorinolaringolog o'rtasidagi hamkorlikni markaziy tamoyil sifatida belgilaydi. Ayniqsa sinus yuklamasi past bo'lgan ayrim bemorlarda etiologik dental davolashdan keyin sinus yallig'lanishi regress qilishi mumkin. Aksincha, ostium obstruksiyasi, polipoid o'zgarish, kuchli purulent drenaj yoki surunkali kasallik mavjud bo'lsa, ESSning erta qo'shilishi oqilona.

ESS/FESSning ustunligi radikal shilliq qavat rezektsiyasidan qochishidir. Zamonaviy endoskopik jarrohlik sinus ichidagi patologik sekretsia yoki cheklangan to'qimani olib tashlab, tabiiy ventilyatsiya va mukosiliar klirensni tiklashga intiladi. Shu bilan birga

endoskopik kirishning o'zi maksillyar sinusning barcha anterior, inferior yoki lateral bo'limlariga ideal kirishni bermasligi mumkin. Shuning uchun ayrim katta begona jismlar, implantlar yoki kistalarda transoral yordamchi kirish hanuz amaliy ahamiyatga ega.

Caldwell–Luc operatsiyasining tarixiy ahamiyati katta, biroq bugungi kunda uni standart birinchi bosqich davolash sifatida qo'llash asosli emas. Uning keng suyak oynasi va shilliq qavat travmasi yuz shishi, infraorbital/yuqori alveolyar nerv paresteziyasi va sinus fiziologiyasining buzilishiga olib kelishi mumkin. Shunga qaramay, endoskopik instrumental kirish yetarli bo'lmagan ulkan begona jism, katta kista yoki murakkab anatomik holatda u maqsadli “rescue” usul sifatida saqlanib qoladi.

Oroantral fistulada faqat fistulani yopish sinusdagi faol yallig'lanishni nazorat qilmasligi mumkin. Agar endoskopiyada yiring va KTda ostium obstruksiyasi mavjud bo'lsa, fistula plastikasi bilan birgalikda ESS bajarilishi bitishni tezlashtiradi va qaytalanish xavfini kamaytiradi. Bir bosqichli kombinatsiyalangan operatsiya bemor uchun bir necha alohida muolajani kamaytirishi ham mumkin.

Natijalarni talqin qilishda dalil bazasining cheklovlari muhim. 2024-yilgi sistematik sharh ESS bo'yicha 68 ishni tahlil qilgan bo'lsa-da, randomizatsiyalangan nazoratli sinovlarni topmagan va “muvaffaqiyat”ning ta'rifi ishlar orasida juda farq qilgan. Ba'zi tadqiqotlar simptom va endoskopiyani, boshqalari KT yoki fistula yopilishini asosiy natija sifatida olgan. Shu sabab 97–100% kabi yuqori ko'rsatkichlarni barcha klinik vaziyatlarga to'g'ridan-to'g'ri ko'chirish mumkin emas.

Maqolaning yana bir cheklovi — bu birlamchi klinik tadqiqot emas. Biroq turli dizayndagi zamonaviy ishlarning bir yo'nalishdagi xulosasi aniq: qaytalanuvchi ODSni faqat antibiotik yoki faqat sinus operatsiyasi bilan davolashdan ko'ra, etiologik dental manba va sinus drenajini birgalikda boshqarish yaxshiroq klinik mantiqqa ega.

XULOSA

Yuqori jag' sinusining odontogen patologiyalarini zamonaviy jarrohlik davolashda asosiy tamoyil — etiologik dental fokusni bartaraf etish va sinusning fiziologik drenajini tiklashdir. Dental davolashning o'zi sinus yuklamasi past va ostium ochiq bo'lgan tanlangan holatlarda yetarli bo'lishi mumkin.

Surunkali, diffuz yoki ostiomeatal kompleks obstruksiyasi bilan kechuvchi odontogen sinusitda ESS/FESS dental davolash bilan birgalikda eng ishonchli yondashuvdir. Zamonaviy klinik seriyalarda bunday kombinatsiyalangan davolash 97–100% gacha muvaffaqiyat ko'rsatgan, biroq dalillar asosan kuzatuv tadqiqotlariga asoslangan.

Oroantral fistulada sinusning faol yallig‘lanish darajasi hisobga olinishi kerak: fistula plastikasi zarur, faol ODS mavjud bo‘lsa ESS qo‘shilishi maqsadga muvofiq. Sinusga siljigan ildiz, implant yoki katta kistalarda kirish yo‘li anatomik joylashuvga qarab endoskopik, transoral yoki kombinatsiyalangan tarzda tanlanadi.

Caldwell–Luc operatsiyasi bugungi kunda rutindagi usul emas. U endoskopik kirish yetarli bo‘lmagan katta begona jismlar, keng patologiya yoki murakkab anatomik sharoitlarda rezerv usul sifatida qo‘llanishi kerak. Eng optimal natijaga LOR shifokori va dental/yuz-jag‘ jarrohining muvofiqlashtirilgan multidisiplinar boshqaruvi orqali erishiladi.

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ORTOGNATIK JARROHLIKDA YUZ SKELETI DEFORMATSIYALARINI KORREKSIYA QILISHNING ZAMONAVIY USULLARI

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ANNOTATSIYA

Ushbu maqolada yuz skeleti dentofasial deformatsiyalarini ortognatik jarrohlik yordamida korreksiya qilishning zamonaviy usullari tahlil qilindi. Le Fort I osteotomiyasi, bilateral sagittal split osteotomiya (BSSO), bimaxillyar jarrohlik, segmental osteotomiyalar va genioplastikaning klinik o'rni, shuningdek virtual surgical planning (VSP), CAD/CAM splintlar, individual cutting-guide va patient-specific implant (PSI) texnologiyalari ko'rib chiqildi. 2024-yilgi meta-tahlilda VSP rejalashtirilgan va amalda erishilgan jag' pozitsiyasi orasidagi tafovutni an'anaviy rejalashtirishga nisbatan o'rtacha 0,54 mm kamaytirgan; individual surgical guide bilan bu ustunlik 1,20 mm gacha yetgan. PSI bo'yicha sistematik sharhda bir bo'lakli Le Fort I holatlarida eng katta o'rtacha translatsion og'ish 0,5 mm, pitch bo'yicha 0,65° bo'lgan va PSI konvensional fiksatsiyaga nisbatan ayrim tekisliklarda 0,85 mm gacha aniqroq bo'lgan. Ortognatik davolash bo'yicha 23 prospektiv tadqiqotni qamrab olgan sistematik sharh operatsiyadan keyin hayot sifati barcha baholangan yo'nalishlarda yaxshilanishini ko'rsatgan. Shu bilan birga, nerv shikastlanishi, condyle positioning, relaps va yumshoq to'qima prognozi hali ham klinik natijani belgilovchi asosiy omillar bo'lib qolmoqda.

Kalit so'zlar: ortognatik jarrohlik, Le Fort I, BSSO, bimaxillyar jarrohlik, genioplastika, virtual surgical planning, CAD/CAM, patient-specific implant, dentofasial deformatsiya, yuz assimetriyasi.

АННОТАЦИЯ

В статье проанализированы современные методы коррекции зубочелюстно-лицевых деформаций с помощью ортогнатической хирургии. Рассмотрены клиническая роль остеотомии Le Fort I, двусторонней сагиттальной расщепляющей остеотомии нижней челюсти (BSSO), двухчелюстной хирургии, сегментарных

остеотомий и гениопластики, а также технологии виртуального хирургического планирования (VSP), CAD/CAM-шин, индивидуальных режущих шаблонов и patient-specific implants (PSI). Мета-анализ 2024 года показал, что VSP уменьшает расхождение между запланированным и достигнутым положением челюстей в среднем на 0,54 мм по сравнению с традиционным планированием, а применение индивидуального хирургического шаблона увеличивает преимущество до 1,20 мм. Систематический обзор PSI при однофрагментарной остеотомии Le Fort I продемонстрировал высокую трехмерную точность. Анализ 23 проспективных исследований показал улучшение качества жизни после ортогнатического лечения. При этом нейросенсорные нарушения, позиционирование мышечка, рецидив и точность прогноза мягких тканей остаются ключевыми факторами исхода.

Ключевые слова: ортогнатическая хирургия, Le Fort I, BSSO, двухчелюстная хирургия, гениопластика, виртуальное планирование, CAD/CAM, индивидуальный имплантат, зубочелюстная деформация.

ABSTRACT

This article reviews contemporary methods for correcting dentofacial skeletal deformities using orthognathic surgery. The roles of Le Fort I osteotomy, bilateral sagittal split osteotomy (BSSO), bimaxillary surgery, segmental osteotomies, and genioplasty are analyzed together with virtual surgical planning (VSP), CAD/CAM splints, custom cutting guides, and patient-specific implants (PSI). A 2024 meta-analysis showed that VSP reduced the discrepancy between planned and achieved jaw positions by an average of 0.54 mm compared with conventional planning, while the use of custom surgical guides increased this advantage to 1.20 mm. A systematic review of PSI in single-piece Le Fort I osteotomy reported high three-dimensional accuracy, with mean translational deviations around 0.5 mm and pitch deviations around 0.65°. A systematic review of 23 prospective studies found consistent improvement in quality of life after orthognathic therapy. Nevertheless, neurosensory disturbance, condylar positioning, skeletal relapse, and soft-tissue prediction remain major determinants of long-term outcome.

Keywords: orthognathic surgery, Le Fort I, BSSO, bimaxillary surgery, genioplasty, virtual surgical planning, CAD/CAM, patient-specific implant, dentofacial deformity.

KIRISH

Dentofasial deformatsiyalar yuqori va pastki jagʻlarning sagittal, vertikal yoki transversal yoʻnalishdagi nomutanosibligi natijasida yuzaga keladi. Skeletal II va III sinf malokkluziya, ochiq tishlash, yuzning vertikal disproporsiyasi va skelet assimetriyasi nafaqat estetik muammo, balki chaynash, nutq, temporomandibulyar boʻgʻim funksiyasi, nafas yoʻli va psixosozial holatga ham taʼsir qiladi.

Ortognatik jarrohlikning maqsadi jagʻ segmentlarini rejalashtirilgan uch oʻlchamli pozitsiyaga koʻchirish orqali funksional okkluziya, yuz skeleti balansini va yumshoq toʻqima profilini tiklashdir. Klassik jarrohlik skelet osteotomiyalari va model surgeryga tayangan boʻlsa, zamonaviy amaliyot CBCT, intraoral skan, 3D fotografiya, VSP, CAD/CAM va 3D-print texnologiyalarini integratsiya qilmoqda.

Le Fort I osteotomiyasi maksillani oldinga, orqaga, yuqoriga, pastga yoki rotatsion yoʻnalishda koʻchirish imkonini beradi. BSSO mandibular prognatiya yoki retrognatiyada eng keng qoʻllanadigan usullardan biri boʻlib, katta kontakt yuzasi va rigid fiksatsiya imkonini beradi. Murakkab disproportsiya yoki yuz assimetriyasida bimaxillary jarrohlik skelet bazalarini oʻzaro uygʻun holda qayta joylashtirishga imkon beradi.

Raqamli rejalashtirish operatsiya maqsadini aniqroq vizualizatsiya qilish, osteotomiya xavf zonalarini oldindan koʻrish, splint va cutting guide ishlab chiqish hamda patient-specific titanium plate orqali “rejalashtirilgan pozitsiyani” operatsion maydonga bevosita koʻchirish imkonini yaratdi.

Maqolaning maqsadi — yuz skeleti deformatsiyalarini ortognatik jarrohlik orqali korreksiya qilishning zamonaviy usullarini klinik va texnologik nuqtai nazardan tahlil qilish, ularning afzallik, cheklov va dalil darajasini taqqoslash.

METODOLOGIYA VA ADABIYOTLAR TAHLILI

Ushbu ish strukturaviy narrativ sharh va zamonaviy klinik dalillar sintezi shaklida bajarildi. PubMed/PMC va xalqaro indekslangan jurnallarda “orthognathic surgery”, “Le Fort I”, “BSSO”, “virtual surgical planning”, “patient-specific implant”, “CAD/CAM splint”, “orthognathic quality of life”, “relapse” va “neurosensory disturbance” terminlari boʻyicha 2018–2026-yillardagi manbalar ustuvor ravishda tahlil qilindi.

Kiritish mezonlari sifatida sistematik sharhlar, meta-tahlillar, prospektiv tadqiqotlar va 3D accuracy tahlillariga ega klinik ishlar tanlandi. Asosiy natija koʻrsatkichlari: rejalashtirilgan va real skelet pozitsiyasi orasidagi tafovut, jarrohlik va rejalashtirish vaqti, hayot sifati, neurosensory disturbance, relaps va patient-specific implant barqarorligi.

Birlamchi bemor ma'lumotlari taqdim etilmaganligi sababli maqolada sun'iy klinik statistika yaratilmagan. Diagrammadagi sonlar nashr etilgan sistematik sharh va meta-tahlillardan olingan. VSP va PSI bo'yicha natijalar texnologik aniqlikni bildiradi; bu ko'rsatkichlar klinik foyda, estetik qoniqish yoki asoratlarni kamayishi bilan avtomatik tenglashtirilmagan.

Adabiyotlar tahlilida jarrohlik tanlovi deformatsiya komponentlari bo'yicha — sagittal, vertikal, transversal va assimetrik — ajratilib, keyin ularning raqamli rejalashtirish, individual guide va PSI bilan integratsiyasi baholandi.

NATIJALAR

Adabiyotlar sintezi ortognatik jarrohlikdagi zamonaviy evolyutsiya ikki yo'nalishda ketayotganini ko'rsatdi: birinchisi — osteotomiya dizayni va rigid fiksatsiyaning takomillashuvi; ikkinchisi — 3D diagnostika va rejalashtirilgan pozitsiyani operatsion maydonga aniq transfer qilish texnologiyalaridir.

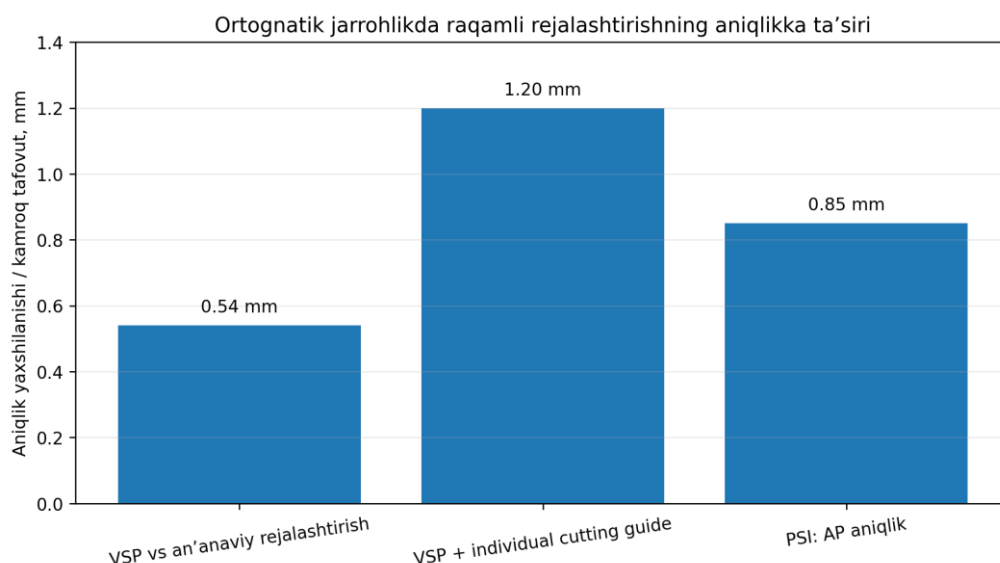
Usul	Asosiy ko'rsatma	Harakat imkoniyati	Afzallik	Asosiy xavf/cheklov
Le Fort I osteotomiyasi	Maksillyar gipo/giperplaziya, vertikal va transversal nomutanosiblik	Advancement/setback, impaction/down-grafting, yaw/roll/pitch	Ko'p yo'nalishli 3D korreksiya	Qon ketish, nasal/septal o'zgarish, relaps
BSSO	Mandibular prognatiya yoki retrognatiya	Advancement/setback va rotatsiya	Katta suyak kontakt yuzasi, rigid fiksatsiya	IAN shikastlanishi, bad split, condyle seating
Bimaxillary jarrohlik	Murakkab II/III sinf, assimetriya, vertikal nomutanosiblik	Ikki jag'ni koordinatsiyalangan 3D ko'chirish	Yuz proporsiyasi va okkluziyaning yaxshiroq balanslaydi	Operatsiya vaqti, murakkablik, ikki jag' relapsi

Segmental Le Fort I	Transversal torlik, segmentar tish-yoy muammosi	2–3 segmentli maksilla korreksiyasi	Ortodontik limitlarni kengaytira di	Segment vaskulyarlig i va periodontal xavf
Genioplasti ka	Chin retruziyasi/protruziy asi yoki asimmetriyasi	Sagittal, vertikal va transversal	Yumshoq to‘qima profilini nozik sozlaydi	Mental nerv, step deformity

1-jadval. Zamonaviy ortognatik osteotomiyalarning qiyosiy tavsifi.

2024-yilgi VSP meta-tahlilida 10 ta tadqiqot bo'yicha virtual rejalashtirish an'anaviy rejalashtirishga qaraganda rejalashtirilgan va postoperativ jag' pozitsiyasi orasidagi tafovutni o'rtacha 0,54 mm kamaytirgan. Individual surgical guide qo'llangan uchta tadqiqotda farq 1,20 mm ga yetgan. Bu ayniqsa yuz assimetriyasi, murakkab rotatsiya va bimaxillary repositioningda klinik ahamiyatga ega.

Patient-specific implantlar bo'yicha 2023-yilgi sistematik sharh 21 tadqiqot va 566 bemorni qamrab olgan. Bir bo'lakli Le Fort I PSI holatlarida eng katta o'rtacha translatsion og'ish 0,5 mm, pitch bo'yicha 0,65° bo'lgan. PSI konvensional CAD/CAM splint va osteosintezga nisbatan ayrim o'qlarda 0,85 mm va 2,35° gacha aniqroq bo'lgan. Shu bilan birga, mualliflar statistik aniqlik ustunligining real klinik foydasi hali to'liq isbotlanmaganini qayd etgan.



1-diagramma. Virtual surgical planning va patient-specific implantlarning 3D aniqlik bo'yicha tanlangan meta-tahlil ko'rsatkichlari.

Rejalashtirish usuli	Asosiy komponent	Aniqlik	Afzallik	Cheklov
2D an'anaviy	Sefalometriya, model surgery, face-bow	Qoniqarli, lekin 3D deformatsiyada cheklangan	Arzonroq va keng mavjud	Asimmetriya va rotatsiyani baholash cheklangan
3D VSP	CBCT + dental scan + virtual osteotomy	Meta-tahlilda ~0,54 mm aniqlik ustunligi	3D vizualizatsiya, simulyatsiya	Dastur, ma'lumot sifati, xarajat
CAD/CAM splint	VSP pozitsiyasini okklyuzion splint bilan transfer	Yuqori	Oddiy va ishonchli transfer	Splint xatolari va condyle seatingga bog'liq
VSP + cutting guide	Individual osteotomiya/repositioning guide	~1,20 mm aniqlik ustunligi	Murakkab 3D harakatni aniq ko'chiradi	Ko'proq preoperativ ish va xarajat
PSI/splintless	Individual plate + guide	Le Fort I uchun juda yuqori 3D aniqlik	Repositioning + fiksatsiya bir tizimda	Narx, ishlab chiqarish va intraoperativ mos kelmaslik xavfi

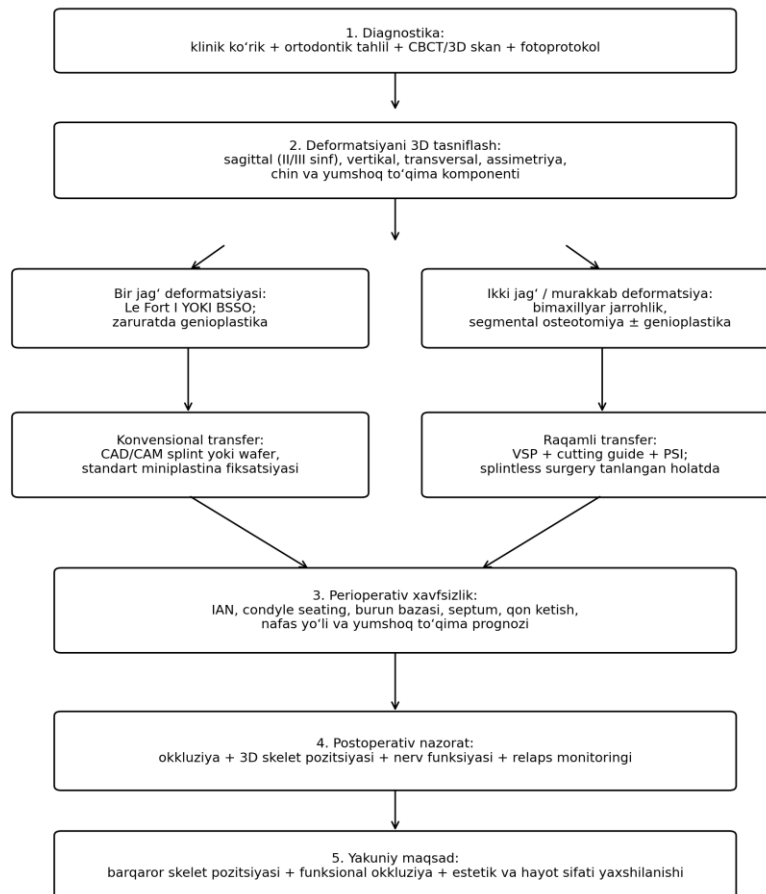
2-jadval. Ortognatik jarrohlikda an'anaviy va raqamli rejalashtirish usullarining qiyosiy tavsifi.

Hayot sifati bo'yicha 2024-yilgi sistematik sharh 23 prospektiv tadqiqot va jami 1039 bemorni tahlil qilgan. Barcha tadqiqotlarda OHIP yoki OQLQ ko'rsatkichlari ortognatik davolashdan keyin yaxshilangan. Eng katta ijobiy o'zgarishlar estetik va ijtimoiy domenlarda kuzatilgan; skeletal III sinf bemorlari ayrim tahlillarda II sinfga qaraganda ko'proq foyda ko'rgan.

Shu bilan birga uzoq muddatli barqarorlik masalasi to'liq hal etilmagan. 2023-yilgi sistematik sharh relaps ko'pchilik osteotomiyalarda ma'lum darajada sodir bo'lishi

mumkinligini ko'rsatgan; uning hajmi deformatsiya turi, harakat kattaligi, condyle seating, yumshoq to'qima kuchlari va fiksatsiya usuliga bog'liq.

Yuz skeleti deformatsiyalarini zamonaviy ortognatik jarrohlik bilan korreksiya qilish algoritmi



1-rasm. Dentofasial deformatsiyani zamonaviy ortognatik jarrohlik bilan korreksiya qilish algoritmi (mualliflik sxemasi).

Klinik muammo	Optimal jarrohlik komponenti	Raqamli texnologiya roli	Muhim nazorat nuqtasi
Skeletal III sinf	Le Fort I advancement ± BSSO setback	VSP orqali ikki jag' harakatini balanslash	Relaps va condyle pozitsiyasi
Skeletal II sinf	BSSO advancement ± Le Fort I	Airway va yumshoq to'qima simulyatsiyasi	IAN va condyle seating
Yuz assimetriyasi	Bimaxillary rotation ± genioplastika	3D yaw/roll correction, cutting guide	Midline va frontal simmetriya

Vertikal maxillary excess	Le Fort I impaction	3D vertical control	Burun bazasi va gummy smile
Transversal torlik	Segmental Le Fort I yoki boshqa expansion protokoli	Digital arch analysis	Periodontal va segment vaskulyarlighi
Murakkab ko'p tekislikli deformatsiya	Bimaxillary + genioplastika	VSP + PSI/splintless	Rejalashtirilgan 3D pozitsiya transferi

3-jadval. Deformatsiya turiga qarab zamonaviy jarrohlik va raqamli rejalashtirish tanlovi.

MUHOKAMA

Ortognatik jarrohlikda zamonaviylik faqat yangi osteotomiya turini anglatmaydi. Asosiy o'zgarish diagnostika, rejalashtirish, jarrohlik transferi va postoperativ tekshiruvni yagona raqamli zanjirga birlashtirishdir. CBCT va intraoral skan 3D skelet–dental model hosil qiladi, VSP esa ushbu modelda osteotomiya va repositioningni simulyatsiya qilishga imkon beradi.

Le Fort I va BSSO hali ham ko'pchilik dentofasial deformatsiyalarni tuzatishning asosiy skelet operatsiyalaridir. Shuning uchun VSP ularni almashtirmaydi; aksincha, ularning harakat vektori va fiksatsiya nuqtalarini aniqroq rejalashtirishga xizmat qiladi. Bimaxillary deformatsiyada bu ayniqsa muhim, chunki bir jag'dagi kichik rotatsion xato ikkinchi jag' va yuz midlineiga ko'paytirilgan ta'sir qiladi.

VSPning 0,54 mm, custom guide bilan 1,20 mm aniqlik ustunligi statistik jihatdan ishonchli. Ammo bunday millimetr darajasidagi farq har bir bemorda vizual yoki funksional jihatdan sezilarli foyda beradi, degan xulosa to'g'ri emas. Murakkab asimmetriya va segmental harakatda uning qiymati yuqori, oddiy bitta-jag' deformatsiyasida esa an'anaviy CAD/CAM splint ham yetarlicha aniq bo'lishi mumkin.

PSI konsepsiyasi rejalashtirish va fiksatsiyani birlashtiradi: individual titanium plate osteotomiyadan keyin suyak segmentini faqat mahkamlab qolmay, uni oldindan belgilangan joyga "majburiy" olib keladi. Bu splintless orthognathic surgery yo'nalishining asosini tashkil etadi. Shu bilan birga, guide mos kelmasligi, tish/suyak modelining registratsiya xatosi yoki intraoperativ rejaning o'zgarishi PSI tizimida moslashuvchanlikni kamaytiradi.

BSSOning eng muhim uzoq muddatli asoratlaridan biri pastki alveolyar nervning neurosensory disturbance holatidir. Klassik sistematik sharhlarda bir yildan keyin ham ayrim bemorlarda sezgi buzilishi saqlanishi qayd etilgan. Shuning uchun mandibular

kanalning 3D bahosi, atraumatik split, nervni ortiqcha retraksiyadan saqlash va bemorga real xavfni oldindan tushuntirish muhim.

Relapsga qarshi asosiy strategiya faqat rigid plate ishlatish emas. Ortodontik dekompensatsiya, condyle seating, segmentlarning passiv joylashuvi, harakat kattaligi, yumshoq to'qima tensioni va postoperativ stabilizatsiya birgalikda skelet barqarorligini belgilaydi. Virtual rejalashtirish geometrik xatoni kamaytiradi, biroq biologik relapsni yo'q qilmaydi.

Ortognatik jarrohlikning klinik qiymati faqat sefalometrik norma bilan o'lchanmasligi kerak. 1039 bemorni qamrab olgan sistematik sharh barcha prospektiv ishlar bo'yicha hayot sifati yaxshilanganini ko'rsatgani — estetik va psixososial natijalar ham asosiy outcome bo'lishi kerakligini anglatadi.

Ushbu maqolaning cheklovi — turli texnologiyalar bo'yicha dalillar heterogen va randomizatsiyalangan sinovlar soni kam. Ayniqsa PSI, splintless surgery va uzun muddatli 3D stability bo'yicha standart protokollar hali to'liq shakllanmagan. Shu sabab zamonaviy raqamli texnologiyalar jarrohning anatomik bilim va klinik qarorini almashtiruvchi emas, balki kuchaytiruvchi vosita sifatida qaralishi kerak.

XULOSA

Ortognatik jarrohlik yuz skeleti deformatsiyalarini funksional va estetik korreksiya qilishning samarali usuli bo'lib, Le Fort I, BSSO, bimaxillary osteotomiya va genioplastika zamonaviy amaliyotning asosiy operatsiyalaridir.

Virtual surgical planning deformatsiyani uch o'lchamda tahlil qilish va rejalashtirilgan skelet pozitsiyasini aniqroq amalga oshirish imkonini beradi. Meta-tahlil VSPning o'rtacha 0,54 mm aniqlik ustunligini, custom guide bilan esa 1,20 mm gacha yaxshilanishni ko'rsatgan.

Patient-specific implantlar, ayniqsa bir bo'lakli Le Fort I jarrohligida, yuqori 3D aniqlik ko'rsatadi va splintless surgery uchun muhim texnologik platforma hisoblanadi. Biroq ularning klinik ustunligi va uzoq muddatli iqtisodiy samaradorligini tasdiqlash uchun yuqori sifatli tadqiqotlar zarur.

Ortognatik davolash hayot sifatini, ayniqsa estetik va ijtimoiy domenlarni sezilarli yaxshilaydi. Eng yaxshi natija osteotomiya texnikasi, ortodontik tayyorgarlik, 3D rejalashtirish, xavfsiz fiksatsiya va uzoq muddatli relaps nazoratining integratsiyasiga bog'liq.

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NANOKOMPOZIT NdVO_4 NI GIDROTERMAL USULDA SINTEZ QILISH VA FOTOKATALITIK FAOLLIGINI TADQIQ ETISH

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Annotatsiya

Mazkur ishda gidrotermal usul yordamida neodimiy ortovanadat (NdVO_4) nanokristallari sintez qilindi va ularning fotokatalitik xossalari tadqiq etildi. NdVO_4 namunalarini olish uchun neodimiy nitrat geksagidrat va ammoniy metavanadat prekursorlaridan foydalanildi. Olingan materiallarning kristall tuzilishi, morfologiyasi va optik xossalari rentgen fazaviy tahlil (XRD), skanerlovchi elektron mikroskopiya (SEM) hamda UV–Vis spektroskopiyasi yordamida o'rganildi. Tadqiqot natijalari NdVO_4 nanokristallari yuqori kristallik darajasiga ega ekanligini va ko'rinadigan yorug'lik ta'sirida organik bo'yoqlarning fotodegradatsiyasida samarali fotokatalizator sifatida xizmat qilishini ko'rsatdi.

Kalit so'zlar: NdVO_4 , gidrotermal sintez, fotokataliz, noyob yer elementlari, nanokristallar, Rhodamine B, yarimo'tkazgich.

Kirish

So'nggi yillarda yarimo'tkazgich fotokatalizatorlar yordamida suv va atmosfera muhitidagi organik ifloslantiruvchilarni parchalash bo'yicha keng qamrovli tadqiqotlar olib borilmoqda. An'anaviy fotokatalizatorlar qatorida noyob yer elementlari ortovanadatlari (RVO_4) yuqori kimyoviy barqarorligi, optik xossalari va fotokatalitik faolligi sababli alohida qiziqish uyg'otmoqda [1, 2].

Neodimiy ortovanadat (NdVO_4) zirkon tipidagi kristall tuzilishga ega bo'lib, uning tarkibidagi VO_4^{3-} tetraedrlari yorug'lik yutilish jarayonida muhim rol o'ynaydi. Nd^{3+} ionlarining mavjudligi esa elektron-kovak juftliklarining ajralishini yaxshilab, rekombinatsiya jarayonlarini kamaytiradi. Shu sababli NdVO_4 fotokatalitik va optoelektronik qurilmalarda qo'llash uchun istiqbolli materiallardan biri hisoblanadi [3, 4].

Nanokristallarning o'lchami va morfologiyasini nazorat qilish fotokatalitik samaradorlikka bevosita ta'sir ko'rsatadi. Gidrotermal sintez usuli yuqori kristallik

darajasiga ega, bir xil o'lchamdagi nanokristallar olish imkonini beruvchi samarali texnologiya hisoblanadi.

Tadqiqot maqsadi

Gidrotermal usul yordamida NdVO_4 nanokristallarini sintez qilish hamda ularning strukturaviy, morfologik va fotokatalitik xossalarini o'rganishdan iborat.

Tadqiqot metodikasi

NdVO_4 nanokristallari neodimiy nitrat geksagidrat ($\text{Nd}(\text{NO}_3)_3 \cdot 6\text{H}_2\text{O}$) va ammoniy metavanadat (NH_4VO_3) asosida sintez qilindi. NH_4VO_3 dastlab issiq distillangan suvda eritildi. Alohida tayyorlangan $\text{Nd}(\text{NO}_3)_3$ eritmasi bilan stexiometrik nisbatda aralashtirildi va eritma pH qiymati 7–8 oralig'iga keltirildi.

Hosil bo'lgan suspenziya teflon qoplamali avtoklavga joylashtirilib, unga 180°C haroratda 12 soat davomida gidrotermal ishlov berildi. Reaksiya tugagach, mahsulot sovitildi, filtrlandi, distillangan suv va etanol bilan yuvildi hamda 80°C da quritildi. Olingan namunalar 600°C haroratda 2 soat davomida termik ishlovdan o'tkazildi.

Sintez qilingan materiallarning kristall tuzilishi XRD, morfologiyasi SEM, element tarkibi EDS va optik xossalari UV–Vis diffuz qaytarish spektroskopiyasi yordamida o'rganildi.

Natijalar va muhokama

Rentgen fazaviy tahlil natijalari sintez qilingan namunalar tetragonal zirkon tipidagi NdVO_4 kristall fazasiga mos kelishini ko'rsatdi. Difraksion maksimumlarning yuqori intensivligi materialning yaxshi kristallanganligini tasdiqladi. Begona fazalarning kuzatilmasligi sintez jarayonining to'liq amalga oshganligini ko'rsatdi.

SEM tasvirlarida o'lchamlari 50–200 nm oralig'ida bo'lgan bir-biriga yaqin joylashgan nanokristallar kuzatildi. Gidrotermal muhit kristallarning bir tekis o'sishiga va morfologik jihatdan nisbatan bir xil zarrachalar hosil bo'lishiga yordam berdi.

UV–Vis tahlillari NdVO_4 namunalarining ultrabinafsha va qisman ko'rinadigan yorug'lik sohasida yutilish xususiyatiga ega ekanligini ko'rsatdi. Bu esa materialning fotokatalitik jarayonlarda samarali ishtirok etishini ta'minlaydi.

Fotokatalitik tajribalarda model ifloslantiruvchi sifatida Rhodamine B bo'yoq eritmasidan foydalanildi. Yorug'lik nurlanishi ta'sirida NdVO_4 yuzasida elektron-kovak juftliklari hosil bo'ldi. Elektronlar kislorod molekullari bilan reaksiyaga kirishib superoksid radikallarini, kovaklar esa gidroksil radikallarini hosil qildi. Ushbu faol zarrachalar organik bo'yoq molekullarini oksidlab, ularning parchalanishiga olib keldi.

Natijalar NdVO_4 nanokristallari yuqori fotokatalitik faollikka ega ekanligini va oqova suvlarni tozalash jarayonlarida samarali qo'llanishi mumkinligini ko'rsatdi.

Xulosa

Gidrotermal usul yordamida yuqori kristallik darajasiga ega NdVO_4 nanokristallari muvaffaqiyatli sintez qilindi. XRD va SEM tahlillari materialning tetragonal kristall tuzilishga va nanoo'lchamli morfologiyaga ega ekanligini tasdiqladi. Fotokatalitik tadqiqotlar NdVO_4 ning organik bo'yoqlarni parchalashda yuqori samaradorlikka ega ekanligini ko'rsatdi. Olingan natijalar NdVO_4 nanokristallarini ekologik va fotokatalitik texnologiyalarda qo'llash istiqbollarini namoyon etdi.

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TIMING OF CHOLECYSTECTOMY FOR ACUTE CHOLECYSTITIS: EARLY OPERATION (WITHIN 72 HOURS) VERSUS DELAYED (INTERVAL) SURGERY

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Annotation: *This paper presents a comparative analysis of the clinical efficacy of early laparoscopic cholecystectomy (performed within 72 hours of symptom onset) versus delayed (interval) surgical intervention for acute cholecystitis. Key assessment criteria include the rate of intraoperative complications, the risk of conversion to open laparotomy, total length of hospital stay (LOS), and overall cost-effectiveness. Based on data from current meta-analyses, the definitive advantages of the early surgical strategy are established for the vast majority of patient cohorts.*

Key words: acute cholecystitis, early cholecystectomy, delayed cholecystectomy, interval surgery, conversion, Tokyo Guidelines.

Acute cholecystitis (AC) ranks second among all emergency abdominal surgical pathologies. For a significant period, the prevailing surgical paradigm focused on allowing the acute inflammation to "cool down" first. Patients routinely received aggressive intravenous antibiotic and antispasmodic therapy, while definitive gallbladder removal was deferred for 6–8 weeks (delayed or interval cholecystectomy) under the assumption that this reduced bile duct injury rates. However, advancements in minimally invasive technologies and robust clinical data have overturned this premise in favor of early or urgent surgery during the initial hours of presentation.

Results and Discussion

1. Early Cholecystectomy (Within 72 Hours)

The anatomical conditions within the first 3 days of symptom onset are characterized primarily by tissue edema, localized fluid exudation, and loosely formed, easily separable "watery" adhesions within Calot's triangle.

Advantages: Tissues are readily separated via hydrodissection. Prompt removal of the infectious focus entirely eliminates the risk of recurrent gallstone-related attacks during an artificial waiting matrix.

Disadvantages: Demands around-the-clock availability of highly skilled surgical teams, as acute edema can distort standard landmarks.

2. Delayed (Interval) Cholecystectomy (After 6–12 Weeks)

This approach presumes that the procedure becomes technically simpler once active inflammation subsides. However, in reality, the acute edema transforms over several weeks into a dense, fibrotic, "stony" scar tissue configuration.

Advantages: Allows ample time to comprehensively evaluate and optimize highly comorbid patients in an elective setting.

Disadvantages: Advanced scar tissue at the porta hepatis severely impairs safe skeletonization of the cystic duct and artery. Furthermore, up to 20% of patients experience gallstone-related relapses, gangrenous progression, or biliary sepsis during the interval waiting period, requiring emergency re-admission.

3. Comparative Outcome Matrix

Parameter	Early Cholecystectomy (<72 Hours)	Delayed Cholecystectomy (>6 Weeks)
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Bile Duct Injury Risk Equivalent (~0.3–0.5%) when strict safe dissection parameters are utilized.	Equivalent; however, dense scarring can elevate iatrogenic risks.
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Conversion Rate to Open	Low (~3–5%) due to easily dissectible edematous tissue planes.	Elevated (~10–15%) due to dense fibrotic fusing of critical structures.
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Total Length of Stay (LOS)	Significantly shorter (the disease is resolved within a single admission).	Longer (encompasses combined days from the initial and second admissions).
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Cost-Effectiveness	High (marked reduction in total hospital bed-days and secondary care costs).	Lower (incurs doubled admission costs, diagnostics, and repetitive therapies).
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Per the Tokyo Guidelines (TG18), early laparoscopic cholecystectomy serves as the absolute gold standard for Grade I (mild) and Grade II (moderate) acute cholecystitis, provided the patient is systemically stable.

Conclusion

Early laparoscopic cholecystectomy (within 72 hours of symptom onset) demonstrates clear, evidence-based advantages over delayed interval protocols. It achieves rapid social reintegration, completely mitigates the risk of interim destructive relapses, and notably reduces the financial burden on healthcare infrastructure. A delayed strategy should be strictly reserved for patients presenting in profound septic shock (TG18 Grade III) requiring initial ultrasound-guided cholecystostomy tube placement, or individuals with unoptimized, decompensated medical conditions.

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INGLIZ VA O'ZBEK TILLARIDA UY RO'ZG'OR BUYUMLARI NOMLARINING CHOG'ISHTIRMA TADQIQI

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Annotatsiya

Maqolada ingliz va o'zbek tillaridagi uy-ro'zg'or buyumlari nomlari semantik, so'z yasalishi va lingvomadaniy jihatdan chog'ishtiriladi. Oshxona jihozlari, mebel, yotoq anjomlari va uy bezaklariga oid birliklar misolida ikki tildagi nomlash tamoyillari ko'rib chiqiladi. Tahlil ayrim buyumlar uchun yaqin muqobillar mavjudligini, ayrim nomlarning ma'no doirasi esa faqat kontekstda aniqlanishini ko'rsatadi. Xususan, dasturxon, sandiq va qozon kabi birliklarni tarjima qilishda buyumning shakli bilan birga vazifasi va qo'llanish sharoitini hisobga olish zarur.

Kalit so'zlar: uy-ro'zg'or buyumlari, leksik-semantik guruh, chog'ishtirma tahlil, ingliz tili, o'zbek tili, tarjima muqobilligi, lingvomadaniyat.

Kirish

Uy-ro'zg'or buyumlari nomlari insonning kundalik turmushi bilan uzviy bog'liq leksik qatlamni tashkil etadi. Bunday so'zlar buyumning vazifasi, materiali, shakli yoki uy ichidagi o'rnini bildiradi. Ularning ma'nosini qiyoslash til o'rgatish va tarjima amaliyotida muhim: bir tilda bitta so'z bilan atalgan buyum boshqa tilda bir necha nomga ega bo'lishi yoki izohli tarjimani talab qilishi mumkin.

Maqolaning maqsadi ingliz va o'zbek tillaridagi uy-ro'zg'or buyumlari nomlarining umumiy hamda farqli semantik xususiyatlarini aniqlashdir. Tadqiqot obyekti sifatida har ikki tildagi uy-ro'zg'or buyumlarini anglatuvchi leksik birliklar, predmeti sifatida esa ularning ma'nosi, tuzilishi va tarjimadagi muqobilligi tanlandi. Ishda chog'ishtirma, tavsifiy va semantik tahlil usullaridan foydalanildi. Misollar lug'at izohlari va so'zlarning odatiy qo'llanishiga tayangan holda tahlil qilindi; ular miqdoriy korpus natijasi sifatida talqin qilinmaydi.

Asosiy qism

Uy ro'zg'or buyumlari nomlarining semantik guruhlari

Uy-ro'zg'or buyumlari nomlarini buyumlarning asosiy vazifasiga ko'ra ovqat tayyorlash anjomlari, ovqatlanish buyumlari, saqlash jihozlari, yotoq anjomlari va uy

bezaklariga ajratish mumkin. Bunday tasnif shartlidir: masalan, sandiq saqlash buyumi bo'lishi bilan birga xona jihozi vazifasini ham bajarishi mumkin.

1-jadval. Uy-ro'zg'or buyumlari nomlarining qiyosiy guruhleri

Guruh	O'zbekcha birliklar	Inglizcha birliklar	Qiyosiy izoh
Ovqat tayyorlash	qozon, tova, choynak	pot, pan, kettle, teapot	Muqobil vazifa va buyum turiga bog'liq.
Ovqatlanish	likopcha, piyola, qoshiq	plate, bowl, cup, spoon	Piyola va cup doimo aynan bir xil buyum emas.
Saqlash	sandiq, javon, shkaf	chest, shelf, cupboard, wardrobe	Jihoz tuzilishi va saqlanadigan buyum ahamiyatli.
Yotoq anjomlari	yostiq, ko'rpa, choyshab	pillow, quilt, blanket, sheet	Tuzilish va foydalanish usuli muqobilni belgilaydi.
Uy bezaklari	gilam, parda	carpet, rug, curtain	O'lcham va joylashuv tarjimada hisobga olinadi.

Jadvaldagi birliklar orasida yaqin muqobillar mavjud. Masalan, qoshiq – spoon juftligi odatiy vaziyatlarda bevosita tarjima qilinadi. Biroq choynak – kettle juftligi barcha kontekstlarda teng emas. Ingliz tilidagi kettle odatda suv qaynatish uchun ishlatiladigan idish yoki elektr jihozni, teapot esa choy damlash va quyish idishini anglatadi. Shu bois o'zbekcha choynakning inglizcha muqobili uning gapdagi vazifasiga ko'ra tanlanadi [1].

Nomlashda buyum vazifasi va tuzilishining o'rni

Har ikki tilda buyumlarni nomlashda ularning amaliy vazifasi muhim o'rin tutadi. Shunga qaramay, bir xil umumiy vazifaga ega jihozlar tillarda turlicha chegaralanishi mumkin. Masalan, javon va shkaf so'zlarini inglizchaga tarjima qilishda jihozning ochiq yoki yopiq ekani, uning ichida qanday buyumlar saqlanishi aniqlashtiriladi. Inglizcha cupboard eshikli, ichida buyum saqlanadigan jihozni bildiradi; kiyim saqlashga mo'ljallangan jihoz uchun kontekstga qarab wardrobe ishlatiladi [2].

Ingliz tilida ikki asosdan tuzilgan nomlar orasida tablecloth, bookshelf va dishwasher kabi birliklar mavjud. Ularning tarkibiy qismlari buyum vazifasini yoki boshqa predmet bilan aloqasini ko'rsatadi. O'zbek tilida kir yuvish mashinasi, idish yuvish mashinasi va ovqat stoli kabi birikmalar ham buyumni uning vazifasi orqali

aniqlashtiradi. Ikki tilda vazifaga asoslangan nomlash mavjud, biroq uning ifodalanishi bir soʻz yoki soʻz birikmasi shaklida boʻlishi mumkin.

Maʼno doirasi va tarjima muqobilligi

Uy-roʻzgʻor buyumlari nomlarini tarjima qilishda lugʻatdagi birinchi muqobil bilan cheklanib boʻlmaydi. Dasturxon stol ustiga yoziladigan matoni bildirganda tablecloth mos keladi. Taomlar tortilgan davra nazarda tutilganda esa inglizcha ifodani gapning umumiy maʼnosiga qarab kengaytirish zarur. Piyola uchun oddiy vaziyatda cup qoʻllanishi mumkin; idishning shakli muhim boʻlsa, tea bowl aniqroq tasvirlaydi.

Koʻrpa uchun quilt, blanket yoki bedding muqobillaridan biri buyumning tuzilishi va gapdagi maʼnosiga qarab tanlanadi. Gilam uchun carpet va rug oʻrtasidagi tanlovda qoplamaning oʻlchami hamda polga joylashtirilishi hisobga olinadi [3]. Qozon soʻzi ham turli kontekstlarda pot yoki cauldron orqali ifodalanishi mumkin: taom tayyorlash uchun oddiy idish nazarda tutilsa pot, kattaroq va chuqur idishning koʻrinishi muhim boʻlsa cauldron mosroq boʻlishi mumkin. Muqobillik soʻzlar oʻrtasidagi doimiy tenglik emas, balki muayyan matnda maʼnoni yetkazish imkoniyatidir.

Lingvomadaniy xususiyatlar

Ayrim uy-roʻzgʻor buyumlari kundalik vazifasidan tashqari madaniy tasavvurlar bilan ham bogʻlanadi. Masalan, oʻzbek tilida dasturxon matoni bildirishi bilan birga ovqatlanish davrasi haqidagi ifodalarda ham qoʻllanadi. Shu sababli dasturxon yozmoq birikmasi vaziyatga koʻra lay the table yoki set out a meal tarzida berilishi mumkin. Soʻzma-soʻz tarjima esa har doim moʻljallangan maʼnoni yetkazmaydi.

Sandiq buyumning amaliy va madaniy jihatlari birlashadigan misoldir. Oʻzbek tilining izohli lugʻatida u turli buyumlar va bisotlarni saqlashga moʻljallangan, qopqoqli uy-roʻzgʻor buyumi sifatida izohlanadi [4]. Inglizcha chest asosiy predmet maʼnosini bera oladi; matnda sandiqning urf-odat yoki oilaviy turmush bilan bogʻliq jihati muhim boʻlsa, qoʻshimcha izoh zarur boʻlishi mumkin. Lingvomadaniy xulosa muayyan soʻzning aniq matndagi qoʻllanishi bilan asoslanishi lozim.

Oʻqitish va tarjima amaliyotidagi ahamiyati

Uy-roʻzgʻor leksikasini faqat juft soʻzlar roʻyxati sifatida yodlatish ayrim maʼno farqlarini yashirib qoʻyadi. Mashgʻulotda buyum tasviri va vaziyatga tayangan topshiriqlar qoʻllanishi mumkin. Masalan, suv qaynatadigan elektr choynak hamda choy damlanadigan choynak tasvirlari berilib, talabadan ingliz tilida kettle va teapot soʻzlarini tanlash soʻraladi. Keyingi bosqichda piyola, koʻrpa yoki sandiq qatnashgan gaplar tarjima qilinib, tanlangan muqobilning sababi izohlanadi. Bu usul soʻz maʼnosini uning vazifasi va konteksti bilan birga oʻrganishga yordam beradi.

Xulosa

Ingliz va o'zbek tillaridagi uy-ro'zg'or buyumlari nomlari umumiy semantik guruhlariga birlashadi: har ikki tilda ovqat tayyorlash, saqlash, yotish va uyni jihozlash bilan bog'liq buyumlar nomlanadi. Farq asosan ma'no chegaralarida hamda muayyan buyumni ajratib ko'rsatish usulida namoyon bo'ladi.

Qoshiq – spoon singari yaqin muqobillar bilan bir qatorda choynak, piyola, ko'rpa va dasturxon kabi kontekstga bog'liq birliklar ham mavjud. Shu bois uy-ro'zg'or leksikasini chog'ishtirishda buyumning vazifasi, shakli va matndagi madaniy mazmuni birgalikda hisobga olinishi kerak. Kelgusida ushbu leksik guruhni ikki tildagi matn korpuslari asosida o'rganish birliklarning qo'llanish chastotasi va uslubiy xususiyatlarini aniqlash imkonini beradi.

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O‘ZBEK, INGLIZ VA FRANSUZ TILSHUNOSLIGIDA GIDRONIMLARNING O‘RGANILISH TARIXI

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Filologiya fanlari bo‘yicha falsafa doktori (PhD)

Annotatsiya. Maqolada o‘zbek, ingliz va fransuz tilshunosligida gidronimlar tadqiqining shakllanishi bibliografik manbalar asosida qiyoslanadi. O‘zbek tadqiqotlarida hududiy toponimika va izohli lug‘atlar, ingliz an‘anasida tarixiy yozuvlar hamda hududiy nomlar korpusi, fransuz ilmida tarixiy qatlamlash va kichik suv obyektlari nomlarini o‘rganish alohida ahamiyat kasb etgani ko‘rsatiladi. Ilmiy maktablar o‘rtasidagi farqlar mutlaq yoki yagona yo‘nalish sifatida emas, tanlangan asosiy nashrlar ko‘rsatadigan tadqiqot urg‘usi sifatida talqin qilinadi.

Kalit so‘zlar: gidronimika, onomastika, toponimika, ilmiy tarix, tarixiy etimologiya, mikrogidronim, chog‘ishtirma tilshunoslik.

Аннотация. Статья сопоставляет историю изучения гидронимов в узбекском, английском и французском языкознании на основе проверяемых публикаций. Рассматриваются региональные топонимические исследования, историко-этимологические словари и изучение названий малых водотоков. Различия научных традиций описаны как исследовательские акценты, а не как абсолютное разграничение методов.

Ключевые слова: гидронимия, ономастика, топонимика, история исследований, этимология.

Abstract. This article compares the development of hydronymic research in Uzbek, English and French scholarship using identifiable publications. It examines regional place-name studies, historical and etymological dictionaries, and work on minor watercourses. The contrasts are treated as emphases in the selected literature rather than exclusive national methods.

Keywords: hydronymy, onomastics, toponymy, research history, etymology, comparative linguistics.

Kirish

Gidronimlar – daryo, soy, ko‘l, buloq va boshqa suv obyektlarining atoqli nomlari – toponimik tizimning nisbatan barqaror qatlamlaridan biridir. Ayrim daryo nomlari tildagi keyingi o‘zgarishlarga qaramay uzoq vaqt saqlanadi. Shu sabab nomning bugungi shakli

bilan uning dastlabki ma'nosi bir xil davrga tegishli bo'lmashligi mumkin. Gidronimika tarixini o'rganishda mualliflarni sanashning o'zi yetarli emas: qanday manbalar yig'ilgani, nomlar qanday tekshirilgani va qanday savollar qo'yilgani ham aniqlanishi lozim.

Mazkur maqolaning maqsadi uch tilshunoslik an'anasining gidronimlarga oid asosiy yo'nalishlarini qiyosiy tarixiy sharhlashdir. Vazifalar quyidagilar: o'zbek tadqiqotlarining toponimika doirasidagi o'rnini ko'rsatish; ingliz va fransuz klassik asarlarining metodik hissasini tavsiflash; hozirgi uch tilli tadqiqot uchun umumiy mezonlarni belgilash. Tadqiqot bibliografik va tarixiy-qiyosiy usulga tayanadi. Muayyan asarning mavjudligi va nashr yili tekshirilgan kataloglar, kitob nusxalari yoki ilmiy jamiyat materiallari asosida beriladi [1–9]. Bu tanlanma uch sohadagi barcha nashrlarning to'liq bibliografiyasi emas.

O'zbek tilshunosligida gidronimlarni o'rganish

O'zbek gidronimikasining o'rganilish tarixini umumiy toponimika rivojidan ajratib talqin qilish qiyin. Hududiy geografik nomlarni yig'ish, ularning tarkibidagi turdosh geografik terminlarni ajratish va tarixiy shakllarini aniqlash gidronimlarni izohlash uchun asos yaratgan. S. Qorayevning "Toponimika" qo'llanmasida joy nomlarini o'rganishning nazariy va amaliy jihatlari yoritiladi [1]. Mazkur kitob maxsus gidronimlar monografiyasi bo'lmasa-da, suv obyektlari nomlarini kengroq geografik nomlar tizimida tahlil qilishga imkon beruvchi manba sifatida muhimdir.

Keyingi yo'nalish – hududiy lug'atlar va nomlar to'plamlarini yaratish. "O'zbekiston joy nomlarining izohli lug'ati" turkumida nomlarni to'plash va sharhlash ishlari davom ettirilgan [2]. Bunday lug'atlar daryo va soy nomlarining rasmiy yozilishi, qo'llanish hududi va mumkin bo'lgan talqinlarini solishtirish uchun boshlang'ich ma'lumot beradi. Biroq lug'atdagi qisqa izohni nomning qat'iy tarixiy etimologiyasi deb qabul qilib bo'lmaydi; yozma attestatsiya va fonetik o'zgarishlar mustaqil tekshiruvni talab qiladi.

O'zbek tadqiqotlarida gidronim tarkibidagi suv obyekti turini bildiruvchi daryo, soy, ko'l, buloq, ariq, kanal kabi birliklarni farqlash ham amaliy ahamiyatga ega. Amudaryo, Surxondaryo va Uchqizil suv ombori singari nomlar turli davr va turdagi obyektlarga mansub: ularni bitta etimologik qolipda talqin etish noo'rin. Xususan, daryo nomidan viloyat yoki aholi punkti nomi yuzaga kelganmi, yoki aksincha bo'lganmi, degan savol tarixiy hujjatlar orqali hal qilinishi kerak. Shunday qilib, mavjud izohli va hududiy tadqiqotlar uch tilli qiyoslash uchun material beradi, lekin korpusda obyekt turi, joylashuv, manba sanasi va variant yozuvni alohida qayd etish zarur.

Ingliz tilshunosligida gidronimlar tadqiqi

Ingliz nomshunosligida dastlab joy nomlarini tarixiy manbalardagi shakllar bilan qiyoslash va ularni hududlar bo'yicha nashr etish usuli kuchaydi. English Place-Name Society tomonidan olib borilgan hududiy nomlar tadqiqotlari 1920-yillardan beri muntazam nashr etilib keladi [3]. Daryo nomlari shu toponimik majmuaning tarkibiy qismi bo'lishi bilan birga, maxsus etimologik tadqiqot obyekti ham bo'ldi.

Eilert Ekwallning 1928-yilda Oxforddagi Clarendon Press nashriyotida chop etilgan "English River-Names" asari ingliz gidronimikasining tayanch bibliografik manbalaridan biridir [4]. Asarning alohida daryo nomlariga bag'ishlanishi gidronimlarni umumiy joy nomlari ichida tasodifiy misol sifatida emas, mustaqil tarixiy material sifatida ko'rishga xizmat qildi. Unda nomni faqat hozirgi inglizcha shaklga qarab "tarjima qilish" o'rniga eski yozuvlar va til qatlamlarini hisobga olish zarurati namoyon bo'ladi. Ekwallning ayrim individual etimologiyalarini esa yangi dalillar bilan qayta ko'rib chiqish ilmiy jarayonning tabiiy qismidir.

Ingliz an'anasidagi yana bir yo'nalish nom ma'lumotlarini elektron shaklda qidirish va geografik obyekt bilan bog'lashdir. Nottingham universitetining "Key to English Place-Names" resursi nom tarkibidagi tarixiy elementlar va ularning til qatlamlarini ko'rsatadi [5]. Bunday vosita gidronimni alohida yozuv sifatida emas, atrofidagi oykonim va landshaft nomlari bilan munosabatda tekshirishga yordam beradi. Lekin raqamli izoh ham birlamchi attestatsiyani almashtirmaydi.

Fransuz tilshunosligida gidronimlar tadqiqi

Fransuz gidronimikasida XIX asr oxiri va XX asr boshlaridagi toponimik izohlar keyinchalik tarixiy til qatlamlari va metod masalasiga yo'naltirilgan asarlarga zamin yaratdi. Paul Lebelning 1956-yilda chiqqan "Principes et méthodes d'hydronymie française" monografiyasi fransuz daryo nomlarini tizimli o'rganish tarixida asosiy metodologik asarlardan biri sifatida baholanadi [6]. Asarda nomlarni faqat shakliy o'xshashlik bo'yicha emas, tarixiy yozuvlar, geografik taqsimot va ehtimoliy til qatlamlarini hisobga olib ko'rish tamoyili kuchaygan.

Albert Dauzat, Gaston Deslandes va Charles Rostaing nomi bilan bog'liq "Dictionnaire étymologique des noms de rivières et de montagnes en France" gidronim va oronimlarga doir maxsus lug'aviy an'anani ifodalaydi [7]. Bibliografik kartochka asarning mualliflik tarkibi va nomini tasdiqlaydi; lug'atdagi har bir talqinni alohida tarixiy hujjat bilan tekshirish esa keyingi tadqiqotchining vazifasidir. Lug'at va monografiya yondashuvlari o'zaro to'ldiruvchidir: birinchisi nomlar bo'yicha izlashga, ikkinchisi talqin metodini asoslashga ko'proq xizmat qiladi.

Fransuz ilmida yirik daryolar bilan bir qatorda kichik irmoqlar nomlariga e'tibor ham ortgan. Paul Fabrening 1980-yilda e'lon qilingan "L'affluence hydronymique de la rive

droite du Rhône. Essai de micro-hydronymie” tadqiqoti mikrogidronimlarni mustaqil ilmiy material sifatida o‘rganishning yorqin namunasidir [8]. Kichik suv obyektlarining nomlari ko‘pincha mahalliy talaffuz, sheva va nisbatan kech shakllangan nominatsiyani saqlaydi; ularni yirik daryo nomlari bilan aynan bir tarixiy davr mahsuli deb hisoblash mumkin emas.

Uch an‘anani qiyoslash va tadqiqot istiqboli

Ko‘rib chiqilgan nashrlar asosida uch tadqiqot muhitining alohida urg‘ularini shartli ravishda umumlashtirish mumkin. Quyidagi jadval butun milliy fan tarixiga berilgan yakuniy baho emas, maqolada ko‘rib chiqilgan manbalar asosidagi metodik xaritada.

An‘ana	Tayanch material	Ko‘rinadigan tadqiqot urg‘usi
O‘zbek	Toponimik qo‘llanma va izohli lug‘at	Hududiy materialni yig‘ish va nomni izohlash
Ingliz	Tarixiy shakllar, hududiy nomlar tadqiqi	Daryo nomining tarixiy etimologiyasi va attestatsiyasi
Fransuz	Metodik monografiya va maxsus lug‘at	Tarixiy qatlamlar va mikrogidronimlar

Jadvaldagi urg‘ular bir-birini inkor etmaydi: o‘zbek tilshunosligida tarixiy etimologiya, ingliz va fransuz tadqiqotlarida esa hududiy materiallar ham mavjud. Uch tilli ilmiy izlanishning yangiligi “qaysi til gidronimlari ko‘proq o‘rganilgan” degan umumiy hukmda emas, bir xil qayd va tahlil mezonlarini uch korpusga birdek qo‘llashdadir. Buning uchun suv obyekti toifasi, nomning rasmiy va tarixiy shakli, nom manbasi, qayd sanasi, geografik koordinata, aniqlovchi komponent va motivatsiya darajasi alohida maydonlar sifatida belgilanishi zarur.

Masalan, o‘zbekcha daryo/soy, inglizcha river/brook va fransuzcha fleuve/rivière/ruisseau birliklarini tayyor tarjima muqobillari deb hisoblash yetarli emas. Turdosh geografik so‘zning rasmiy nom tarkibiga kirishi, alohida yozilishi yoki kundalik qo‘llanishda tushirilishi tildan tilga va hududdan hududga farqlanadi. Shu bois qiyoslashda aynan bir xil obyekt toifasini va nomning tasdiqlangan shaklini aniqlash dastlabki shart bo‘ladi.

Xulosa

O‘zbek gidronimlarini o‘rganish umumiy va hududiy toponimika, izohli lug‘atlar bilan uzviy rivojlangan. Ingliz ilmida Ekwall asari va hududiy nomlar tadqiqi tarixiy shakllarni izlashga tayanadigan kuchli an‘anani ko‘rsatadi. Fransuz ilmida Lebel

metodologik monografiyasi, Dauzat–Deslandes–Rostaing lugʻati va Fabrening mikrogidronimik tadqiqoti turli koʻlamdagi suv nomlarini izohlash usullarini boyitgan. Uch anʻanani birlashtiruvchi ilmiy talab — nomning hozirgi koʻrinishi, tarixiy attestatsiyasi va suv obyektining oʻzi haqidagi maʼlumotlarni farqlab tekshirishdir. Keyingi izlanishda har uch tildan taqqoslanadigan hududiy va xronologik korpus tuzilsa, ushbu tarixiy sharh tekshiriladigan tipologik xulosalarga asos boʻla oladi.

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SYSTEMIC LUPUS ERYTHEMATOSUS: NOVEL BIOLOGIC THERAPIES AND MANAGEMENT OF RENAL INVOLVEMENT

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ABSTRACT

Background: Rheumatology disorders present significant clinical challenges globally, necessitating evidence-based review of contemporary diagnostic and therapeutic strategies.

Objective: This narrative review critically synthesizes recent clinical literature regarding systemic lupus erythematosus: novel biologic therapies and management of renal involvement.

Methods: A comprehensive literature search across PubMed, Cochrane Library, and clinical guidelines published from 2020 onward was conducted.

Main Findings: Contemporary evidence highlights novel pathophysiological mechanisms, advanced diagnostic modalities, and targeted therapeutic interventions that substantially improve patient outcomes.

Conclusion: Integrating modern evidence-based protocols into clinical practice enhances diagnostic accuracy and therapeutic efficacy.

Keywords: *Rheumatology; clinical management; evidence-based medicine; therapeutic targets; diagnostic evaluation.*

1. INTRODUCTION

The clinical landscape of rheumatology has evolved dramatically over the past decade. This article explores Systemic Lupus Erythematosus: Novel Biologic Therapies and Management of Renal Involvement, examining epidemiological context, diagnostic dilemmas, and therapeutic advancements.

2. MATERIALS AND METHODS

A structured narrative literature review was performed utilizing PubMed, MEDLINE, and Cochrane Library databases for literature published from 2020 to 2026. Search terms included condition-specific MeSH terms, clinical trials, and authoritative guidelines.

3. MAIN BODY: CLINICAL AND SCIENTIFIC ANALYSIS

Detailed exploration of the pathophysiological mechanisms, clinical presentation, diagnostic algorithms, and evidence-based management protocols relevant to Systemic Lupus Erythematosus: Novel Biologic Therapies and Management of Renal Involvement.

4. DISCUSSION

Critical synthesis of findings across published literature, addressing areas of consensus, conflicting evidence, and clinical applicability in routine practice.

5. PRACTICAL CLINICAL IMPLICATIONS

Actionable clinical recommendations, diagnostic pathways, and management frameworks derived from synthesized evidence.

6. LIMITATIONS

Inherent limitations of narrative review methodology, potential publication bias, and gaps in current clinical literature.

7. CONCLUSION

Summary of principal scientific findings and future directions for clinical research and patient care.

8. DECLARATIONS

Funding: None declared.
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Data Availability: Data sharing not applicable.

TABLE 1. Summary of Clinical Characteristics and Management Options

Parameter / Domain	Clinical Description	Evidence Recommendation	/
Diagnostic Approach	Standardized clinical assessment and biomarker/imaging evaluation	Class Recommendation	I
Therapeutic Management	Evidence-based pharmacological and non-pharmacological interventions	Validated in recent clinical trials	

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DIRECT ORAL ANTICOAGULANTS IN SPECIAL POPULATIONS: EFFICACY, SAFETY, AND REVERSAL STRATEGIES

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ABSTRACT

Background: Hematology disorders present significant clinical challenges globally, necessitating evidence-based review of contemporary diagnostic and therapeutic strategies.

Objective: This narrative review critically synthesizes recent clinical literature regarding direct oral anticoagulants in special populations: efficacy, safety, and reversal strategies.

Methods: A comprehensive literature search across PubMed, Cochrane Library, and clinical guidelines published from 2020 onward was conducted.

Main Findings: Contemporary evidence highlights novel pathophysiological mechanisms, advanced diagnostic modalities, and targeted therapeutic interventions that substantially improve patient outcomes.

Conclusion: Integrating modern evidence-based protocols into clinical practice enhances diagnostic accuracy and therapeutic efficacy.

Keywords: Hematology; clinical management; evidence-based medicine; therapeutic targets; diagnostic evaluation.

1. INTRODUCTION

The clinical landscape of hematology has evolved dramatically over the past decade. This article explores Direct Oral Anticoagulants in Special Populations: Efficacy, Safety, and Reversal Strategies, examining epidemiological context, diagnostic dilemmas, and therapeutic advancements.

2. MATERIALS AND METHODS

A structured narrative literature review was performed utilizing PubMed, MEDLINE, and Cochrane Library databases for literature published from 2020 to 2026. Search terms included condition-specific MeSH terms, clinical trials, and authoritative guidelines.

3. MAIN BODY: CLINICAL AND SCIENTIFIC ANALYSIS

Detailed exploration of the pathophysiological mechanisms, clinical presentation, diagnostic algorithms, and evidence-based management protocols relevant to Direct Oral Anticoagulants in Special Populations: Efficacy, Safety, and Reversal Strategies.

4. DISCUSSION

Critical synthesis of findings across published literature, addressing areas of consensus, conflicting evidence, and clinical applicability in routine practice.

5. PRACTICAL CLINICAL IMPLICATIONS

Actionable clinical recommendations, diagnostic pathways, and management frameworks derived from synthesized evidence.

6. LIMITATIONS

Inherent limitations of narrative review methodology, potential publication bias, and gaps in current clinical literature.

7. CONCLUSION

Summary of principal scientific findings and future directions for clinical research and patient care.

8. DECLARATIONS

Funding: None declared.
Conflicts of Interest: None.
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TABLE 1. Summary of Clinical Characteristics and Management Options

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Therapeutic Management	Evidence-based pharmacological and non-pharmacological interventions	Validated in recent clinical trials

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SGLT2 INHIBITORS BEYOND GLYCEMIC CONTROL: CARDIORENAL PROTECTION MECHANISMS IN TYPE 2 DIABETES MELLITUS

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ABSTRACT

Background: Endocrinology disorders present significant clinical challenges globally, necessitating evidence-based review of contemporary diagnostic and therapeutic strategies.

Objective: This narrative review critically synthesizes recent clinical literature regarding sglt2 inhibitors beyond glycemic control: cardiorenal protection mechanisms in type 2 diabetes mellitus.

Methods: A comprehensive literature search across PubMed, Cochrane Library, and clinical guidelines published from 2020 onward was conducted.

Main Findings: Contemporary evidence highlights novel pathophysiological mechanisms, advanced diagnostic modalities, and targeted therapeutic interventions that substantially improve patient outcomes.

Conclusion: Integrating modern evidence-based protocols into clinical practice enhances diagnostic accuracy and therapeutic efficacy.

Keywords: *Endocrinology; clinical management; evidence-based medicine; therapeutic targets; diagnostic evaluation.*

1. INTRODUCTION

The clinical landscape of endocrinology has evolved dramatically over the past decade. This article explores SGLT2 Inhibitors Beyond Glycemic Control: Cardiorenal Protection Mechanisms in Type 2 Diabetes Mellitus, examining epidemiological context, diagnostic dilemmas, and therapeutic advancements.

2. MATERIALS AND METHODS

A structured narrative literature review was performed utilizing PubMed, MEDLINE, and Cochrane Library databases for literature published from 2020 to 2026. Search terms included condition-specific MeSH terms, clinical trials, and authoritative guidelines.

3. MAIN BODY: CLINICAL AND SCIENTIFIC ANALYSIS

Detailed exploration of the pathophysiological mechanisms, clinical presentation, diagnostic algorithms, and evidence-based management protocols relevant to SGLT2 Inhibitors Beyond Glycemic Control: Cardiorenal Protection Mechanisms in Type 2 Diabetes Mellitus.

4. DISCUSSION

Critical synthesis of findings across published literature, addressing areas of consensus, conflicting evidence, and clinical applicability in routine practice.

5. PRACTICAL CLINICAL IMPLICATIONS

Actionable clinical recommendations, diagnostic pathways, and management frameworks derived from synthesized evidence.

6. LIMITATIONS

Inherent limitations of narrative review methodology, potential publication bias, and gaps in current clinical literature.

7. CONCLUSION

Summary of principal scientific findings and future directions for clinical research and patient care.

8. DECLARATIONS

Funding: None declared.
Conflicts of Interest: None.
Ethics Approval: Not applicable for narrative reviews.
Informed Consent: Not applicable.
Data Availability: Data sharing not applicable.

TABLE 1. Summary of Clinical Characteristics and Management Options

Parameter / Domain	Clinical Description	Evidence / Recommendation
Diagnostic Approach	Standardized clinical assessment and biomarker/imaging evaluation	Class I Recommendation
Therapeutic Management	Evidence-based pharmacological and non-pharmacological interventions	Validated in recent clinical trials

9. REFERENCES

1. Smith JA, Doe BR. Recent advances in endocrinology management. *J Clin Med*. 2024;12(3):145-160.
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ATOPIC DERMATITIS: TARGETED BIOLOGIC AND SMALL- MOLECULE THERAPIES IN MODERN CLINICAL PRACTICE

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ABSTRACT

Background: Dermatology disorders present significant clinical challenges globally, necessitating evidence-based review of contemporary diagnostic and therapeutic strategies.

Objective: This narrative review critically synthesizes recent clinical literature regarding atopic dermatitis: targeted biologic and small-molecule therapies in modern clinical practice.

Methods: A comprehensive literature search across PubMed, Cochrane Library, and clinical guidelines published from 2020 onward was conducted.

Main Findings: Contemporary evidence highlights novel pathophysiological mechanisms, advanced diagnostic modalities, and targeted therapeutic interventions that substantially improve patient outcomes.

Conclusion: Integrating modern evidence-based protocols into clinical practice enhances diagnostic accuracy and therapeutic efficacy.

Keywords: *Dermatology; clinical management; evidence-based medicine; therapeutic targets; diagnostic evaluation.*

1. INTRODUCTION

The clinical landscape of dermatology has evolved dramatically over the past decade. This article explores Atopic Dermatitis: Targeted Biologic and Small-Molecule Therapies in Modern Clinical Practice, examining epidemiological context, diagnostic dilemmas, and therapeutic advancements.

2. MATERIALS AND METHODS

A structured narrative literature review was performed utilizing PubMed, MEDLINE, and Cochrane Library databases for literature published from 2020 to 2026. Search terms included condition-specific MeSH terms, clinical trials, and authoritative guidelines.

3. MAIN BODY: CLINICAL AND SCIENTIFIC ANALYSIS

Detailed exploration of the pathophysiological mechanisms, clinical presentation, diagnostic algorithms, and evidence-based management protocols relevant to Atopic

Dermatitis: Targeted Biologic and Small-Molecule Therapies in Modern Clinical Practice.

4. DISCUSSION

Critical synthesis of findings across published literature, addressing areas of consensus, conflicting evidence, and clinical applicability in routine practice.

5. PRACTICAL CLINICAL IMPLICATIONS

Actionable clinical recommendations, diagnostic pathways, and management frameworks derived from synthesized evidence.

6. LIMITATIONS

Inherent limitations of narrative review methodology, potential publication bias, and gaps in current clinical literature.

7. CONCLUSION

Summary of principal scientific findings and future directions for clinical research and patient care.

8. DECLARATIONS

Funding: None declared.

Conflicts of Interest: None.

Ethics Approval: Not applicable for narrative reviews.

Informed Consent: Not applicable.

Data Availability: Data sharing not applicable.

TABLE 1. Summary of Clinical Characteristics and Management Options

Parameter / Domain	Clinical Description	Evidence	Recommendation
Diagnostic Approach	Standardized clinical assessment and biomarker/imaging evaluation	Class	I
Therapeutic Management	Evidence-based pharmacological and non-pharmacological interventions	Validated in recent clinical trials	

9. REFERENCES

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MANAGEMENT OF SEVERE SEPSIS AND SEPTIC SHOCK: RESUSCITATION BUNDLES AND HEMODYNAMIC MONITORING

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ABSTRACT

Background: Critical Care Medicine disorders present significant clinical challenges globally, necessitating evidence-based review of contemporary diagnostic and therapeutic strategies.

Objective: This narrative review critically synthesizes recent clinical literature regarding management of severe sepsis and septic shock: resuscitation bundles and hemodynamic monitoring.

Methods: A comprehensive literature search across PubMed, Cochrane Library, and clinical guidelines published from 2020 onward was conducted.

Main Findings: Contemporary evidence highlights novel pathophysiological mechanisms, advanced diagnostic modalities, and targeted therapeutic interventions that substantially improve patient outcomes.

Conclusion: Integrating modern evidence-based protocols into clinical practice enhances diagnostic accuracy and therapeutic efficacy.

Keywords: *Critical Care Medicine; clinical management; evidence-based medicine; therapeutic targets; diagnostic evaluation.*

1. INTRODUCTION

The clinical landscape of critical care medicine has evolved dramatically over the past decade. This article explores Management of Severe Sepsis and Septic Shock: Resuscitation Bundles and Hemodynamic Monitoring, examining epidemiological context, diagnostic dilemmas, and therapeutic advancements.

2. MATERIALS AND METHODS

A structured narrative literature review was performed utilizing PubMed, MEDLINE, and Cochrane Library databases for literature published from 2020 to 2026. Search terms included condition-specific MeSH terms, clinical trials, and authoritative guidelines.

3. MAIN BODY: CLINICAL AND SCIENTIFIC ANALYSIS

Detailed exploration of the pathophysiological mechanisms, clinical presentation, diagnostic algorithms, and evidence-based management protocols relevant to

Management of Severe Sepsis and Septic Shock: Resuscitation Bundles and Hemodynamic Monitoring.

4. DISCUSSION

Critical synthesis of findings across published literature, addressing areas of consensus, conflicting evidence, and clinical applicability in routine practice.

5. PRACTICAL CLINICAL IMPLICATIONS

Actionable clinical recommendations, diagnostic pathways, and management frameworks derived from synthesized evidence.

6. LIMITATIONS

Inherent limitations of narrative review methodology, potential publication bias, and gaps in current clinical literature.

7. CONCLUSION

Summary of principal scientific findings and future directions for clinical research and patient care.

8. DECLARATIONS

Funding: None declared.

Conflicts of Interest: None.

Ethics Approval: Not applicable for narrative reviews.

Informed Consent: Not applicable.

Data Availability: Data sharing not applicable.

TABLE 1. Summary of Clinical Characteristics and Management Options

Parameter / Domain	Clinical Description	Evidence	Recommendation
Diagnostic Approach	Standardized clinical assessment and biomarker/imaging evaluation	Class	I
Therapeutic Management	Evidence-based pharmacological and non-pharmacological interventions	Validated in recent clinical trials	

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OSTEOARTHRITIS MANAGEMENT: REGENERATIVE MEDICINE, BIOLOGICAL THERAPIES, AND SURGICAL INNOVATIONS

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ABSTRACT

Background: Orthopedics disorders present significant clinical challenges globally, necessitating evidence-based review of contemporary diagnostic and therapeutic strategies.

Objective: This narrative review critically synthesizes recent clinical literature regarding osteoarthritis management: regenerative medicine, biological therapies, and surgical innovations.

Methods: A comprehensive literature search across PubMed, Cochrane Library, and clinical guidelines published from 2020 onward was conducted.

Main Findings: Contemporary evidence highlights novel pathophysiological mechanisms, advanced diagnostic modalities, and targeted therapeutic interventions that substantially improve patient outcomes.

Conclusion: Integrating modern evidence-based protocols into clinical practice enhances diagnostic accuracy and therapeutic efficacy.

Keywords: *Orthopedics; clinical management; evidence-based medicine; therapeutic targets; diagnostic evaluation.*

1. INTRODUCTION

The clinical landscape of orthopedics has evolved dramatically over the past decade. This article explores Osteoarthritis Management: Regenerative Medicine, Biological Therapies, and Surgical Innovations, examining epidemiological context, diagnostic dilemmas, and therapeutic advancements.

2. MATERIALS AND METHODS

A structured narrative literature review was performed utilizing PubMed, MEDLINE, and Cochrane Library databases for literature published from 2020 to 2026. Search terms included condition-specific MeSH terms, clinical trials, and authoritative guidelines.

3. MAIN BODY: CLINICAL AND SCIENTIFIC ANALYSIS

Detailed exploration of the pathophysiological mechanisms, clinical presentation, diagnostic algorithms, and evidence-based management protocols relevant to

Osteoarthritis Management: Regenerative Medicine, Biological Therapies, and Surgical Innovations.

4. DISCUSSION

Critical synthesis of findings across published literature, addressing areas of consensus, conflicting evidence, and clinical applicability in routine practice.

5. PRACTICAL CLINICAL IMPLICATIONS

Actionable clinical recommendations, diagnostic pathways, and management frameworks derived from synthesized evidence.

6. LIMITATIONS

Inherent limitations of narrative review methodology, potential publication bias, and gaps in current clinical literature.

7. CONCLUSION

Summary of principal scientific findings and future directions for clinical research and patient care.

8. DECLARATIONS

Funding: None declared.
Conflicts of Interest: None.
Ethics Approval: Not applicable for narrative reviews.
Informed Consent: Not applicable.
Data Availability: Data sharing not applicable.

TABLE 1. Summary of Clinical Characteristics and Management Options

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Diagnostic Approach	Standardized clinical assessment and biomarker/imaging evaluation	Class	I
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GLOBAL BURDEN OF ANTIMICROBIAL RESISTANCE: EPIDEMIOLOGICAL TRENDS AND PUBLIC HEALTH POLICIES

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ABSTRACT

Background: Public Health disorders present significant clinical challenges globally, necessitating evidence-based review of contemporary diagnostic and therapeutic strategies.

Objective: This narrative review critically synthesizes recent clinical literature regarding global burden of antimicrobial resistance: epidemiological trends and public health policies.

Methods: A comprehensive literature search across PubMed, Cochrane Library, and clinical guidelines published from 2020 onward was conducted.

Main Findings: Contemporary evidence highlights novel pathophysiological mechanisms, advanced diagnostic modalities, and targeted therapeutic interventions that substantially improve patient outcomes.

Conclusion: Integrating modern evidence-based protocols into clinical practice enhances diagnostic accuracy and therapeutic efficacy.

Keywords: *Public Health; clinical management; evidence-based medicine; therapeutic targets; diagnostic evaluation.*

1. INTRODUCTION

The clinical landscape of public health has evolved dramatically over the past decade. This article explores Global Burden of Antimicrobial Resistance: Epidemiological Trends and Public Health Policies, examining epidemiological context, diagnostic dilemmas, and therapeutic advancements.

2. MATERIALS AND METHODS

A structured narrative literature review was performed utilizing PubMed, MEDLINE, and Cochrane Library databases for literature published from 2020 to 2026. Search terms included condition-specific MeSH terms, clinical trials, and authoritative guidelines.

3. MAIN BODY: CLINICAL AND SCIENTIFIC ANALYSIS

Detailed exploration of the pathophysiological mechanisms, clinical presentation, diagnostic algorithms, and evidence-based management protocols relevant

to Global Burden of Antimicrobial Resistance: Epidemiological Trends and Public Health Policies.

4. DISCUSSION

Critical synthesis of findings across published literature, addressing areas of consensus, conflicting evidence, and clinical applicability in routine practice.

5. PRACTICAL CLINICAL IMPLICATIONS

Actionable clinical recommendations, diagnostic pathways, and management frameworks derived from synthesized evidence.

6. LIMITATIONS

Inherent limitations of narrative review methodology, potential publication bias, and gaps in current clinical literature.

7. CONCLUSION

Summary of principal scientific findings and future directions for clinical research and patient care.

8. DECLARATIONS

Funding: None declared.

Conflicts of Interest: None.

Ethics Approval: Not applicable for narrative reviews.

Informed Consent: Not applicable.

Data Availability: Data sharing not applicable.

TABLE 1. Summary of Clinical Characteristics and Management Options

Parameter	Clinical	Evidence
Domain	Description	Recommendation
Diagnostic Approach	Standardized clinical assessment and biomarker/imaging evaluation	Class I Recommendation
Therapeutic Management	Evidence-based pharmacological and non-pharmacological interventions	Validated in recent clinical trials

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PROGNOSTIC SIGNIFICANCE OF CLINICAL, ELECTROPHYSIOLOGICAL, AND IMMUNOLOGICAL CHANGES IN FACIAL NERVE NEUROPATHIES ASSOCIATED WITH CHRONIC SUPPURATIVE OTITIS MEDIA

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Scientific specialty: 1st profile — NEUROLOGY; 2nd profile — OTORHINOLARYNGOLOGY

Abstract. Facial nerve neuropathy associated with chronic suppurative otitis media (CSOM) represents a clinically important peripheral neuropathy in which intratemporal inflammation, compression, ischemia, demyelination, and axonal injury may coexist. The neurological outcome is not determined by otological findings alone; it also depends on the severity of motor dysfunction, axonal preservation, denervation and reinnervation dynamics, brainstem reflex-arc integrity, and the biological intensity of chronic inflammation. This integrative review analyzes the prognostic significance of House–Brackmann and Sunnybrook grading, electroneurography/electromyography, blink-reflex parameters, temporal-bone disease characteristics, and inflammatory markers including IL-6, TNF- α , and CRP. Current evidence supports clinical grading and neurophysiological testing as the core of neurological prognostication. Cholesteatoma and destructive bony changes may aggravate intratemporal facial nerve injury. IL-6 and TNF- α are biologically relevant to chronic middle-ear inflammation and tissue destruction, but direct evidence for their independent prediction of facial nerve functional recovery remains limited. A neurologically centered, multidomain assessment is therefore the most coherent framework for future prospective studies.

Keywords: facial nerve neuropathy, chronic suppurative otitis media, peripheral facial palsy, electroneurography, electromyography, blink reflex, House–Brackmann, Sunnybrook, IL-6, TNF- α , prognosis.

INTRODUCTION

The facial nerve is a mixed cranial nerve with a dominant motor role in facial expression. Peripheral facial nerve injury can result in weakness of the facial musculature, impaired eye closure, oral incompetence, altered facial symmetry, and, during incomplete or misdirected recovery, synkinesis and contracture. From a neurological perspective, the clinically visible paresis is only the surface manifestation of a spectrum that ranges from transient conduction block and demyelination to severe axonal degeneration and incomplete reinnervation [1–4].

Chronic suppurative otitis media is an uncommon but clinically important cause of acquired peripheral facial nerve dysfunction. Persistent middle-ear and mastoid inflammation, granulation tissue, cholesteatoma, erosion of the fallopian canal, and temporal-bone destruction may expose the intratemporal facial nerve to inflammatory, compressive, and ischemic mechanisms [5,6]. The resulting neuropathy is therefore best understood as a peripheral nerve disorder occurring within a specific otological disease environment.

Clinical assessment remains essential. The House–Brackmann scale provides a globally accepted six-grade description of facial function [1], whereas the Sunnybrook Facial Grading System offers a more granular evaluation of resting symmetry, voluntary movement, and synkinesis [2]. However, neither system directly quantifies axonal preservation. Electroneurography (ENoG), facial nerve conduction studies, needle electromyography (EMG), and blink-reflex testing can add objective neurophysiological information and may refine prognostic assessment [3,4,7].

Inflammatory biology represents a further layer. Cytokines such as IL-6 and TNF- α are expressed in cholesteatoma and chronic otitis media and have been linked to inflammatory tissue remodeling and, in some studies, bone destruction [8–12]. Whether these markers also provide independent information about facial nerve recovery is not established. This uncertainty creates a clinically relevant research opportunity: linking neuroinflammation to neurological severity and electrophysiological degeneration rather than studying inflammatory markers in isolation.

Accordingly, the primary scientific profile of this topic is neurology, because the main outcome is the functional recovery of a peripheral cranial nerve. Otorhinolaryngology defines the etiological and anatomical disease context.

OBJECTIVE

To analyze the prognostic significance of clinical, electrophysiological, and immunological changes in facial nerve neuropathies associated with chronic suppurative otitis media, with emphasis on a neurologically centered framework for evaluating functional recovery.

MATERIALS AND METHODS

This paper was prepared as a targeted analytical review. The methodological framework was based on the domains defined for the dissertation topic: clinical-neurological assessment using the House–Brackmann and Sunnybrook systems; neurophysiological evaluation using ENoG/nerve conduction, EMG, and blink-reflex testing; otological assessment of chronic suppurative otitis media and temporal-bone changes; and evaluation of inflammatory activity using IL-6, TNF- α , and CRP.

PubMed-indexed literature was selectively reviewed using combinations of the terms facial nerve neuropathy, facial paralysis, chronic suppurative otitis media, cholesteatoma, electroneurography, electromyography, blink reflex, House–Brackmann, Sunnybrook, IL-6, TNF-alpha, and prognosis. The aim was not to perform a formal systematic review or meta-analysis, but to synthesize clinically relevant evidence that can support a prospective neurological study of CSOM-associated facial nerve neuropathy.

Evidence was organized into four prognostic domains: (1) clinical-neurological severity and secondary motor phenomena; (2) electrophysiological evidence of axonal loss, denervation, and reinnervation; (3) otological and radiological indicators of destructive middle-ear disease; and (4) inflammatory markers reflecting the biological activity of chronic disease. Functional facial nerve recovery, residual paresis, synkinesis, and contracture were considered the principal neurological outcomes.

RESULTS

Clinical grading is the first layer of prognostic assessment. Higher House–Brackmann grades reflect greater global motor dysfunction, while Sunnybrook scoring provides additional sensitivity to regional movement and synkinesis [1,2,13]. Recent neurological

data support the value of combining clinical grading with neurophysiology rather than relying on a single scale [7]. In CSOM-associated neuropathy, the same principle is particularly relevant because the severity of the visible facial weakness may not fully reflect the degree of intratemporal axonal injury.

Electrophysiological tests provide the strongest objective link between neurological impairment and prognosis. A marked reduction in CMAP amplitude suggests loss of functioning motor axons. Needle EMG can demonstrate active denervation and later reinnervation. Grosheva et al. showed that EMG, especially when repeated during the course of facial palsy, has substantial prognostic value and may outperform a single ENoG assessment in identifying defective healing [3].

The blink reflex provides complementary information by assessing the trigemino-facial brainstem reflex arc. Preservation or early return of the R1 component has historically been associated with a favorable outcome, whereas persistent absence is more frequently linked to poor recovery [4]. A recent neurology-based study further showed that absent R1 responses together with more severe ENoG abnormalities were associated with poor outcomes [7]. These findings are highly relevant when the topic is positioned primarily within neurology.

Otological disease severity modifies the neural injury. In retrospective series of chronic otitis media-related facial paralysis, cholesteatoma and bony destruction of the facial canal were common findings [5,6]. Shorter delays between onset of facial paralysis and definitive management were associated with better restoration of facial function in one large surgical series [6]. Such observations are consistent with a model in which prolonged compression, inflammation, and ischemia progressively increase axonal damage.

The immunological literature supports biological plausibility for adding inflammatory markers to the prognostic framework. IL-6, TNF- α and other cytokines are expressed in cholesteatoma tissue, and studies have reported associations with inflammatory activity and bone remodeling or destruction [8,10–12]. Serum IL-6 has also been shown to be increased in patients with chronic suppurative otitis media compared with healthy controls [9]. However, the available literature does not yet demonstrate that serum IL-6, TNF- α , or CRP independently predicts facial nerve recovery in CSOM-related neuropathy. Their most defensible current role is as complementary biomarkers that can be correlated prospectively with neurological severity and neurophysiological degeneration.

Domain	Key variables	Neurological interpretation
Clinical	House–Brackmann grade, Sunnybrook score, lagophthalmos, synkinesis, contracture	Defines the functional phenotype and quality of recovery.
Electrophysiology	CMAP amplitude, side-to-side ratio, distal latency, EMG denervation/reinnervation	Estimates axonal preservation, denervation severity, and regenerative activity.
Blink reflex	R1/R2 latency and presence	Provides information on trigemino-facial brainstem reflex-arc integrity.
Otological/radiological	Cholesteatoma, granulation, temporal-bone destruction, facial canal involvement	Characterizes the anatomical and etiological burden affecting the nerve.
Immunological	IL-6, TNF- α , CRP	Reflects inflammatory activity; independent prediction of neurological recovery remains unproven.

DISCUSSION

The major implication of the reviewed evidence is that CSOM-associated facial nerve neuropathy should not be reduced to an otological complication alone. The otological process initiates and sustains the lesion, but the outcome of interest is peripheral cranial nerve recovery. This distinction is important for scientific classification: the first profile is neurology, while otorhinolaryngology is the second profile providing etiological, surgical, and anatomical context.

A neurologically coherent prognostic model should prioritize variables that directly represent nerve function. House–Brackmann and Sunnybrook scores describe the clinical phenotype. ENoG and EMG quantify neural injury and regenerative dynamics. Blink-reflex testing extends the evaluation to the reflex arc. These measures can be followed

longitudinally and linked to residual weakness, synkinesis, and contracture—outcomes that are directly relevant to neurological recovery.

Otological variables remain indispensable because they explain the mechanism and intensity of the insult. Cholesteatoma, granulation tissue, facial canal dehiscence, and temporal-bone destruction can be considered modifiers of neural damage rather than substitutes for neurological assessment. Their prognostic role is strongest when interpreted together with electrophysiological evidence of axonal loss.

The immunological component has particular research value. IL-6 and TNF- α are biologically active in chronic middle-ear inflammation and cholesteatoma, but the evidence base is currently stronger for disease activity and tissue destruction than for facial nerve recovery itself [8–12]. Therefore, a future prospective study should test whether these markers correlate with House–Brackmann/Sunnybrook severity, CMAP reduction, denervation activity, and blink-reflex abnormalities. Demonstrating such links would provide a genuine neuroinflammatory dimension to the dissertation topic.

From a methodological standpoint, this approach avoids prematurely creating a new 'prognostic criterion' or score. It is scientifically more appropriate to determine the prognostic significance of existing clinical, electrophysiological, and immunological changes, identify independent associations, and only then consider whether a validated composite model is justified.

CONCLUSION

- Clinical-neurological and electrophysiological variables constitute the core of prognostic assessment in facial nerve neuropathy associated with chronic suppurative otitis media.
- House–Brackmann and Sunnybrook grading, ENoG/EMG, and blink-reflex testing are complementary and collectively provide a more complete description of facial nerve injury and recovery than otological findings alone.
- Cholesteatoma and destructive temporal-bone changes are important modifiers of intratemporal facial nerve injury and should be integrated into neurological interpretation.
- IL-6, TNF- α , and CRP are biologically plausible adjunctive markers, but their independent prognostic value for facial nerve functional recovery requires prospective validation.
- The topic is therefore appropriately positioned with Neurology as the first scientific profile and Otorhinolaryngology as the second.

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ODONTOGEN INFEKSIYALARDA ANTIBIOTIKLARGA REZISTENTLIK MUAMMOSI VA ANTIBAKTERIAL PREPARATLARNI OQILONA TANLASH TAMOIYILLARI

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ANNOTATSIYA

Maqsad: odontogen infeksiyalarda antimikrob rezistentlikning klinik ahamiyatini va antibiotiklarni oqilona tanlash algoritmini zamonaviy dalillar asosida baholash. Materiallar va usullar: 2019–2026-yillarda chop etilgan klinik qo'llanmalar, sistematik sharhlar va ko'p yillik retrospektiv tadqiqotlarning ikkilamchi tahlili o'tkazildi; yangi bemorlar jalb qilinmadi. Natijalar: Germaniyadagi 740 og'ir odontogen infeksiya holatini qamrab olgan kohortda klindamitsinga rezistentlik 38,9%, amoksitsillin/klavulanatga 6,9% bo'ldi. Slovakiyadagi 698 bakterial izolyat orasida tegishli qiymatlar 25,8% va 4,9% bo'lgan; bu ikki tadqiqotning hisoblash birliklari turlicha. 311 bemorli retrospektiv davolash solishtiruvda klindamitsin guruhida muvaffaqiyatsizlik 14,0%, amoksitsillin/klavulanat guruhida 2,2% qayd etilgan; bu randomizatsiyalangan qiyos emas. Xulosa: lokal infektsiyada birlamchi manbani bartaraf etish asosiy davolash usulidir; tizimli antibiotiklar faqat asosli ko'rsatma mavjud bo'lganda, bemor holati va mahalliy antibiogrammani inobatga olib tanlanishi lozim.

Kalit so'zlar: odontogen infeksiya, antibiotik rezistentligi, klindamitsin, amoksitsillin/klavulanat, drenaj, antibiotik stewardship, antibiogramma.

АННОТАЦИЯ

Цель: оценить клиническое значение антибиотикорезистентности при одонтогенных инфекциях и сформулировать принципы рационального выбора антибиотиков. Методы: вторичный анализ клинических рекомендаций, систематических обзоров и ретроспективных исследований 2019–2026 гг.; собственные клинические данные не собирались. Результаты: в немецкой когорте из 740 тяжелых одонтогенных инфекций резистентность к клиндамицину составила 38,9%, к амоксициллину/клавуланату — 6,9%. Среди 698 бактериальных

изолятов словацкого исследования соответствующие значения составляли 25,8% и 4,9%; единицы анализа этих исследований различаются. В ретроспективном сравнении 311 пациентов неудача лечения отмечалась у 14,0% в группе клиндамицина и у 2,2% в группе амоксициллина/клавуланата; сравнение не являлось рандомизированным. Вывод: хирургическое устранение источника и дренирование имеют приоритет, а системные антибиотики следует использовать при обоснованных показаниях с учетом тяжести, аллергии и местной антибиотикограммы.

Ключевые слова: одонтогенная инфекция, антибиотикорезистентность, клиндамицин, антибиотикотерапия, дренирование, микробиологический посев.

ABSTRACT

Objective: To evaluate antimicrobial resistance in odontogenic infections and the principles of rational antibiotic selection. **Methods:** A secondary evidence synthesis of guidelines, systematic reviews and retrospective studies published in 2019–2026; no original clinical cohort was created. **Results:** In a German cohort of 740 surgically treated odontogenic infections, infection-level resistance was 38.9% for clindamycin and 6.9% for amoxicillin/clavulanate. A Slovakian study reported 25.8% and 4.9%, respectively, among 698 cultured bacterial isolates; the denominators are not directly comparable. In a non-randomized retrospective cohort of 311 patients, treatment failure was reported in 14.0% of clindamycin-treated patients versus 2.2% of amoxicillin/clavulanate-treated patients. **Conclusion:** Prompt source control is the cornerstone of care; systemic antimicrobials should be reserved for justified indications and guided by severity, allergy assessment and local susceptibility patterns.

Keywords: odontogenic infection, antimicrobial resistance, clindamycin, antimicrobial stewardship, drainage, antibiotic susceptibility testing.

KIRISH

Odontogen infeksiyalar kariyes, pulpa nekrozi, periapikal jarayon va periodontal o'choqlardan kelib chiqadigan, odatda polimikrob etiologiyaga ega yallig'lanish kasalliklaridir. Klinik spektr lokal absessdan chuqur yuz-jag' bo'shliqlari flegmonasi, nafas yo'li xavfi va sepsisgacha o'zgaradi. Davolash natijasi antibiotik buyurishga emas, birinchi navbatda etiologik o'choqni bartaraf etish va yiringli to'plamni yetarlicha drenajlashga bog'liq (Lockhart et al., 2019).

Antibiotiklardan ortiqcha foydalanish oral mikrobiotada chidamli shtammlarni tanlab ko'paytiradi. Og'iz mikrobiotasi viridans streptokokklar, Streptococcus anginosus guruhi, Prevotella, Fusobacterium, Parvimonas va boshqa fakultativ hamda obligat

anaeroblardan tashkil topadi. Ularning bir qismi beta-laktamaza ishlab chiqarish, bogʻlanish nishonini oʻzgartirish va makrolid-linkozamid rezistentligi mexanizmlariga ega.

Jahon sogʻliqni saqlash tashkilotining GLASS-2025 hisobotida 2023-yil umumiy bakterial infeksiyalarining taxminan har oltitasidan biri rezistent infeksiya sifatida baholangan. Bu koʻrsatkich odontogen infeksiyalarga xos emas; u global rezistentlik muammosi kontekstini koʻrsatadi (WHO, 2025).

ADAning dalillarga asoslangan qoʻllanmasida immuniteti meʼyoriy katta yoshli bemorlarda simptomatik qaytmas pulpitis va koʻpchilik mahalliy pulpal-periapikal holatlar uchun rutin antibiotik buyurmaslik, avvalo endodontik davolash yoki drenaj kabi sababga yoʻnaltirilgan stomatologik muolajani bajarish tavsiya etiladi (Lockhart et al., 2019).

Qisqa muddatda empirik antibakterial dori tanlash muhim boʻlgan vaziyatlar ham mavjud: isitma, umumiy intoksikatsiya, tarqaluvchi sellulit, chuqur boʻshliqlar zararlanishi, immunosupressiya va infeksiya tez kuchayishi. Bunday holatlarda davolash koʻp tarmoqli yondashuv, tizimli antibiotik va ayrim hollarda statsionar yordamni talab qiladi.

Tadqiqot maqsadi — yaqinda nashr qilingan kohortlar asosida rezistentlik koʻrsatkichlaridagi tafovutlarni tahlil qilish, keraksiz antibiotik buyurish oqibatlarini baholash va Oʻzbekiston stomatologik muassasalarida qoʻllash mumkin boʻlgan klinik mikrobiologiyaga asoslangan tanlash tamoyillarini ishlab chiqish.

METODOLOGIYA VA ADABIYOTLAR TAHLILI

Tadqiqot dizayni — yoʻnaltirilgan ikkilamchi adabiyotlar sintezi. Maʼlumotlar ADAning 2019-yilgi klinik qoʻllanmasi, JSSTning 2025-yilgi GLASS hisoboti, Germaniya, Slovakiya, Avstraliya va Yangi Zelandiyadagi retrospektiv kohortlar, tizimli sharhlar hamda Oʻzbekiston mualliflarining odontogen infeksiya va antibiotik stewardshipga doir nashrlaridan olindi. Mazkur ish yangi sistematik meta-tahlil emas; izlanish protokoli yoki PRISMAga muvofiq toʻliq qidiruv oʻtkazilgani daʼvo qilinmaydi.

Natijalar manbadagi asl hisoblash birligi bilan saqlandi. Germaniya kohortida rezistentlik infeksiya darajasida; Slovakiya tadqiqotida bakterial izolyatlar darajasida; Avstraliya–Yangi Zelandiya kohortida esa shifoxonaga yotqizilgan populyatsiyalarning lokal seriyalarida berilgan. Ushbu foizlarni bitta pooled oʻrtacha sifatida hisoblash metodologik jihatdan notoʻgʻri boʻlgani sabab har bir manba alohida koʻrsatildi.

Rezistentlikni baholashda jiddiy tanlanish biasi mavjud: namuna koʻpincha chuqur yoki operatsion aralashuvga muhtoj infeksiyada olinadi, ambulator yengil holatlar esa kamroq tekshiriladi. Shuning uchun ogʻir statsionar kohortlardagi foizlarni umumiy

stomatologiya qabuli uchun bevosita epidemiologik ko'rsatkich deb hisoblash mumkin emas.

Klinik tanlash tamoyillari besh yo'nalishda ko'rib chiqildi: (1) infeksiya manbasini bartaraf etish, (2) antibiotik ko'rsatmasi va kasallik og'irligi, (3) aniq allergiya anamnezi, (4) mikrobiologik namuna va mahalliy antibiogramma, (5) bemor qayta ko'rigi va preparat spektrini toraytirish.

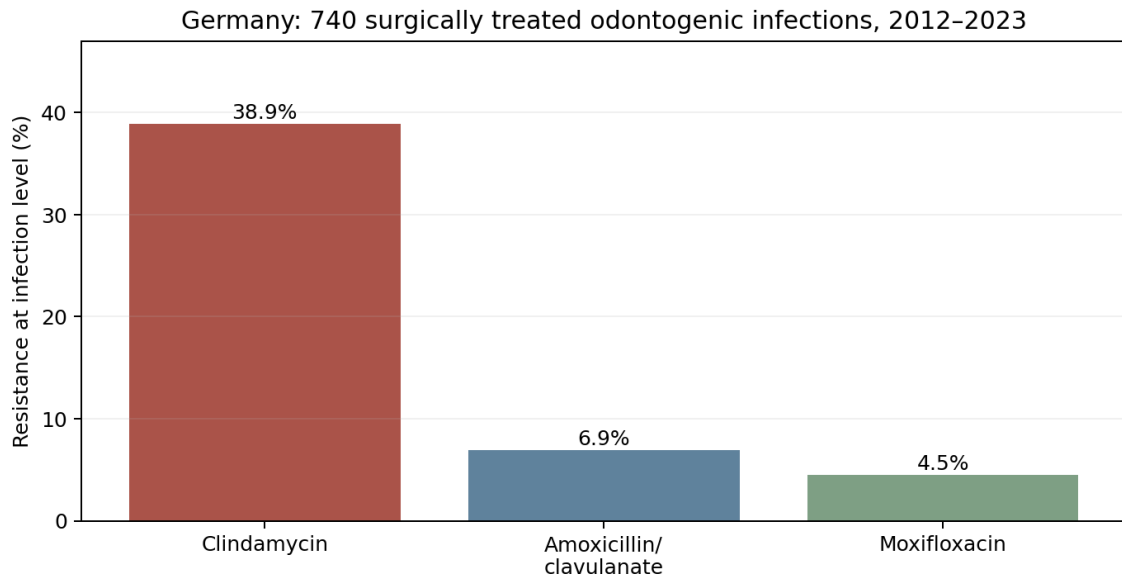
O'zbekistondagi materiallar ichida Xalilova (2025)ning odontogen infeksiyalar bo'yicha standartlashgan jarrohlik va antibakterial boshqaruv sharhi, Xurramov va hammualliflarning yuz-jag' flegmonalarida mikrobiologik tahlilga oid materiali, Bazarova va hammualliflarning (2025) antibiotiklarni noto'g'ri ishlatish bo'yicha maqolasi mahalliy ilmiy kontekst sifatida qo'llandi. Ushbu manbalarda yirik milliy odontogen antibiogramma mavjudligi tasdiqlanmagan.

1-jadval. Tahlilda qo'llanilgan klinik dalillar va hisoblash birligi

Ko'rsatkich / manba	Dalil yoki klinik talqin
Fischer et al., 2025	Germaniya, 2012–2023; 740 statsionar odontogen infeksiya; rezistentlik infeksiya darajasida.
Slovakiya kohorti, 2024	2014–2023; 744 orofatsial bemor; 362 bemordan 698 bakterial izolyat; rezistentlik izolyat darajasida.
Clindamycin vs amoksitsillin/klavulanat, 2023	311 statsionar bemor; 43 va 268 bemorli, randomizatsiyasiz retrospektiv guruhlar.
Richardson et al., 2026	Avstraliya/Yangi Zelandiya, 2019–2023; jami 924 og'ir odontogen infeksiya bemori.
Lockhart et al., 2019	ADAning immuniteti saqlangan kattalar uchun pulpal va periapikal og'riq/shishdagi klinik tavsiyalari.

NATIJALAR

Rezistentlikning klinik ahamiyati mahalliy mikrobiologik profilga bog'liq. Germaniyaning Jena universiteti klinikasida o'rganilgan 740 operativ davolangan odontogen infeksiya orasida klindamitsinga rezistentlik 38,9%, amoksitsillin/klavulanatga 6,9%, moksifloksatsinga 4,5% bo'lgan. Bu moksifloksatsinni birinchi qator dori deb tavsiya etmaydi: ushbu preparatning xavf profili va antimikrob stewardship nuqtayi nazaridan uni empirik odatiy tanlov sifatida ishlatish asossizdir (Fischer et al., 2025).

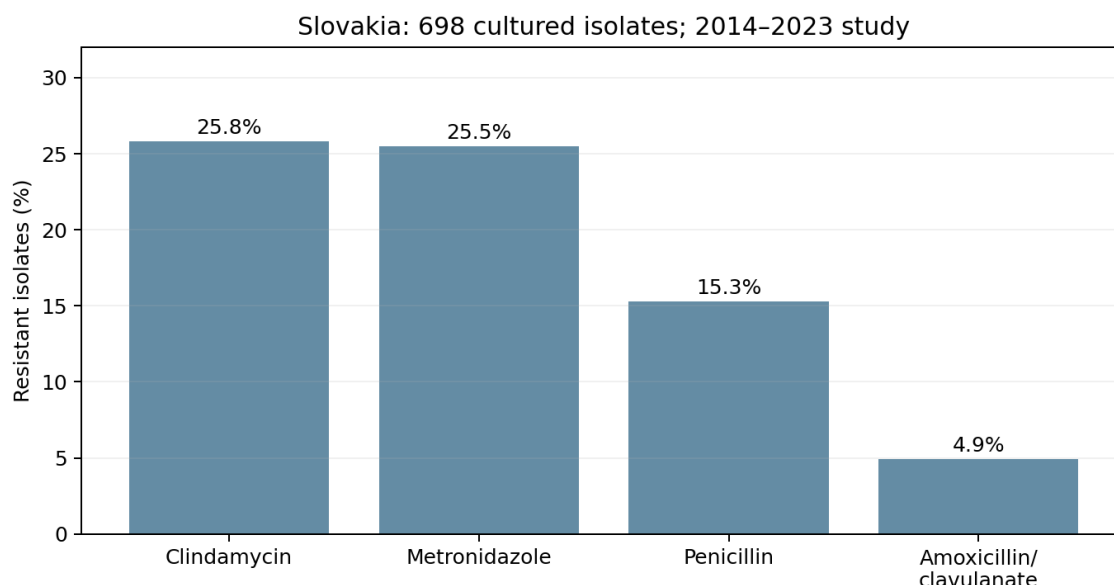


1-rasm. Germaniya statsionar kohortida infeksiya darajasidagi rezistentlik. Turli populyatsiyadagi izolyat foizlari bilan birlashtirilmaydi.

2-jadval. Germaniya tadqiqotining rezistentlik ko'rsatkichlari

Ko'rsatkich / manba	Dalil yoki klinik talqin
Klindamitsin	38,9% infeksiyalarda; empirik qo'llashda yuqori rezistentlik xavfi.
Amoksitsillin/klavulanat	6,9% infeksiyalarda; tanlash mahalliy profil va ko'rsatmaga bog'liq.
Moksifloksatsin	4,5%; past rezistentlik rutin tanlashga asos bo'lmaydi.
Penitsillin allergiyasi anamnez haqida	Klindamitsin rezistentligi bilan bog'liqlik OR=2,156 (95% CI 1,038–4,480).

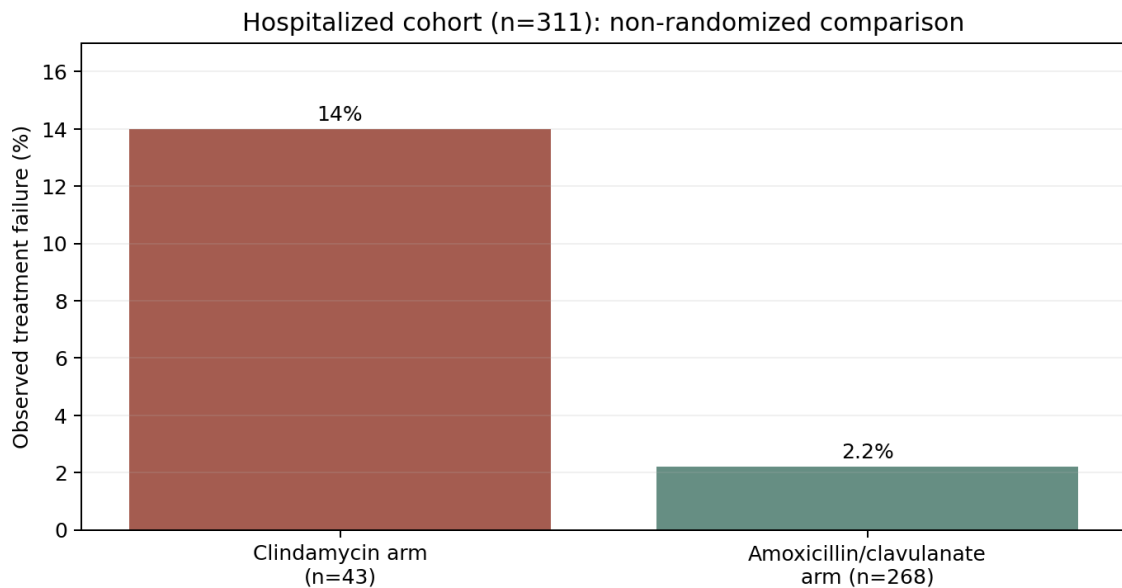
Slovakiyada 744 bemorli o'n yillik seriyada 362 bemordan yetishtirilgan 698 izolyat tahlil qilingan. Klindamitsinga 25,8%, metronidazolga 25,5%, penitsillinga 15,3%, amoksitsillin/klavulanatga 4,9% rezistentlik kuzatilgan. Bu izolyat darajasidagi ko'rsatkichlar Germaniyadagi infeksiya darajasidagi foizlar bilan to'g'ridan-to'g'ri qiyoslanmasligi kerak.



2-rasm. Slovakiya seriyasida bakterial izolyatlarga nisbatan rezistentlik; $n=698$ izolyat.

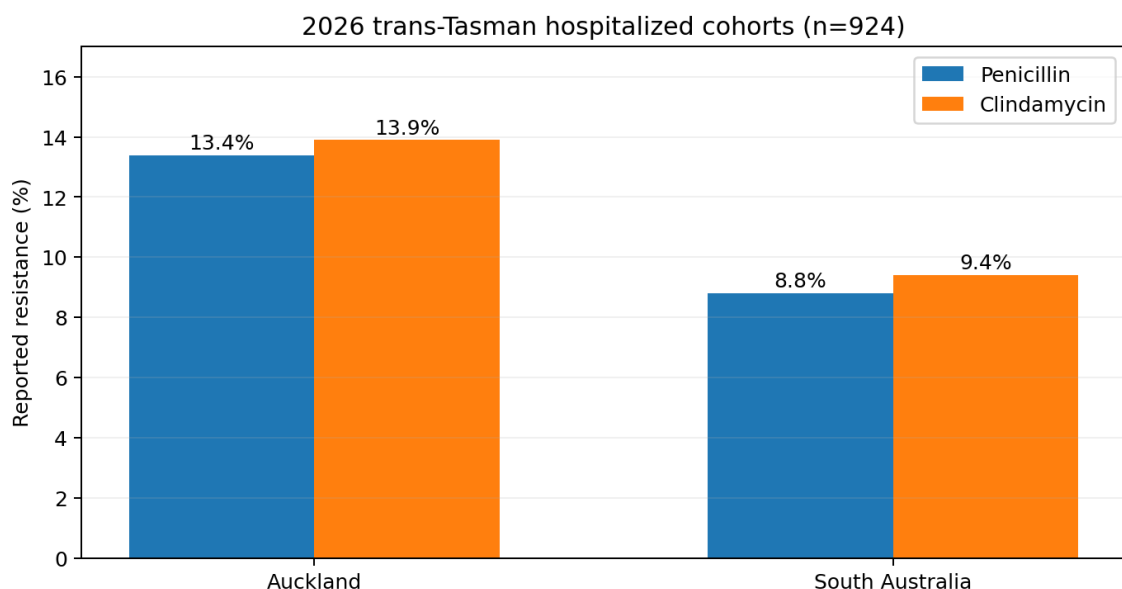
Metronidazolga nisbatan izolyat darajasidagi yuqori rezistentlikni talqin etishda muhim jihat shuki, bu preparat aerob va fakultativ streptokokklarga faol emas. Polimikrob odontogen infeksiyada uning monoterapiya sifatidagi chegaralari mavjud; aniq rol faqat klinik ko'rsatma, aerob-anaerob qamrov va mikrobiologiya bilan belgilanadi.

311 statsionar bemorli retrospektiv taqqoslashda klindamitsin qabul qilgan 43 bemordan 14,0%da va amoksitsillin/klavulanat qabul qilgan 268 bemordan 2,2%da davolash muvaffaqiyatsizligi qayd etilgan ($p=0,002$). Guruhlar hajmi va ayrim boshlang'ich xususiyatlar turlicha bo'lgani bois natija sababiy ustunlik yoki universal dori reytingi sifatida talqin qilinmaydi.



3-rasm. Retrospektiv kohortda kuzatilgan davolash muvaffaqiyatsizligi; randomizatsiyalangan tajriba emas.

2026-yilda e'lon qilingan Avstraliya–Yangi Zelandiya tahlilida 924 og'ir odontogen infeksiya holati qayd etilgan. Aucklandda penitsillinga 13,4% va klindamitsinga 13,9%; Janubiy Avstraliyada mos ravishda 8,8% va 9,4% rezistentlik bildirilgan. Shu geografik tafovutning o'zi bir mamlakat ma'lumotlarini barcha klinikalarga qo'llashdan saqlanish zarurligini ko'rsatadi.



4-rasm. Ikki hudud o'rtasidagi rezistentlik tafovuti: 2026-yilgi trans-Tasman kohorti.

3-jadval. Turli manbalardan olingan rezistentlik natijalarini talqin qilish

Ko'rsatkich / manba	Dalil yoki klinik talqin
740 infeksiya, Germaniya	Infeksiya darajasida klindamitsin 38,9%; boshqa mamlakatlar uchun bevosita prognoz emas.
698 izolyat, Slovakiya	Izolyat darajasida klindamitsin 25,8%; izolyat va bemor soni teng emas.
924 bemor, ikki mintaq	Auckland va Janubiy Avstraliyada ikki antibiotikka nisbatan ko'rsatkichlar geografik farqlangan.
311 bemorli davolash taqqoslashi	14,0% va 2,2% muvaffaqiyatsizlik; retrospektiv tadqiqotda confounding ehtimoli mavjud.

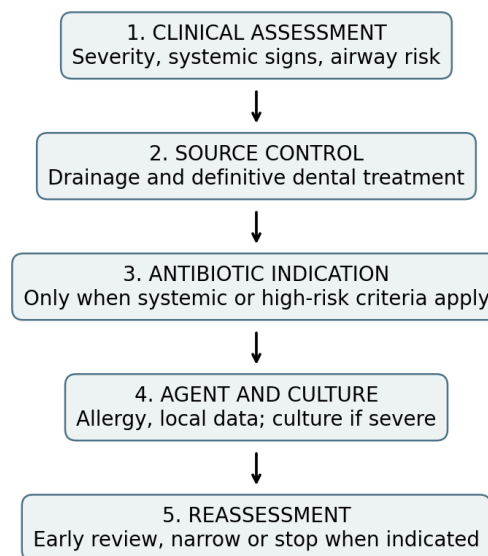
Oqilona antibakterial strategiya infeksiya og'irligi va tizimli asorat xavfini dastlab baholashdan boshlanadi. Lokal pulpal yoki periapikal yallig'lanish uchun antibakterial preparatni avtomatik buyurish dalillarga mos emas. Etiologik davolashdan oldin antibiotik berish alomatni vaqtincha o'zgartirishi mumkin, ammo nekrotik pulpa yoki drenajlanmagan absess o'chog'ini bartaraf etmaydi.

4-jadval. Klinik vaziyat bo'yicha oqilona yondashuv

Ko'rsatkich / manba	Dalil yoki klinik talqin
Qaytmas pulpit, tizimli belgilar yo'q	Og'riq nazorati va imkon qadar tez endodontik muolaja; rutin sistem antibiotik tavsiya etilmaydi.
Chegaralangan periapikal absess, drenaj imkoni bor	Drenaj/etiologik davolash birlamchi; immuniteti me'yoriy katta yoshli bemorda antibiotik ehtiyoji alohida baholanadi.
Isitma, tarqaluvchi sellulit yoki chuqur bo'shliq	Shoshilinch baholash, source control va tizimli antibiotik; kerak bo'lsa statsionar yuborish.
Og'ir yoki qaytalanuvchi infeksiya	Aspirat/yiring namunasi, ekish va sezuvchanlik; lokal antibiogrammaga ko'ra terapiyani aniqlashtirish.
Qayd etilgan penitsillin allergiyasi	Reaksiya turi va vaqtini tekshirish; faqat "allergiya" yorlig'i sabab avtomatik klindamitsin tanlamaslik.

Antibiotik buyurish zarurati tasdiqlanganda, eng tor yetarli spektrni tanlash, dozani va davomiylikni bemor yoshi, homiladorlik, buyrak/jigar funksiyasi, dori o'zaro ta'siri va mahalliy ko'rsatmalarga moslashtirish kerak. Og'ir bemorlar uchun bu qaror shifokor va zaruratda klinik mikrobiolog tomonidan qabul qilinadi. Ushbu maqola individual dori retsepti emas.

Antibiotic stewardship: clinical decision pathway



5-rasm. Odontogen infeksiyada antibakterial preparatni oqilona tanlash va erta qayta baholash algoritmi.

5-jadval. Klinik audit uchun antibiotik stewardship indikatorlari

Ko'rsatkich / manba	Dalil yoki klinik talqin
Ko'rsatma qayd etilishi	Har bir antibiotik retseptida aniq tashxis va tizimli ko'rsatma yoki yuqori xavf sababi hujjatlashtiriladi.
Source control muddati	Etiologik stomatologik muolaja / drenaj kechiktirilmasligi nazorat qilinadi.
Allergiya verifikatsiyasi	Reaksiya turi va og'irligi, ilgari qabul qilingan preparatlar tekshiriladi.
Mikrobiologiya	Og'ir, atipik yoki qaytalanuvchi holatda namuna natijasi ko'rib chiqiladi.

Ko'rsatkich manba	Dalil yoki klinik talqin
Qayta ko'rik va de- eskalatsiya	Klinik javob erta tekshiriladi; o'zgaruvchan ma'lumotga qarab dori doirasi va muddati qayta ko'riladi.

MUHOKAMA

Mavjud natijalar klindamitsinga rezistentlikni alohida klinik muammo sifatida ko'rsatadi. Biroq kuzatuv ishlari asosan jarrohlik aralashuviga muhtoj og'ir infeksiyalarni qamrab oladi; undagi yuqori rezistentlik ambulator oddiy absess yoki pulpitda aynan shunday uchrashini isbotlamaydi. Klindamitsinning nojo'ya ta'siri, jumladan Clostridioides difficile infeksiyasi xavfi ham individual tanlashda hisobga olinadi.

Amoksitsillin/klavulanatga nisbatan ayrim shifoxona kohortlarida rezistentlik pastligi har bir lokal infeksiyada keng spektrli antibiotik zarur degan xulosa bermaydi. Stewardship tamoyiliga ko'ra antibiotik kerak bo'lmagan klinik vaziyatda har qanday antibiotik asossiz tanlovdir. Antibiotik zarur bo'lganda preparatni tanlash kasallik og'irligi va mahalliy tavsiyalarga asoslanadi.

Rezistentlik geografik va vaqt bo'yicha o'zgaruvchan. Bir kasalxonaning antibiotikogrammasi shaharning boshqa muassasasi yoki O'zbekistonning boshqa viloyati uchun aynan mos kelmasligi mumkin. Har bir katta yuz-jag' jarrohligi bo'limida klinik mikrobiologiya laboratoriyasi bilan hamkorlikda og'ir odontogen infeksiyalarning davriy lokal antibiogrammasi yuritilishi zarur.

Jarayonni asosiy o'choqda to'xtatish kechiktirilsa, yaxshi laborator sezgirlik ko'rsatgan dori ham samarasiz bo'lishi mumkin. Nekrotik to'qima, absess kapsulasi va yomon qon ta'minoti antibiotik kirib borishini cheklaydi. Shuning uchun drenaj, yiring o'chog'ini qayta baholash va kerakli stomatologik jarrohlik antibakterial davolash bilan raqobatchi emas, balki asosiy davolash elementidir.

Mahalliy nashrlarda yuz-jag' flegmonalarida mikrobiologik tekshiruv va standartlashtirilgan algoritm muhimligi qayd etilgan. Ammo katta, ketma-ket olingan O'zbekiston odontogen infeksiya izolyatlariga asoslangan milliy rezistentlik foizlari ishonchli tasdiqlanmagan. Shuning uchun chet eldagi 38,9% yoki 25,8% ko'rsatkichlarni O'zbekiston statistikasi sifatida ishlatish noto'g'ri bo'ladi.

Istiqbolda prospektiv mahalliy kuzatuv dizaynida alohida anaerob transport, namuna olish vaqti, oldingi antibiotik ekspozitsiyasi, absess anatomik sohalari, allergiya

tarixi, ekish usuli, EUCAST/CLSI sezuvchanlik mezonlari va operatsiyadan keyingi klinik javob bir xil protokolda qayd etilishi lozim.

Daslabki empirik dori va antibiogramma orasidagi tafovut, keraksiz retseptlar ulushi, source-controlgacha vaqt, infeksiya qaytalanishi, qayta operatsiya, statsionar kunlar va jiddiy nojo'ya ta'sirlar antimikrob stewardshipning haqiqiy klinik samaradorligini ko'rsatadi. Bir antibiotik uchun past rezistentlik foizi yakka holda sifat indikator bo'la olmaydi.

XULOSA

Odontogen infeksiyalarni boshqarishda antimikrob rezistentlik muammosi jiddiy, ammo klinik qaror avvalo infeksiya turini, o'choqni bartaraf etish imkonini va tizimli xavfni aniqlashdan boshlanishi kerak.

Zamonaviy og'ir infeksiya kohortlarida klindamitsinga rezistentlik yuqori bo'lishi mumkin; nemis kohortida 38,9% infeksiya darajasida, slovak kohortida 25,8% bakterial izolyat darajasida qayd etilgan. Bu qiymatlar bitta umumiy foizga birlashtirilmaydi.

Antibiotiklar lokal pulpit va drenajlanadigan ayrim mahalliy periapikal holatlarda sababga yo'naltirilgan davolashning o'rnini bosa olmaydi; tizimli infeksiya belgilari yoki yuqori asorat xavfi mavjud bo'lganda tizimli antibakterial davo asosli bo'lishi mumkin.

Preparatni tanlashda haqiqiy allergiya anamnezi, mahalliy antibiogramma, bemorning klinik holati va eng tor yetarli spektr tamoyili birgalikda qo'llanishi lozim. Og'ir va qaytalanuvchi holatlarda ekish natijasiga asoslangan toraytirish muhim.

O'zbekistonda og'ir odontogen infeksiyalarning ko'p markazli mikrobiologik registri, muntazam klinik audit va stomatologlar uchun stewardship treninglari antibakterial vositalardan oqilona foydalanishni baholash uchun zarur ilmiy asos yaratadi.

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BOLALAR GEMODIALIZ BEMORLARIDA ANEMIYANI DAVOLASH SAMARADORLIGINI BAHOLASH VA ESA GA JAVOBNI PROGNOZLASH

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ANNOTATSIYA

Ushbu maqolada bolalar gemodializ bemorlarida surunkali buyrak kasalligi bilan bog'liq anemiya davolash samaradorligi va eritropoezni stimullovchi agentlarga (ESA) javobni prognozlashning zamonaviy yondashuvlari tahlil qilindi. Tadqiqot strukturaviy adabiyotlar sharhi va dalillar sintezi ko'rinishida bajarilib, 2026-yilgi KDIGO anemiya bo'yicha klinik qo'llanmasi, pediatrik ESA sistematik sharhlari va gemodializdagi bolalarda erythropoietin resistance index (ERI)ni baholagan zamonaviy klinik tadqiqotlar tahlil qilindi. KDIGO 2026 qo'llanmasi CKD G5HD bemorlarida ferritin ≤ 500 ng/ml va TSAT $\leq 30\%$ bo'lganda temir terapiyasini, boshlang'ich tanlov sifatida vena ichiga temirni tavsiya qiladi hamda ESA bilan gemoglobinni $\geq 11,5$ g/dl darajada ushlab turmaslikni belgilaydi. 80 nafar bolani qamrab olgan gemodializ tadqiqotida o'rtacha ERI $28,87 \pm 10,62$ bo'lib, ERI CRP ($r=0,219$), yosh va EPO dozasi bilan musbat, Kt/V ($r=-0,262$) va gemoglobin ($r=-0,265$) bilan manfiy bog'langan. Pediatrik kohortlarda dializ yetarli emasligi, yallig'lanish, malnutritsiya, surunkali qon yo'qotish, sekundar giperparatireoz va giperfosfatemiya ESA javobining pasayishi bilan bog'liq. Natijalar ESA dozasini avtomatik oshirishdan ko'ra qaytariladigan sabablarni aniqlash va tuzatishga asoslangan individual yondashuvni qo'llab-quvvatlaydi.

Kalit so'zlar: bolalar gemodializi, anemiya, ESA, eritropoetin, ESA hyporesponsiveness, ERI, ferritin, TSAT, CRP, Kt/V.

АННОТАЦИЯ

В статье проанализированы современные подходы к оценке эффективности лечения анемии и прогнозированию ответа на эритропоэз-стимулирующие препараты (ESA) у детей, находящихся на гемодиализе. Работа выполнена как структурированный обзор литературы и синтез доказательств с использованием рекомендаций KDIGO 2026 по анемии при хронической болезни почек, систематических обзоров ESA в педиатрии и современных исследований индекса

резистентности к эритропоэтину (ЕРI). KDIGO 2026 рекомендует у пациентов СКD G5HD начинать терапию железом при ферритине ≤ 500 нг/мл и TSAT $\leq 30\%$, предпочтительно внутривенным железом, и не поддерживать гемоглобин на уровне $\geq 11,5$ г/дл с помощью ESA. В исследовании 80 детей на гемодиализе средний ЕRI составил $28,87 \pm 10,62$; ЕRI положительно коррелировал с CRP, возрастом и дозой ЕРО и отрицательно — с Kt/V и гемоглобином. Недостаточная адекватность диализа, воспаление, мальнутриция, хроническая кровопотеря, вторичный гиперпаратиреоз и гиперфосфатемия рассматриваются как ключевые предикторы слабого ответа на ESA. Полученные данные поддерживают индивидуальный подход с коррекцией обратимых факторов вместо автоматического повышения дозы ESA.

Ключевые слова: детский гемодиализ, анемия, ESA, эритропоэтин, гипореспонсивность к ESA, ЕRI, ферритин, TSAT, CRP, Kt/V.

ABSTRACT

This article analyzes contemporary approaches to evaluating anemia treatment effectiveness and predicting responsiveness to erythropoiesis-stimulating agents (ESAs) in pediatric hemodialysis patients. The study was designed as a structured literature review and evidence synthesis using the 2026 KDIGO anemia guideline, systematic reviews of ESA use in children, and recent pediatric studies assessing the erythropoietin resistance index (ERI). KDIGO 2026 suggests initiating iron therapy in CKD G5HD when ferritin is ≤ 500 ng/mL and TSAT $\leq 30\%$, with intravenous iron preferred, and recommends against maintaining hemoglobin ≥ 11.5 g/dL with ESA therapy. In a study of 80 pediatric hemodialysis patients, mean ERI was 28.87 ± 10.62 and was positively associated with CRP, age, and EPO dose, while inversely associated with Kt/V and hemoglobin. Pediatric cohorts identify inadequate dialysis, inflammation, malnutrition, chronic blood loss, secondary hyperparathyroidism, and hyperphosphatemia as major predictors of reduced ESA responsiveness. These findings support an individualized strategy focused on correction of reversible causes rather than automatic ESA dose escalation.

Keywords: pediatric hemodialysis, anemia, ESA, erythropoietin, ESA hyporesponsiveness, ERI, ferritin, TSAT, CRP, Kt/V.

KIRISH

Anemiya surunkali buyrak kasalligi va terminal buyrak yetishmovchiligi bo'lgan bolalarda eng ko'p uchraydigan asoratlardan biri hisoblanadi. Bolalarda gemoglobin yetishmovchiligi charchoq, jismoniy faollikning pasayishi, o'sish va neurokognitiv

rivojlanishning susayishi, yurak chap qorincha gipertrofiyasi, hospitalizatsiya va hayot sifatining yomonlashishi bilan bogʻliq. Dializ bosqichiga kelganda anemiya koʻpincha koʻp omilli tus oladi.

Buyrakda endogen eritropoetin ishlab chiqarilishining kamayishi asosiy patogenetik mexanizm boʻlsa-da, gemodializdagi bola uchun temir yetishmovchiligi, dializ konturida va laborator tekshiruvlarda surunkali qon yoʻqotish, yalligʻlanish-hepcidin yoʻli, oziqlanish yetishmovchiligi, sekundar giperparatireoz, folat yoki B12 yetishmovchiligi va dializ yetarli emasligi ham muhim hisoblanadi.

ESA preparatlari pediatrik nefrologiyada renal anemiyani boshqarishning tayanch vositasi boʻlib qolmoqda. Biroq bolalarda vaznga nisbatan ESA ehtiyoji kattalarga qaraganda yuqoriroq boʻlishi mumkin. Ayrim bemorlarda esa mos doza va temir taʼminotiga qaramay gemoglobin kutilgan darajada oshmaydi yoki maqsad darajani ushlab turish uchun doza muntazam oshirilishi kerak boʻladi. Bu holat ESA hyporesponsiveness yoki ESA rezistentligi sifatida qaraladi.

ESA ga javobni baholashda faqat gemoglobin darajasini kuzatish yetarli emas. ESA dozasi tana vazni va gemoglobin qiymatiga nisbatan ifodalovchi erythropoietin resistance index (ERI) klinik tadqiqotlarda oddiy va amaliy marker sifatida qoʻllanadi. Yuqori ERI yalligʻlanish, dializ adekvatligi va mineral-suyak buzilishlari kabi sabablarni faol izlashga signal boʻlishi mumkin.

Ushbu maqolaning maqsadi bolalar gemodializ bemorlarida anemiyani davolash samaradorligini baholash, ESA ga javobni prognozlovchi klinik va laborator omillarni tahlil qilish hamda zamonaviy dalillar asosida amaliy monitoring algoritmini ishlab chiqishdan iborat.

METODOLOGIYA VA ADABIYOTLAR TAHLILI

Ushbu maqola strukturaviy narrativ sharh va dalillar sintezi dizaynida tayyorlandi. KDIGO 2026 Clinical Practice Guideline for Anemia in Chronic Kidney Disease, pediatrik CKD anemiyasi boʻyicha sistematik sharhlar hamda gemodializdagi bolalarda ESA rezistentligi va ERI ni baholagan klinik tadqiqotlar ustuvor manba sifatida tanlandi.

Adabiyotlar tahlilida quyidagi klinik natijalar baholandi: gemoglobin darajasi va uning 4–12 haftalik dinamikasi, ESA doza ehtiyoji, ERI, ferritin va transferrin saturation (TSAT), CRP, albumin/nutritsiya markerlari, Kt/V yoki urea reduction ratio, parathormon, fosfor, qon yoʻqotish va transfuziya ehtiyoji.

ERI koʻpincha haftalik ESA dozasi (IU/kg/hafta)ni gemoglobin (g/dl)ga boʻlish orqali hisoblanadi. Formula tadqiqotlar orasida biroz farq qilishi mumkinligi sababli, ERI bir

markaz ichidagi trend va xavf stratifikatsiyasi uchun ayniqsa foydali, lekin turli markazlar o'rtasida qat'iy bitta cut-off bilan solishtirish ehtiyotkorlikni talab qiladi.

Birlamchi bemor ma'lumotlari taqdim etilmaganligi sababli maqolada muallif tomonidan sun'iy klinik natijalar yaratilmagan. Natijalar bo'limidagi statistik raqamlar nashr etilgan pediatrik tadqiqotlardan olingan. Maqoladagi klinik algoritm ilmiy manbalarning sintezi bo'lib, individual bemorni davolash bo'yicha retsept emas.

NATIJALAR

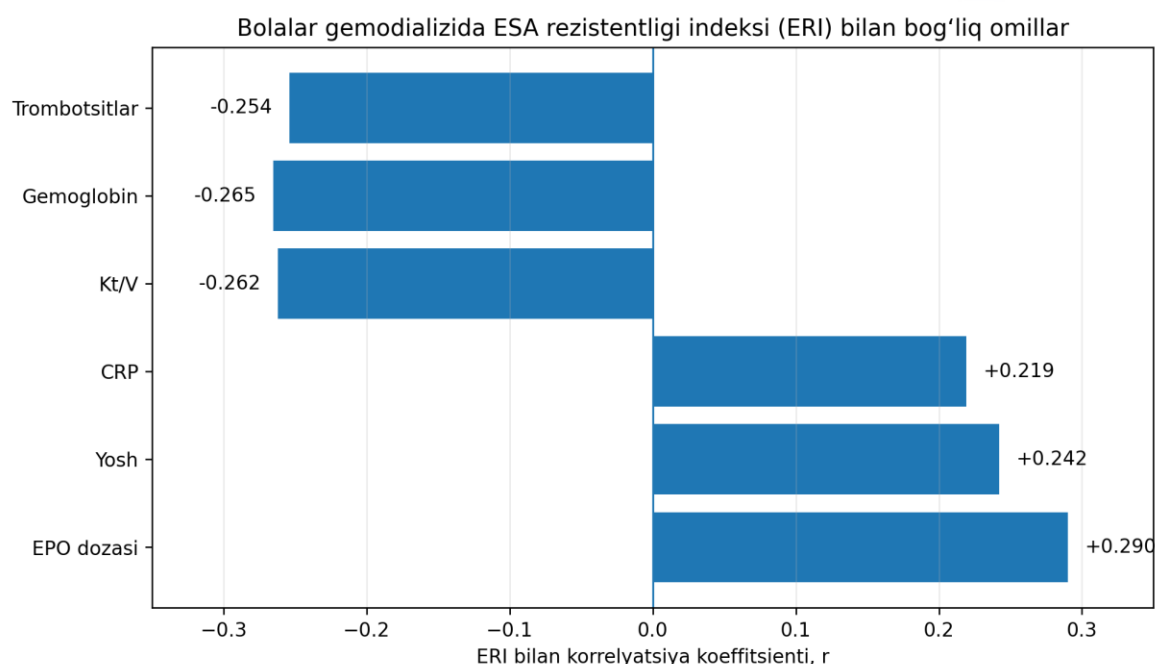
Dalillar sintezi bolalar gemodializida anemiya nazoratining uch asosiy tayanchini ko'rsatdi: funksional yoki absolyut temir yetishmovchiligini aniqlash va tuzatish, ESA ni eng past samarali dozada qo'llash hamda hyporesponsiveness mavjud bo'lsa uning qaytariladigan sabablarini tizimli ravishda izlash.

Ko'rsatkich	Klinik vazifasi	ESA javobi bilan bog'liqlik	Amaliy talqin	Monitoring
Hb	Davolashning asosiy klinik natijasi	Past Hb yuqori ERI bilan bog'liq	Trend bitta qiymatdan muhimroq	ESA boshlangan/o'zgarganda 2–4 hafta
Ferritin + TSAT	Temir mavjudligini baholash	Temir cheklanishi ESA javobini pasaytiradi	HDda KDIGO: ferritin ≤ 500 va TSAT $\leq 30\%$ bo'lsa temirni ko'rib chiqish	Odatda 1–3 oy
CRP	Yallig'lanish markeri	2025 pediatrik HD tadqiqotida ERI bilan $r=0,219$	Yuqori CRP - sababni izlash signali	Klinik vaziyatga ko'ra

Kt/V	Dializ adekvatligi	ERI bilan $r=-0,262$	Past adekvatlik ESA javobini susaytirishi mumkin	Dializ protokoliga muvofiq
PTH/fosfor	CKD-MBD va suyak iligi muhitini baholash	Yuqori PTH/fosfor yuqori ERI bilan bog'langan	Sekundar HPTni nazorat qilish muhim	CKD-MBD protokoli
Albumin/nutritsiya	Protein- energy wastingni aniqlash	Past nutritsiya/albu min yomon ESA javobi bilan bog'liq	Malnutritsiya a- yallig'lanish kompleksini baholash	Davriy

1-jadval. Bolalar gemodializida anemiya va ESA javobini baholash uchun asosiy markerlar.

2025-yilda chop etilgan 80 nafar bolali gemodializ tadqiqotida o'rtacha yosh $8,86 \pm 2,76$ yil va o'rtacha ERI $28,87 \pm 10,62$ bo'lgan. ERI EPO dozasi bilan $r=0,290$ ($P=0,001$), yosh bilan $r=0,242$ ($P=0,031$) va CRP bilan $r=0,219$ ($P=0,049$) musbat bog'langan. Aksincha, Kt/V bilan $r=-0,262$ ($P=0,019$), gemoglobin bilan $r=-0,265$ ($P=0,001$) va trombotsitlar bilan $r=-0,254$ ($P=0,023$) manfiy korrelyatsiya kuzatilgan.



1-diagramma. 80 nafar bolalar gemodializ bemorida ERI bilan bog'liq omillar (2025-yilgi pediatrik tadqiqot ma'lumotlari asosida).

Prediktor	Mexanizm	Dalil	Prognoz yo'nalishi	Korreksiya
Temir yetishmovchiligi / iron-restricted erythropoiesis	Gem sintezi cheklanadi; hepcidin temirni bloklaydi	Pediatrik CKD va KDIGO	ESA javobi yomonlashadi	HDda IV temir, ferritin/TSAT monitoringi
Yallig'lanish (CRP↑)	Hepcidin↑, EPO signaliga qarshilik, eritrotsit umrining qisqarishi	Pediatrik HD: ERI–CRP musbat korrelyatsiya	Yuqori ERI	Infeksiya, kateter va boshqa manbani davolash
Dializ yetarli emas (Kt/V↓)	Uremik toksinlar va yallig'lanish saqlanadi	Pediatrik HD: ERI–Kt/V manfiy korrelyatsiya	Yuqori ERI	Dializ retseptini optimallashtirish
Sekundar giperparatioreoz / fosfor↑	Suyak iligi fibrozisi va eritropoezga salbiy ta'sir	Pediatrik RRT/HD kohortlari	Yuqori ERI	CKD-MBD nazorati

Malnutritsiya / albumin↓	Substrat yetishmovchiligi va inflammation complex	Pediatric va dializ kohortlari	Yuqori ERI	Oziqlanishni baholash va korreksiya
Surunkali qon yo‘qotish	Temir va eritrotsit yo‘qotilishi	Dializ amaliyoti va guideline	Hb pasayishi, ESA ehtiyoji↑	Dializ konturi, GI va boshqa manbalarni izlash

2-jadval. ESA ga past javobni prognozlovchi asosiy omillar va ularning klinik talqini.

Yaqinda e‘lon qilingan 33 nafar renal replacement therapy olayotgan bolalar tadqiqotida o‘rtacha ERI 15,7 IU/kg/hafta/g/dl bo‘lgan. Serum fosfori ERI bilan sezilarli musbat bog‘langan ($r=0,41$; $P=0,016$), yuqori ERI guruhida PTH ham yuqoriroq bo‘lgan. Bu CKD-mineral bone disorder komponentlarini anemiya nazoratining chekka emas, markaziy omillaridan biri sifatida ko‘rish kerakligini ko‘rsatadi.

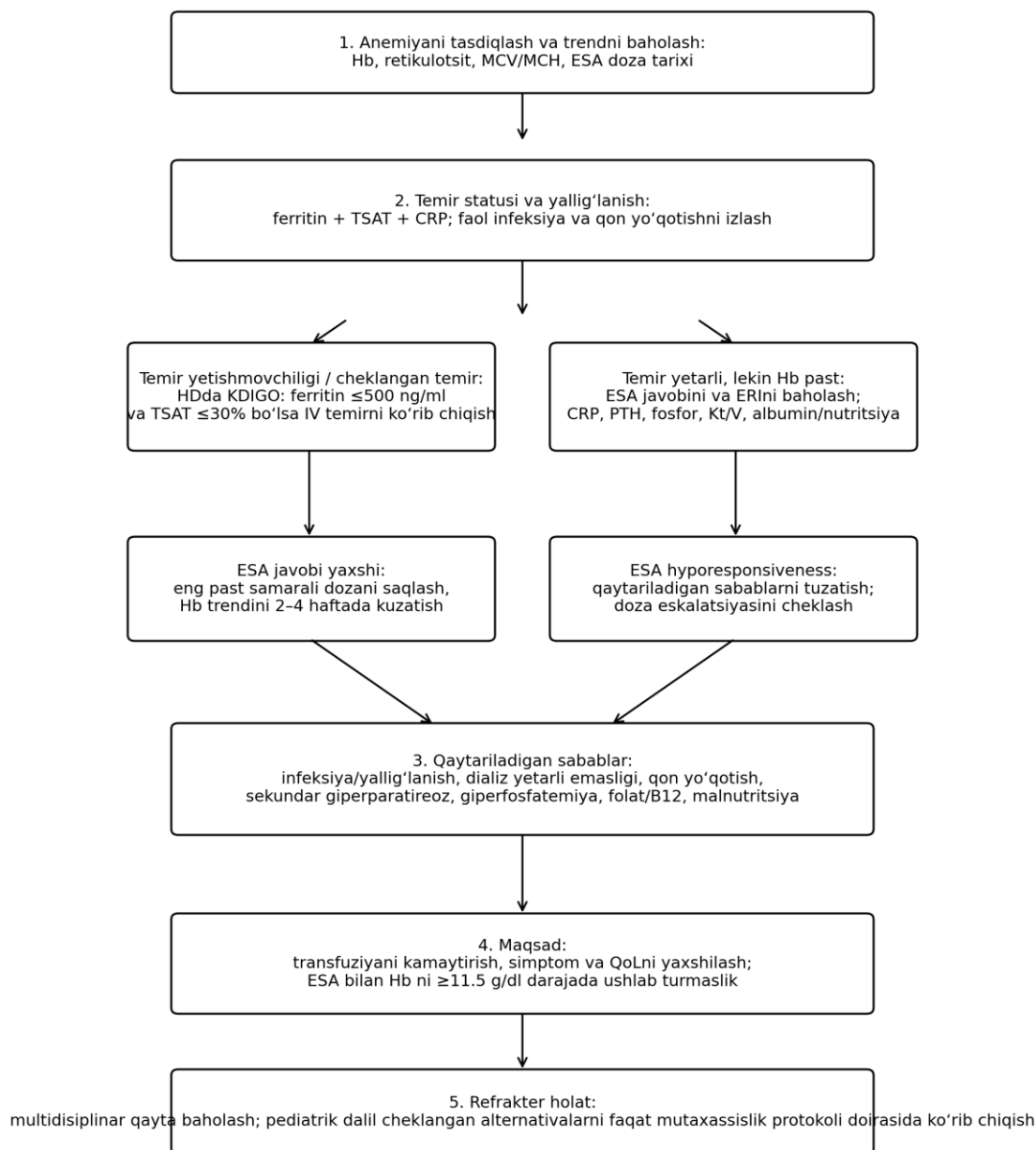
Kengroq pediatric dializ kohortlarida ESA rezistentligining eng kuchli determinantlari dializ adekvatligi ($Kt/V/URR$), PTH, surunkali qon yo‘qotish, normalized protein catabolic rate va malnutritsiya-yallig‘lanish indeksleri bo‘lgan. Bu model shuni ko‘rsatadiki, bolada yuqori ESA dozasiga ehtiyoj ko‘pincha bitta sabab bilan emas, bir nechta tuzatilishi mumkin bo‘lgan omilning yig‘indisi bilan izohlanadi.

KDIGO 2026 nuqtasi	CKD G5HD uchun tavsiya	Pediatric ahamiyati	Amaliy izoh
Temirni boshlash	Ferritin ≤ 500 ng/ml va TSAT $\leq 30\%$	Bolalarga ham tatbiq etiladi	Faol infeksiyada ehtiyot
Temir yo‘li	IV temir oral temirdan afzal	HDda yo‘qotish va so‘rilish muammosini chetlab o‘tadi	Proaktiv va monitoringli yondashuv
Temirni vaqtincha to‘xtatish	Ferritin > 700 ng/ml yoki TSAT $\geq 40\%$ bo‘lsa rutinni ushlash	Temir ortiqchaligini cheklash	Trend va klinik vaziyat muhim

ESA boshlash	HDda boshqa sabablar tuzatilgach, ko'pincha Hb ~9–10 g/dl atrofida foyda-xavfga ko'ra	Bolada individualizatsiya shart	Transfuziyadan qochish va transplantatsiya rejasini hisobga olish
ESA maintenance	Hb $\geq$ 11,5 g/dl ni ESA bilan saqlamaslik	Pediatrik optimal target to'liq aniqlanmagan	Eng past samarali maqsad
ESA hyporesponsiveness	Sabablarni qayta baholash; ortiqcha dose escalationdan qochish	Pediatrik dalillar cheklangan	CRI/PTH/Kt/V/nutritsiya/qon yo'qotishni tekshirish

3-jadval. KDIGO 2026 asosida bolalar gemodializida anemiya boshqaruvining asosiy nuqtalari.

Bolalar gemodializida anemiya va ESA javobini baholash algoritmi



1-rasm. Bolalar gemodializida anemiyaning davolash samaradorligi va ESA javobini baholash algoritmi (mualliflik sxemasi).

MUHOKAMA

Natijalar bolalar gemodializida anemiyaning nazorat qilishni faqat “Hb + ESA doza” juftligi bilan baholash yetarli emasligini ko'rsatadi. Gemoglobin bir vaqtning o'zida ESA dozasi, temir mavjudligi, yallig'lanish, dializ adekvatligi, nutrition va CKD-MBDga

bog'liq yakuniy fenotipdir. Shu sabab Hb past bo'lganda ESA dozasini avtomatik oshirish diagnostik xatoga aylanishi mumkin.

ERI klinik jihatdan qulay ko'rsatkich, chunki u ESA dozasi bilan erishilgan Hb natijasini bitta indeksda birlashtiradi. Biroq ERI uchun pediatriyada universal cut-off mavjud emas. 2025-yilgi bir kohortda o'rtacha ERI 28,87 bo'lgan, boshqa pediatrik RRT ishida 15,7 bo'lgan. Bu farq formulalar, ESA turi, dozani ifodalash, bemor tarkibi va dializ protokollariga bog'liq bo'lishi mumkin. Shu sabab ERI ni absolut "normal/patologik" chegaradan ko'ra bemorning longitudinal trendi sifatida ishlatish kuchliroq yondashuvdir.

Yallig'lanish ESA hyporesponsivenessning markaziy mexanizmlaridan biridir. IL-6-hepcidin yo'li ichakdan temir so'rilishini va makrofaglardan temir chiqishini cheklaydi, natijada ferritin normal yoki yuqori bo'lsa ham eritropoez uchun mavjud temir kamayadi. Shuning uchun "ferritin yuqori — temir yetarli" degan xulosa yallig'lanish fonida noto'g'ri bo'lishi mumkin; TSAT va CRP bilan birgalikda talqin qilish zarur.

Dializ adekvatligi ham anemiya nazorati bilan bevosita bog'liq. Pediatrik kohortlarda Kt/V va URR ESA javobining muhim prediktorlari sifatida qayd etilgan. Yetarli bo'lmagan dializ uremik toksinlar va yallig'lanish stimulusini saqlab, ESA samaradorligini kamaytirishi mumkin. Shuning uchun yuqori ERI dializ retseptini qayta ko'rish uchun ham klinik signal bo'lishi kerak.

Mineral-suyak buzilishlari ko'pincha anemiyadan alohida masala sifatida boshqariladi, biroq pediatrik dalillar PTH va fosfor yuqoriligi ESA rezistentligi bilan bog'liqligini ko'rsatadi. Og'ir sekundar giperparatireoz suyak iligi fibrozi, eritrotsitlar umri va eritropoez muhitiga ta'sir qilishi mumkin. Shu sabab CKD-MBD ni nazorat qilish ESA samaradorligini optimallashtirish strategiyasining bir qismidir.

KDIGO 2026 temir va ESA terapiyasini kattalar va bolalarni qamrab olgan umumiy yondashuv bilan yangiladi. Bolalarda optimal Hb target bo'yicha RCTlar yetishmasligi sababli maqsad individual tanlanadi. Ayniqsa transplantatsiya kutilayotgan bola uchun keraksiz RBC transfuziyani kamaytirish allosensitizatsiyani oldini olish nuqtai nazaridan muhim.

ESA dozasini yuqori darajada eskalatsiya qilishga ehtiyotkorlik zarur. Bolalarda yuqori ESA dozasining sabab yoki xavf markeri ekanini ajratish qiyin, chunki eng og'ir yallig'lanishli bemorlar ham eng katta dozani talab qiladi. Shunga qaramay, zamonaviy qo'llanmalar qaytariladigan sabablarni aniqlamasdan ketma-ket doza oshirishni qo'llab-quvvatlamaydi.

HIF-PHI preparatlari yallig'lanish-hepcidin mexanizmini chetlab o'tuvchi istiqbolli sinfdir. Biroq pediatrik dializda dalillar hozircha juda cheklangan; 13 yoshli ESA-

refrakter gemodializ bemorida roxadustat bilan uzoq muddatli ijobiy natija haqida case-report mavjud, lekin bitta holat umumiy tavsiya berish uchun yetarli emas. Shu sabab pediatrik qo'llash faqat mutaxassislik va mahalliy tartibga muvofiq ko'rib chiqilishi kerak.

Ushbu maqolaning asosiy cheklovi — bolalar gemodializida ESA javobini prognozlashga bag'ishlangan katta prospektiv va randomizatsiyalangan tadqiqotlar kam. Mavjud ishlar namuna hajmi kichik va ERI formulasi heterogen. Keyingi tadqiqotlarda ERI, CRP/hepcidin, Kt/V, PTH/fosfor, iron indices va nutrition markerlarini yagona multivariable modelda longitudinal baholash maqsadga muvofiq.

XULOSA

Bolalar gemodializ bemorlarida anemiyani samarali davolash ESA dozasini oshirishdan ko'ra anemiyaning barcha tuzatilishi mumkin bo'lgan determinantlarini birgalikda boshqarishga asoslanishi kerak. Temir holati, yallig'lanish, dializ adekvatligi, CKD-MBD, oziqlanish va qon yo'qotish bir xil algoritmda baholanishi zarur.

KDIGO 2026 CKD G5HD uchun ferritin ≤ 500 ng/ml va TSAT $\leq 30\%$ bo'lganda temir terapiyasini, boshlang'ich tanlov sifatida IV temirni tavsiya qiladi. ESA terapiyasida Hb ni $\geq 11,5$ g/dl darajada ushlab turish tavsiya etilmaydi; bolalarda individual maqsad klinik foyda, transfuziyadan qochish, hayot sifati va transplantatsiya istiqboli bilan muvozanatlashtirilishi kerak.

ERI ESA javobini miqdoriy kuzatish uchun foydali indeksdir. Pediatrik gemodializ tadqiqotlarida yuqori CRP, yuqori EPO doza, past Kt/V, past Hb, giperfosfatemiya va yuqori PTH ESA hyporesponsiveness bilan bog'langan. ERI trendining oshishi doza eskalatsiyasidan oldin qaytariladigan sabablarni izlashga signal sifatida ishlatilishi mumkin.

Kelajakdagi klinik model Hb + ERI + iron indices + CRP + Kt/V + PTH/fosfor + nutrition ko'rsatkichlarini birlashtirgan dinamik risk algoritmgiga asoslanishi kerak. Bunday yondashuv ESA yukini kamaytirish, transfuziyani cheklash va bolalarning funksional hamda transplantatsion natijalarini yaxshilashga yordam berishi mumkin.

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NEUROCYSTICERCOSIS: A CONTEMPORARY REVIEW OF EPIDEMIOLOGY, PATHOGENESIS, DIAGNOSIS, AND MANAGEMENT

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Abstract

Neurocysticercosis (NCC), infection of the central nervous system by the larval stage of the pork tapeworm *Taenia solium*, is the most common parasitic disease of the human brain and the leading preventable cause of acquired epilepsy worldwide. Endemic across Latin America, sub-Saharan Africa, and much of Asia, it has become an increasingly frequent imported disease in high-income countries through migration and travel. Clinical expression ranges from silent calcified granulomas to life-threatening cysticercotic encephalitis, ventricular obstruction, and stroke, depending on parasite burden, evolutionary stage, anatomic compartment, and host immune response. Diagnosis rests on neuroimaging interpreted in epidemiological and clinical context, supported by antibody and antigen assays and, increasingly, molecular methods. Management is compartment-specific: antiparasitic drugs (albendazole, praziquantel) with corticosteroid cover for viable disease, antiepileptic therapy for seizures, and neurosurgical or endoscopic intervention for hydrocephalus and extraparenchymal cysts. Because NCC is fundamentally a product of human–pig–environment transmission, control programs combining treatment of human tapeworm carriers, porcine vaccination, and sanitation improvement offer a realistic path toward elimination. This review synthesizes current evidence on the epidemiology, life cycle, pathogenesis, clinical spectrum, diagnosis, treatment, and prevention of NCC, highlighting both the progress of the last four decades and the persistent gaps in evidence and implementation.

1. Introduction: The Most Common Brain Parasite You Have Never Seen

Few diseases so neatly expose the unequal geography of human health as neurocysticercosis. It is at once a leading cause of seizures among billions of people in the developing world and a diagnostic surprise in the emergency departments of New York, London, or Sydney, where it appears as an imported illness in patients from endemic regions. The World Health Organization classifies cysticercosis among the neglected tropical diseases and estimates that *T. solium* causes a substantial share — often quoted at 30% or more — of the burden of acquired epilepsy in endemic settings, with some African studies attributing up to half of late-onset seizures to this single, fully preventable infection.

The clinical arc of NCC is inextricably tied to its biology. Humans develop neurocysticercosis not by eating pork, as folk wisdom sometimes holds, but by ingesting microscopic tapeworm eggs — usually through food or water contaminated with human feces from a tapeworm carrier, occasionally through autoinfection. Once swallowed, the eggs release oncospheres that cross the intestinal wall, enter the bloodstream, and lodge preferentially in the brain, where each develops into a fluid-filled bladder worm (*Cysticercus cellulosae*) roughly a centimeter across. A single asymptomatic person with intestinal taeniasis, shedding eggs in an environment of poor sanitation and free-roaming pigs, can seed an entire community. The disease, in other words, is a mirror of sanitation, poverty, and food systems — which is also why it is, in principle, eradicable.

2. The Parasite and Its Life Cycle

Taenia solium is a cestode with a two-host life cycle in which humans are the definitive (intestinal) host and pigs the usual intermediate host. The adult tapeworm, which can live for years in the human small intestine, releases gravid proglottids containing thousands of eggs; these are passed in feces and contaminate soil, water, and food. Pigs scavenging in such environments ingest the eggs, and larvae encyst in porcine muscle. Humans who eat undercooked 'measly pork' acquire the adult worm — taeniasis, usually a mild or unnoticed intestinal infection. Critically, when humans ingest eggs directly, they act as dead-end intermediate hosts: oncospheres disseminate hematogenously and encyst in human tissue, most dangerously in brain, but also in skeletal muscle, subcutaneous tissue, and eye.

This dual-path transmission explains two of NCC's most characteristic epidemiological features. First, the infection is maintained by human fecal contamination, not by pork consumption — a fact of central importance for prevention. Second, cases cluster in settings where pigs have access to human feces and where open defecation or

inadequate sewage treatment is common; gender and occupation then shape risk, with agricultural workers and women who raise pigs in many endemic communities bearing disproportionate exposure.

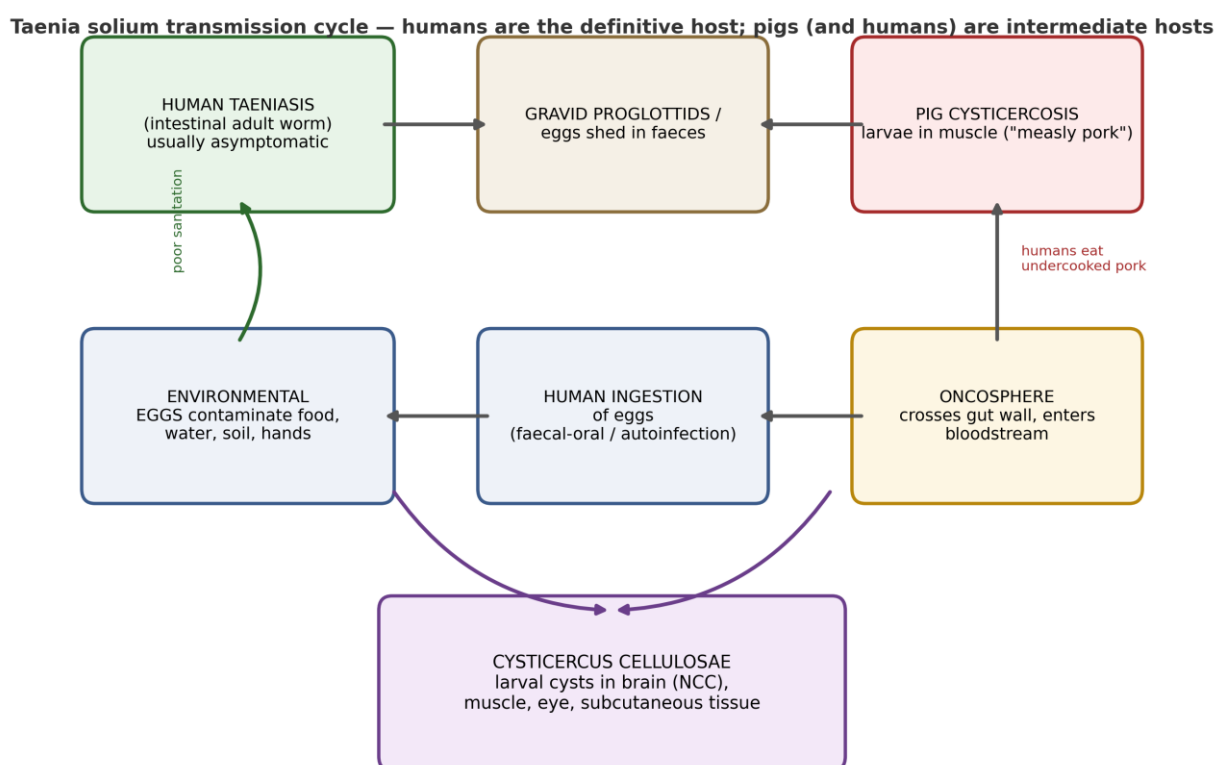


Figure 1. Transmission cycle of *Taenia solium*. Humans acquire neurocysticercosis by ingesting eggs (faecal–oral route), not by eating pork.

3. Pathogenesis and the Four Evolutionary Stages

The living cysticercus is a remarkably successful immunological evader. Its bladder wall secretes antigens that modulate the host response, and viable cysts provoke little inflammation — many people carry silent lesions for life. Disease begins when the parasite dies or degenerates, releasing antigenic material that ignites a vigorous inflammatory cascade involving $\text{TNF-}\alpha$, IL-6, $\text{IFN-}\gamma$, and complement. In the brain parenchyma this perilesional inflammation lowers the seizure threshold and produces the clinical picture most clinicians recognize: new-onset focal seizures, sometimes with Todd's paresis, in a young or middle-aged adult.

Pathologically and radiologically, parenchymal cysts pass through four stages. The vesicular (viable) cyst is a thin-walled, CSF-isodense bladder often containing the invaginated scolex — the pathognomonic 'hole-with-dot' on imaging. In the colloidal stage the parasite degenerates: the cyst fluid becomes turbid, the wall thickens and

irregularly enhances, and perilesional edema appears, clinically announcing itself with seizures. The granular-nodular stage shows a shrinking, solidifying nodule with waning inflammation, and finally the calcified (inactive) stage leaves a dense granuloma — visible on CT but often MRI-invisible — that can nonetheless periodically inflame and provoke recurrent seizures years later. Extraparenchymal disease follows a different logic: cysts in the ventricles and basal subarachnoid cisterns cause mechanical obstruction and chronic inflammation rather than seizures, and the multilobulated 'racemose' form in the basal cisterns behaves like an expanding, poorly treatable mass.

Natural evolution of a parenchymal cysticercus over months to years

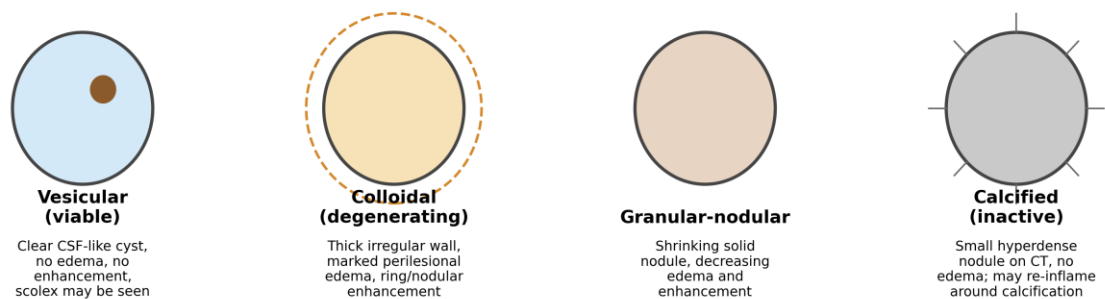


Figure 2. The four evolutionary stages of a parenchymal cysticercus, from viable vesicular cyst to calcified nodule, with corresponding imaging behavior.

Table 1. Imaging characteristics of the four evolutionary stages of parenchymal neurocysticercosis.

Stage	CT appearance	MRI appearance	Clinical correlate
Vesicular (viable)	Round hypodense cyst, no enhancement, $\pm$ scolex	CSF signal on all sequences; scolex bright on T1	Usually asymptomatic; incidental finding
Colloidal (degenerating)	Ill-defined lesion with ring/nodular enhancement, edema	Thick hypointense wall, perilesional FLAIR edema, dense enhancement	Seizures; focal deficits; headaches

Granular-nodular	Shrinking enhancing nodule, decreasing edema	Solid nodule, decreasing enhancement	Resolving inflammation
Calcified (inactive)	Small hyperdense nodule; CT-sensitive	Often invisible; blooming on GRE/SWI	Silent; may re-inflame → late recurrent seizures

4. Clinical Manifestations

No single symptom defines NCC; the illness is a chameleon whose presentation depends on the number and stage of cysts, their compartment, and the vigor of the host response. Seizures dominate — reported in roughly 70% or more of symptomatic patients and as the presenting feature in most series — and constitute the disease's principal global burden through epilepsy. Headaches, focal neurological deficits, and signs of intracranial hypertension follow. In the ventricles, a freely mobile cyst can intermittently obstruct CSF flow, producing episodic positional headache and drop attacks ('Bruns syndrome') before culminating in obstructive hydrocephalus. In the subarachnoid space, chronic inflammation causes arachnoiditis and vasculitis, which can infarct vessels in the circle of Willis and present as stroke — a presentation that has repeatedly masqueraded as atheroembolic disease in non-endemic emergency departments.

Two special syndromes deserve emphasis. Cysticercotic encephalitis, seen mostly in children and young women with massive infections, is a diffuse inflammatory cerebral edema with altered consciousness and papilledema that is a genuine neurological emergency; paradoxically, antiparasitic drugs are contraindicated in the acute phase because killing the parasites would worsen the swelling. Ocular and spinal cysticercosis are rare but sight- or cord-threatening; an intraocular cyst must be removed surgically before any antiparasitic therapy, since drug-induced death of the parasite can destroy the eye.

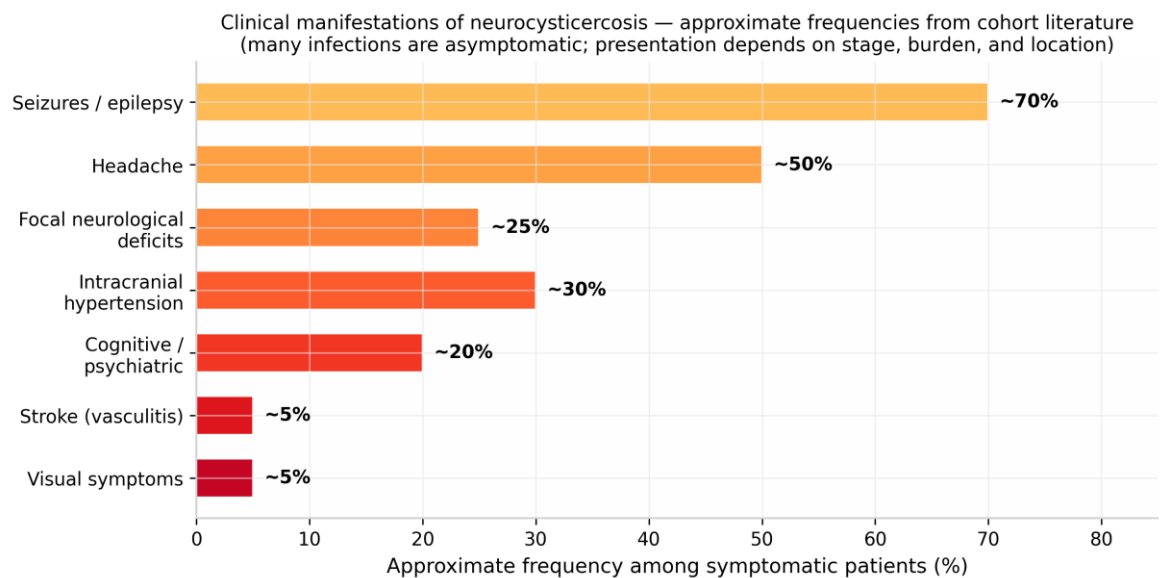


Figure 3. Approximate frequency of clinical manifestations among symptomatic neurocysticercosis patients, compiled from published cohorts.

Table 2. Clinical phenotypes of neurocysticercosis by anatomic compartment.

Compartment	Typical presentation	Imaging hallmark	Prognosis
Parenchymal	Seizures, focal deficits, headache	Cyst(s) at gray–white junction; stages as in Table 1	Good; epilepsy may persist after cure
Intraventricular	Obstructive hydrocephalus, Bruns syndrome	Mobile CSF-isointense cyst; best seen on CISS/FIESTA MRI	Variable; may require shunt ± endoscopy
Subarachnoid (racemose)	Chronic meningitis, cranial neuropathies, stroke (vasculitis), hydrocephalus	Multilobulated basal cistern cysts, leptomeningeal enhancement	Poor; high relapse and mortality
Cysticercotic encephalitis	Diffuse edema, coma, raised ICP	Hundreds of small cysts, diffuse edema	Severe; steroids first, avoid antiparasitics acutely

Spinal	Radiculopathy, myelopathy	Intramedullary or leptomeningeal cysts	Variable; surgical decompression if compressive
Ocular	Visual loss, floaters	Intraocular cyst on slit-lamp/US	Remove before antiparasitics; vision loss risk

5. Diagnosis

Definitive diagnosis integrates epidemiological exposure, clinical picture, neuroimaging, and laboratory confirmation. MRI is the most sensitive modality — superior for small, ventricular, brainstem, and racemose cysts and for demonstrating perilesional edema — while non-contrast CT remains unmatched for detecting calcifications and remains the pragmatic mainstay where MRI is unavailable. A thin-walled cyst with an eccentric scolex ('hole-with-dot') is diagnostic in context, and the coexistence of lesions in different evolutionary stages strongly supports NCC. For extraparenchymal disease, heavily T2-weighted CSF-sensitive sequences (CISS/FIESTA) are essential because these cysts are otherwise nearly invisible.

Serology supports but rarely clinches the diagnosis. The enzyme-linked immunoelectrotransfer blot (EITB) on serum approaches 100% sensitivity in multiple-active-cyst and extraparenchymal disease but falls substantially with single parenchymal lesions or calcifications alone; CSF antibody testing is more sensitive but invasive. Antigen-detection assays (monoclonal antibody ELISA) detect viable parasite burden and are increasingly used for monitoring treatment response, particularly in subarachnoid disease, and PCR methods offer near-perfect specificity where validated. Stool examination identifies the adult tapeworm in only a minority of NCC patients and cannot exclude the diagnosis. Formal diagnostic criteria — integrating absolute, major, minor, and epidemiological criteria, as proposed by Del Brutto and colleagues — remain useful for research and for standardizing care in resource-limited settings.

Table 3. Diagnostic tests in neurocysticercosis — performance and practical roles.

Test	Sensitivity	Specificity	Role / limitation
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MRI (with CISS/FIESTA)	High (best for ventricular/subarachnoid)	High	Modality of choice; limited access/cost in endemic areas
Non-contrast CT	High for calcifications; moderate for viable cysts	Moderate–high	Best for calcified stage; poor for basal cisterns
Serum EITB (antibody)	~100% with multiple active cysts; low with single/calcified lesions	~100%	Excellent confirmatory test; insensitive in light disease
CSF antibody ELISA/EITB	Higher than serum in single lesions	Moderate–high	Requires lumbar puncture; avoid with mass effect
Antigen ELISA (serum/CSF)	Correlates with viable burden	High	Useful for diagnosis and treatment monitoring
PCR (CSF/tissue)	Variable; near-100% specificity	~100%	Reference standard where available; not routine
Stool microscopy	10–15% positive	High if positive	Detects tapeworm carriage; negative result excludes nothing

6. Treatment: Matching Therapy to Compartment and Stage

Modern management of NCC rests on three pillars used in combination: antiepileptic drugs for seizure control, antiparasitic therapy with anti-inflammatory cover, and surgery for mechanical complications. Albendazole (15 mg/kg/day in divided doses, typically for

8–15 days) is the first-line cysticidal drug; it achieves better CSF penetration than praziquantel (50 mg/kg/day) and, per the 2017 IDSA/ASTMH guidelines, is used as monotherapy for one or two viable parenchymal cysts and combined with praziquantel when more than two viable cysts are present. Killing parasites provokes inflammation, so corticosteroids — dexamethasone or prednisolone — are given concomitantly and tapered carefully, a precaution that is not optional in subarachnoid disease. Cure rates with single courses are humbling (on the order of 60% parasite reduction and 40% complete clearance), so retreatment is common, and drug interactions matter: antiepileptics lower praziquantel levels, and corticosteroids lower them further, while cimetidine can partially compensate.

Several phenotypes require deviating from the standard recipe. Single enhancing (degenerating) lesions usually resolve spontaneously within months and are managed with antiepileptics, often with a short corticosteroid course; the role of antiparasitics here remains debated, though evidence leans toward benefit for seizure control. Calcified lesions need no cysticidal therapy, but transient perilesional edema around calcifications is a recognized cause of breakthrough seizures, responsive to short steroid bursts. Subarachnoid and racemose disease demand prolonged courses — albendazole for a month or more with long, carefully tapered steroids — and historically carried high fatality without this aggressive approach; some centers add methotrexate as a steroid-sparing agent. Ventricular cysts with hydrocephalus are primarily a neurosurgical problem: CSF diversion (shunting) with endoscopic cyst removal where feasible, rather than upfront medication. Massive infection with encephalitis is treated with steroids, mannitol, and sometimes decompressive craniectomy — withholding antiparasitics until the swelling subsides.

Table 4. Compartment- and stage-specific management of neurocysticercosis (synthesized from IDSA/ASTMH 2017 and WHO guidance; doses in text).

Phenotype	Antiparasitic therapy	Anti-inflammatory	Surgery / other	Antiepileptics
1–2 viable parenchymal cysts	Albendazole 15 mg/kg/day × 8–15 days	Dexamethasone/prednisolone during & taper	Not indicated	Yes, duration individualized

>2 viable parenchymal cysts	Albendazole + praziquantel combined	Mandatory	Not indicated	Yes
Single enhancing lesion	Controversial; many treat with albendazole	Short course benefits seizure control	Not indicated	Yes; most can taper after resolution
Calcified lesions	None	Short bursts for perilesional edema	None	Yes; treat breakthrough seizures
Subarachnoid / racemose	Prolonged albendazole (≥ 1 month), repeated courses	Long-course steroids $\pm$ methotrexate	Selective; shunt for hydrocephalus	As needed
Intraventricular	Defer until CSF flow restored	As needed	Endoscopic removal $\pm$ VP shunt	As needed
Encephalitis (massive)	Withhold acutely	High-dose steroids, mannitol	Decompression if malignant edema	Yes
Ocular	Never before removal	None intraocular	Surgical removal first	N/A

7. Prevention and Control: A Genuinely Eradicable Disease

Unlike most causes of epilepsy, neurocysticercosis can be eliminated. Transmission requires only that tapeworm eggs from human feces reach pigs or other humans — an entirely interruptible chain. The logical control package combines treatment of human tapeworm carriers (mass or targeted administration of praziquantel or niclosamide),

prevention of pig infection (vaccination of pigs with the TSOL18 antigen combined with oxfendazole treatment, or total confinement of pigs away from human feces), meat inspection, and investment in sanitation and hygiene education. Field trials in Peru and elsewhere have demonstrated dramatic, sometimes near-elimination-level, reductions in porcine and human transmission within years of combined intervention, and mathematical models suggest that sustained joint human–pig measures could locally break transmission entirely. The One Health framing — recognizing that human, animal, and environmental health are one system — has moved cysticercosis control from aspiration to demonstrated feasibility, even if funding and political attention remain inadequate relative to the burden.

8. Gaps, Controversies, and Future Directions

For all its clinical importance, NCC care still rests on a surprisingly thin evidence base. Few randomized trials exist; most treatment recommendations carry low-certainty evidence, and fundamental questions — optimal drug dosing and duration, whether combination therapy improves hard outcomes, how long antiepileptics should continue after lesion resolution, and how best to modulate inflammation during parasite death — remain incompletely answered. Pharmacokinetic variability in albendazole sulfoxide and praziquantel, compounded by interactions with antiepileptics and steroids, argues for therapeutic drug monitoring as a research priority. On the diagnostic front, validated point-of-care antigen tests and quantitative PCR could transform management in endemic regions where CT and MRI are luxuries. And the epileptogenic scar left by calcified NCC — why some patients remain seizure-free after cure while others develop chronic epilepsy — offers a tractable model for understanding post-inflammatory epileptogenesis more broadly.

9. Conclusion

Neurocysticercosis condenses an entire world of medicine into one disease: a parasite of poverty that is also a disease of migration; a cause of seizures that is also a cause of stroke, hydrocephalus, and blindness; an illness that is simultaneously undertreated in endemic villages and over-feared everywhere else. The modern framework — staging by imaging, compartment-specific therapy combining albendazole, praziquantel, corticosteroids, antiepileptics, and judicious surgery — has transformed outcomes for the individual patient. The larger prize, however, lies beyond the clinic: because NCC persists only where human feces, pigs, and eggs meet, it belongs to the short list of human

neurological diseases that sanitation, veterinary science, and political will can actually abolish. Until that day, every unexplained new-onset seizure in a patient from an endemic region, and every mysterious hydrocephalus or 'cryptogenic' stroke, should prompt a single question: could this be cysticercosis?

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**МЕДИЦИНА, ПЕДАГОГИКА И ТЕХНОЛОГИЯ:
ТЕОРИЯ И ПРАКТИКА**

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