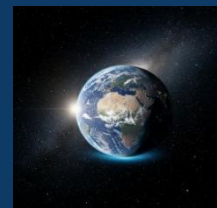




QUALITY IN SPORT

eISSN 2450-3118 · Open Access · Peer-reviewed

apcz.umk.pl/QS Nicolaus Copernicus University in Toruń



JAGIELŁO, Weronika, LE HONG, Natalia, DYMEL, Natalia, JANKOWSKA, Natasza, KUKUCZKA, Karolina, KARPIŃSKA, Gabriela, KĘDZIOR, Kamila and KRZYKAWSKA, Sonia. Operational Definitions and Case Ascertainment of Alveolar Osteitis After Tooth Extraction: A Structured Narrative Review and Methodological Implications for Sports Dentistry. *Quality in Sport*. 2026;75:75915. <https://doi.org/10.12775/QS.2026.75.75915>

ARTICLE TIMELINE

Received: 07.09.2026. Accepted: 16.09.2026. Published: 22.09.2026.

The journal has been awarded 20 points in the parametric evaluation by the Polish Ministry of Higher Education and Science (Annex to the announcement of 05.01.2024, No. 32553). Unique Journal Identifier: 201398. Scientific disciplines assigned: Economics and Finance (Field of Social Sciences); Management and Quality Sciences (Field of Social Sciences).

Punkty Ministerialne z 2019 – aktualny rok 20 punktów. Załącznik do komunikatu Ministra Szkolnictwa Wyższego i Nauki z dnia 05.01.2024 Lp. 32553. Posiada Unikatowy Identyfikator Czasopisma: 201398. Przypisane dyscypliny naukowe: Ekonomia i finanse (Dziedzina nauk społecznych); Nauki o zarządzaniu i jakości (Dziedzina nauk społecznych). © The Authors 2026.

OPEN ACCESS · CC BY-NC-SA 4.0 This article is published with open access under the License Open Journal Systems of Nicolaus Copernicus University in Toruń, Poland, and is distributed under the terms of the Creative Commons Attribution Non-commercial Share Alike License (<http://creativecommons.org/licenses/by-nc-sa/4.0/>), which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the work is properly cited. The authors declare no conflict of interest regarding the publication of this paper.

OPERATIONAL DEFINITIONS AND CASE ASCERTAINMENT OF ALVEOLAR OSTEITIS AFTER TOOTH EXTRACTION: A STRUCTURED NARRATIVE REVIEW AND METHODOLOGICAL IMPLICATIONS FOR SPORTS DENTISTRY

Authors:

Weronika Jagiello¹ [WJ]

5th Military Clinical Hospital with Polyclinic - Independent Public Healthcare Institution, Krakow, Poland

ORCID ID: <https://orcid.org/0009-0000-5200-9208>

e-mail: weronikajagiello@o2.pl

Natalia Le Hong [NLH]

5th Military Clinical Hospital with Polyclinic - Independent Public Healthcare Institution, Krakow, Poland

ORCID ID: <https://orcid.org/0009-0000-0540-8222>

e-mail: natalialehong@gmail.com

Natalia Dymel [ND]

5th Military Clinical Hospital with Polyclinic - Independent Public Healthcare Institution, Krakow, Poland

ORCID ID: <https://orcid.org/0009-0009-3928-5393>

e-mail: Natalia6545@gmail.com

Natasza Jankowska [NJ]

5th Military Clinical Hospital with Polyclinic - Independent Public Healthcare Institution, Krakow, Poland

ORCID ID: <https://orcid.org/0009-0009-0491-3716>

e-mail: jankowskanatasza@gmail.com

¹ Corresponding Author: e-mail: weronikajagiello@o2.pl

Karolina Kukuczka [KKu]

Independent Researcher, Krakow, Poland

ORCID ID: <https://orcid.org/0009-0006-6436-3718>

e-mail: carolina.kaa@onet.pl

Gabriela Karpińska [GK]

HCP Medical Center Ltd., Poznan, Poland

ORCID ID: <https://orcid.org/0009-0007-2185-2586>

e-mail: g.karpinska13@gmail.com

Kamila Kędzior [KKe]

Independent Researcher, Krakow, Poland

ORCID ID: <https://orcid.org/0009-0007-4562-3825>

e-mail: kedziorkamila97@gmail.com

Sonia Krzykawska [SK]

University Dental Clinic in Krakow, Krakow, Poland

ORCID ID: <https://orcid.org/0009-0001-3577-014X>

e-mail: sonia.krzykawska2001@gmail.com

Abstract

Background. Alveolar osteitis (AO) is a painful post-extraction complication, but its terminology, diagnostic criteria, timing, and case-ascertainment procedures are heterogeneous.

Aim. To synthesize how AO is operationally defined and identified in clinical studies and to discuss implications for reproducibility and sports-dentistry research.

Material and methods. This structured narrative review was informed by broad searches of six bibliographic databases (MEDLINE via PubMed, Embase, CENTRAL, Scopus, Web of Science, and LILACS) through 1 September 2026. Source selection for narrative discussion was purposive and prioritized reports with explicit diagnostic rules, timing, ascertainment, examiner procedures, or unit-of-analysis information. The review was not conducted as a prospectively locked systematic-review workflow.

Results. Definitions variably combined postoperative pain with clot loss/disintegration, an empty socket, exposed bone, halitosis, and different timing rules. Ascertainment pathways, examiner standardization, diagnostic units, denominators, and handling of within-patient clustering also varied.

Conclusions. AO research should report explicit case logic, symptom-onset windows, assessment schedules, ascertainment pathways, examiner procedures, and analytic units. These principles are relevant to athlete oral-health research, although evidence does not support AO as a sport-specific disorder.

Keywords: alveolar osteitis; dry socket; narrative review; operational definition; case ascertainment; sports dentistry

1. Introduction

Alveolar osteitis (AO), commonly termed dry socket, is a painful complication of tooth extraction characterized by disturbed socket healing and, in many descriptions, severe postoperative pain associated with partial or complete loss or disintegration of the blood clot. Reported incidence varies across clinical settings and is generally higher after mandibular third-molar surgery than after routine extraction. The literature has traditionally concentrated on risk factors, prevention, and management, whereas the diagnostic construct itself has received less methodological attention (Chow et al. 2020; Daly et al. 2022).

AO has not been operationalized uniformly. Historical labels include dry socket, alveolar osteitis, localized osteitis, and fibrinolytic alveolitis. Definitions have variably emphasized pain, increasing or analgesic-refractory pain, clot loss or disintegration, an empty socket, exposed bone, halitosis, debris, local inflammation, and the postoperative interval. A frequently cited formulation centers on increasing pain within 1–3 days after extraction together with partial or total disintegration of the blood clot, with or without halitosis (Blum 2002). Subsequent reviews continued to identify competing formulations and inconsistent terminology (Kolokythas et al. 2010; Ghosh et al. 2022). Existing reviews have largely emphasized etiology, prevention, and management; comparatively less attention has been paid

to the operational architecture of diagnosis, case ascertainment, and the statistical unit used when AO is analyzed as an outcome.

Diagnostic heterogeneity is not limited to wording. Cases can be identified through scheduled postoperative examinations, symptom-triggered return visits, telephone contact, questionnaires, retrospective chart review, database-based review, or hybrid pathways. Examiner identity, training, calibration, blinding, and inter-rater reliability may be incompletely reported. The diagnostic unit may be the patient, tooth, socket, procedure, or postoperative episode. When multiple teeth or sockets from the same patient are analyzed, observations are correlated and should not automatically be treated as statistically independent (Litaker et al. 2013).

These differences matter because reproducibility requires both an explicit case rule and a sufficiently transparent pathway by which cases are detected. Differences in reported AO incidence cannot be attributed to diagnostic definition alone: population characteristics, tooth type, surgical difficulty, prophylaxis, smoking, operator factors, follow-up intensity, and historical context may also influence observed risk or case capture. A narrative review is therefore useful for examining the conceptual and reporting architecture of AO diagnosis without implying that methodological variation alone causes between-study differences.

Although AO is not a sport-specific disorder, the topic has a limited but defensible relevance to sports dentistry. Oral-health problems have been associated with adverse self-reported effects on training and performance among athletes, and sports-dentistry consensus work supports integration of oral care into sports medicine (Gallagher et al. 2018; Stamos et al. 2020). If tooth extraction and postoperative complications are evaluated in athlete populations, inconsistent AO definitions or follow-up pathways could make results difficult to compare. The purpose of this review is therefore to synthesize recurring AO diagnostic concepts and ascertainment practices, identify methodological weaknesses that limit

reproducibility, and outline practical reporting principles applicable to general dental research and, where relevant, athlete-focused oral-health care.

2. Review approach

This structured narrative review was developed from a broad literature-search corpus originally assembled to examine AO case definitions and ascertainment. Searches covered MEDLINE (Medical Literature Analysis and Retrieval System Online) via PubMed, Embase, CENTRAL (Cochrane Central Register of Controlled Trials), Scopus, Web of Science Core Collection, and LILACS (Literatura Latinoamericana y del Caribe en Ciencias de la Salud) through 1 September 2026 without date or language restrictions. Search concepts included "alveolar osteitis" or "dry socket" together with terms related to diagnosis, case definition, operational definition, case ascertainment, incidence, and tooth extraction. For narrative consideration, priority was given to primary human clinical reports in which AO functioned as an outcome, complication, eligibility condition, or treatment-entry diagnosis and that provided information relevant to case definition, timing, ascertainment, examiner procedures, diagnostic or analytic unit, or clustering. Reviews and methodological sources were used to provide conceptual context (Blum 2002; Kolokythas et al. 2010; Litaker et al. 2013; Murad and Wang 2017; Chow et al. 2020; Page et al. 2021; Rethlefsen et al. 2021; Daly et al. 2022; Ghosh et al. 2022).

The present article is deliberately framed as a narrative review rather than a completed systematic review or prevalence-oriented meta-research study. The initial literature workflow was not completed with prospectively locked full-text eligibility assessment of the entire search-retained corpus, duplicate independent screening, or a reproducible probability-based sampling procedure. Consequently, retrospective PRISMA record counts or a flow diagram would overstate the completeness of the process. PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) 2020, PRISMA-S (an extension to PRISMA for

reporting literature searches), and meta-epidemiological reporting recommendations informed parts of the earlier search and coding framework (Murad and Wang 2017; Page et al. 2021; Rethlefsen et al. 2021), but compliance with those frameworks is not claimed here. The narrative structure was additionally checked against the domains emphasized by SANRA (Scale for the Assessment of Narrative Review Articles), including justification of the review, statement of aims, description of the literature search, referencing, scientific reasoning, and presentation of relevant endpoints (Baethge et al. 2019).

Source selection for discussion was purposive rather than frequency-based. Priority was given to reports that provided explicit case definitions, clinically distinctive diagnostic rules, informative timing or ascertainment procedures, examiner-standardization information, or examples illustrating unit-of-analysis and clustering problems. No formal risk-of-bias instrument, diagnostic-accuracy meta-analysis, or certainty-of-evidence grading was applied because the objective was conceptual and methodological synthesis rather than estimation of intervention effects or diagnostic performance. Accordingly, statements in this review describe recurring patterns and illustrative examples rather than literature-wide prevalence estimates. Absence of reporting is interpreted as absence of reported information, not proof that a procedure was not performed.

3. Narrative synthesis

3.1 Terminology and the conceptual boundaries of alveolar osteitis

The literature uses several labels for overlapping postoperative socket-healing phenomena. The term dry socket is common in clinical reports, while alveolar osteitis, localized osteitis, and fibrinolytic alveolitis appear in older and contemporary sources. Terminological variation is not merely semantic because different labels have sometimes been paired with different symptom and sign requirements (Blum 2002; Kolokythas et al. 2010;

Ghosh et al. 2022). A report may therefore use a familiar disease name without providing enough information to reconstruct how a patient was actually classified.

A useful distinction is between descriptive phenotype and operational definition. Background sections often describe the classic combination of delayed postoperative pain, clot loss, an empty socket, or exposed bone, but such prose does not necessarily define the study outcome. For reproducibility, the operational rule should be identifiable in the Methods, eligibility criteria, outcome definition, questionnaire, or an explicitly adopted external definition. For example, recognizable background descriptions should not automatically be treated as the actual classification algorithm (Requena-Calla and Funes-Rumiche 2016; Nagaja et al. 2024), while AO has also been used as a treatment-entry label without a component-level rule in the material reviewed for this manuscript (Chybicki and Janas-Naze 2022).

3.2 Core diagnostic components and Boolean logic

Pain appears repeatedly across many AO formulations, but its specification varies substantially. Some definitions require increasing pain, severe or throbbing pain, pain not adequately relieved by analgesics, or pain beginning after an initially less symptomatic period. Others simply require postoperative pain in association with local socket findings. The socket component may be expressed as partial or complete clot loss, clot disintegration, an empty socket, exposed or denuded bone, or a combination of these findings (Blum 2002; King et al. 2018; Shad et al. 2018; Iqbal et al. 2023; Erinoso et al. 2024). Halitosis appears in multiple descriptions but may be optional rather than mandatory (Blum 2002; Shad et al. 2018).

Boolean logic is therefore as important as the component list. A rule requiring pain AND an empty socket is not equivalent to a rule allowing pain plus either clot loss OR exposed bone, and neither is equivalent to a broad clinician-diagnosed disturbed-healing phenotype. One randomized trial required increasing pain 2–3 days after extraction together

with clot disintegration leading to an empty socket and denuded bone, with or without halitosis (Shad et al. 2018). Another used a pain-plus-empty-socket construct with a pain threshold and scheduled assessments (Iqbal et al. 2023). A further study referred to Blum-related criteria while operationalizing analgesic-refractory throbbing pain at 48–72 hours plus either a resorbed clot or bare bone on probing (Erinoso et al. 2024). A treatment trial required both pain and exposed bone for eligibility, representing a narrower construct than definitions in which exposed bone is supportive or optional (King et al. 2018).

Table 1. Recurrent operational families of alveolar osteitis definitions in the reviewed literature

Definition family	Typical elements	Main interpretive issue	Illustrative sources
Broad disturbed-healing phenotype	AO/dry socket diagnosed without a fixed symptom-sign combination	High clinical flexibility but limited reproducibility if no explicit threshold or rule is stated	(Blum 2002; Kolokythas et al. 2010; Ghosh et al. 2022)
Pain plus clot loss or empty socket	Postoperative pain combined with clot disintegration, clot loss, or an empty socket; timing may be specified	Close to commonly cited classic formulations, but pain threshold and timing still vary	(Blum 2002; Shad et al. 2018; Iqbal et al. 2023)
Pain plus exposed bone	Pain together with denuded/exposed alveolar bone or wall	Narrower construct; may classify a different clinical subset than rules not requiring exposed bone	(King et al. 2018; Erinoso et al. 2024)
Multicomponent or alternative rule	Pain plus mandatory and/or alternative socket findings, sometimes with halitosis or other supportive features	Interpretation depends on explicit AND/OR/optional logic rather than on the list of features alone	(Hita-Iglesias et al. 2008; Hoaglin and Lines 2013; Ghaemina et al. 2017; Shad et al. 2018; Yüce and Kömerik 2019; Erinoso et al. 2024)

AO, alveolar osteitis. The families are conceptual groupings used for narrative comparison; they are not mutually exclusive diagnostic standards and are not presented as validated categories.

3.3 Timing: symptom onset versus assessment schedule

Timing is a central source of non-equivalence. Reviewed reports used windows such as 1–3 days, 48–72 hours, at least 48 hours, 2–4 days, 2–5 days, 3–5 days, 1–5 days, one week, or scheduled day-specific reviews. The methodological distinction is between the time at which symptoms are required to begin and the time at which the patient is examined. A day-3 or day-7 appointment is an ascertainment schedule, not necessarily a diagnostic onset criterion. For example, scheduled assessments on postoperative days 3 and 7 were used in one

study (Iqbal et al. 2023); those assessment days should not be interpreted as a separate symptom-onset requirement unless the case rule explicitly says so.

Failure to separate these concepts can produce apparently similar definitions that capture different postoperative trajectories. A study requiring increasing pain within 1–3 days after extraction is conceptually different from a study that simply examines all patients on day 3 and records whether AO is present. Future reports should therefore state symptom-onset windows and assessment days as separate fields.

3.4 Case ascertainment and follow-up intensity

The route by which cases enter the dataset is partly independent of the diagnostic definition. Active scheduled clinical examination can identify patients who would not otherwise seek care, whereas symptom-triggered return depends on patient perception, access, and care-seeking behavior. Telephone follow-up can identify pain or functional symptoms but cannot always confirm socket findings, and retrospective chart or database-based approaches depend on the completeness and accuracy of routine documentation. One clinical study instructed patients to return if pain developed and then applied a clinical rule (Kamal et al. 2020), whereas a nested case-control study within a large healthcare cohort used explicit clinical features (Taberner-Vallverdú et al. 2022). These pathways may produce different case capture even when diagnostic wording overlaps.

Ascertainment should therefore be reported as an explicit methodological domain: scheduled examination, symptom-triggered contact, telephone screening with or without clinical confirmation, chart or database review, or a hybrid strategy. The present literature does not permit a general causal estimate of how much each pathway changes observed AO incidence, but differential case capture is sufficiently plausible to require transparent reporting.

3.5 Examiner procedures and competing diagnoses

AO diagnosis includes subjective and semi-objective elements, particularly pain characterization and interpretation of local socket findings. Among the reports examined, examiner identity, training, calibration, blinding, and reliability were variably described. One trial reported inter-examiner reliability for clinical AO diagnosis assessed using kappa, with approximately 62% agreement among examiners (Rashid et al. 2018). A blinded observer was used for pain assessment in another study (Iqbal et al. 2023), and one blinded investigator per center was used in a multicenter trial (Ghaeminia et al. 2017). Another study assessed pain, clot presence or absence, and alveolar-bone coverage on specified postoperative days but did not clearly define the minimum combination of findings required for AO classification (Sridhar et al. 2011).

A reproducible case definition should also specify how competing explanations are handled. Infected retained roots, surgical-site infection, bony sequestra, and other causes of severe post-extraction pain may mimic or coexist with AO (Kolokythas et al. 2010; Daly et al. 2022). A definition can be precise in wording yet clinically nonspecific if exclusion procedures are not described. Examiner standardization and differential-diagnosis procedures should therefore be considered part of case ascertainment rather than optional reporting detail.

3.6 Diagnostic unit, denominator, and within-patient clustering

Dental research frequently permits more than one observation per patient. AO can be reported at the patient, tooth, extraction-site, socket, or procedure level, and these units are not interchangeable. A patient-level incidence asks whether a person experienced at least one AO event, whereas a socket-level incidence uses extraction sites as the denominator. The distinction becomes especially important in bilateral third-molar studies and cohorts in which several teeth are extracted from the same patient. Authors should distinguish the diagnostic

unit (where AO is classified) from the statistical unit entering the analysis and should define the estimand that the numerator and denominator represent.

Observations from the same patient are correlated. Ignoring that dependence can inflate the nominal sample size and produce overly precise inference. Depending on the study design and estimand, appropriate approaches may include patient-level analysis, paired split-mouth methods, selection of one unit per patient, generalized estimating equations, or multilevel models (Litaker et al. 2013). For example, one study analyzed 904 mandibular molar extraction sites from 499 patients, a design in which extraction sites from the same patient are correlated and should not automatically be treated as statistically independent (Rutkowski et al. 2007). The lesson for future AO research is not that one unit is universally correct, but that the diagnostic unit, denominator, statistical unit, and handling of repeated observations must be explicit and analytically coherent.

4. Implications for research, reporting, and clinical interpretation

4.1 Toward reproducible AO reporting

The reviewed literature suggests that improving AO research requires more than choosing a preferred disease label. A useful report should permit another investigator to reconstruct the case algorithm and the pathway by which patients were evaluated. At minimum, authors should identify the exact terminology, state mandatory and alternative symptoms and signs, specify Boolean logic and thresholds, distinguish symptom onset from assessment timing, describe the ascertainment pathway, report examiner procedures, explain exclusion of competing diagnoses, and define the diagnostic and analytic unit. These elements are summarized in Table 2.

Table 2. Proposed reporting domains for alveolar osteitis case definitions and ascertainment

Domain	What should be reported	Why it matters
Terminology	Exact AO term and any named external definition	Prevents nominal equivalence from being mistaken for operational equivalence.
Mandatory components	Symptoms and local signs classified as required, alternative, supportive, or optional	Allows replication and comparison across reports.
Boolean logic	Explicit AND/OR/optional relationships and any thresholds	A component list alone does not reveal the diagnostic algorithm.
Timing	Symptom-onset window stated separately from assessment days	Separates the case rule from the follow-up schedule.
Case ascertainment	Scheduled examination, symptom-triggered return, telephone, chart/database, or hybrid pathway	The route to assessment can influence which cases are detected.
Examiner procedures	Assessor identity, training/calibration, blinding, and reliability when applicable	Supports reproducibility and appraisal of susceptibility to misclassification.
Competing diagnoses	How infection, retained roots/fragments, fracture, and other causes were assessed	Clarifies diagnostic specificity.
Unit and denominator	Patient, procedure, tooth, or socket/site, with consistent numerator and denominator	Prevents incompatible incidence estimates from being conflated.
Repeated observations	Whether patients contribute more than one unit and how dependence is addressed	Reduces pseudoreplication and over-precise inference.

AO, alveolar osteitis. These items are proposed as a practical reporting framework derived from recurring methodological problems in the literature. They have not undergone Delphi consensus, formal guideline development, or external validation.

4.2 Clinical interpretation

Standardization should not be confused with proof that one diagnostic rule is clinically superior. The available literature does not establish which AO definition has the greatest criterion validity, prognostic value, responsiveness to treatment, or patient relevance. A stricter component set may capture a different clinical spectrum than a broader rule, but sensitivity and specificity cannot be inferred from stringency alone without an external reference standard. Likewise, reproducibility depends primarily on explicit operationalization and consistent ascertainment rather than simply on whether a definition is broad or narrow. Future work should therefore compare candidate definitions against clinically relevant outcomes and prespecified reference constructs rather than selecting a standard solely because it is historically familiar.

Likewise, between-study differences in AO incidence should not be interpreted as evidence that definition choice is the sole cause. Tooth type, surgical difficulty, prophylactic measures, smoking, hormonal exposures, operator experience, follow-up intensity, and clinical setting have been associated with observed risk or can affect case detection (Chow et al. 2020; Daly et al. 2022; Ghosh et al. 2022). Residual confounding is likely in much of the observational evidence. Diagnostic standardization improves comparability, but it cannot eliminate biological, clinical, and design heterogeneity.

4.3 Relevance to sports dentistry and athlete care

The relevance to sports dentistry is methodological and clinical rather than etiologic. Oral-health problems have been associated with self-reported impacts on training and performance among elite and professional athletes, and sports-dentistry consensus statements emphasize prevention, surveillance, and integration of dental care within multidisciplinary sports medicine (Gallagher et al. 2018; Stamos et al. 2020). Tooth extraction may occasionally be required in athletes as in the general population. A painful postoperative complication could plausibly interfere with eating, sleep, recovery, or training participation, but this is an extrapolation from symptom burden rather than an established athlete-specific AO effect. The literature synthesized here does not establish that athletic status, exercise, or training load increases AO risk.

Accordingly, athlete-focused research should not create a sport-specific AO definition without evidence. Instead, it should use transparent general diagnostic criteria, record the athlete-specific context separately, and report consequences such as interruption of training or competition only when those outcomes are directly measured. The strongest connection between this review and sport is therefore methodological: standardized outcome definitions are needed when oral complications are incorporated into athlete-health surveillance or sports-dentistry research.

5. Limitations of this narrative review

This review is not exhaustive and should not be interpreted as a systematic estimate of the prevalence of particular AO definitions or reporting practices. The underlying literature corpus was generated through broad searches, but full-text eligibility assessment of the entire search-retained set was not prospectively completed in duplicate and the present narrative selection was purposive. Consequently, no PRISMA flow diagram, pooled frequencies, temporal trend estimates, or literature-wide prevalence claims are presented. Historical and difficult-to-retrieve reports may be underrepresented.

The review also did not apply a formal risk-of-bias instrument or certainty-of-evidence framework because the primary question concerned conceptual definitions and reporting practices rather than treatment effects. Examples were selected to illustrate recurring methodological patterns and should not be interpreted as a complete audit of every included report. Finally, the proposed reporting domains in Table 2 are expert-informed synthesis items rather than a validated guideline; formal consensus development and external validation would be required before they could be promoted as a reporting standard.

6. Conclusions

The clinical literature on alveolar osteitis uses overlapping but non-equivalent diagnostic constructs. Differences occur in terminology, pain requirements, local socket findings, Boolean logic, timing, case-ascertainment pathways, examiner procedures, diagnostic units, denominators, and handling of multiple observations from the same patient. These features should be reported explicitly because they materially affect the reproducibility and comparability of AO outcomes across studies.

A practical next step is to standardize reporting before attempting to standardize the disease construct itself: authors should state exactly what constitutes a case, when symptoms

must occur, when and how patients are assessed, who performs the assessment, how competing diagnoses are handled, and what unit enters the analysis. This approach is relevant to general oral-surgery research and can support sports dentistry when post-extraction complications are monitored in athletes. Current evidence does not justify describing AO as a sport-specific disorder or inferring a causal effect of exercise on socket healing.

Disclosure

Author contributions (CRediT):

Conceptualization: [WJ], [NLH];

Methodology: [WJ], [NLH], [ND], [KKu];

Validation: [WJ], [GK], [NJ];

Formal analysis: [WJ], [SK];

Investigation: [WJ], [KKe], [NLH];

Resources: [WJ], [KKu], [SK];

Data curation: [WJ], [NJ], [ND];

Writing - original draft preparation: [WJ], [GK], [KKe];

Writing - review and editing: [WJ], [NLH], [KKu], [KKe];

Visualization: [WJ], [GK], [SK];

Supervision: [WJ], [ND], [KKe], [GK];

Project administration: [WJ], [ND], [KKu], [NJ].

All authors have read and agreed to the submitted version of the manuscript.

Funding: No external funding was received for this study.

Institutional Review Board Statement: Not applicable. This narrative review did not involve new research with human participants or animals.

Informed Consent Statement: Not applicable.

Data Availability Statement: All data discussed in this review are derived from the cited published studies. No new primary dataset was generated.

Acknowledgments. None.

Conflicts of Interest: The authors declare no conflicts of interest.

Declaration of generative AI and AI-assisted technologies in the writing process: In preparing this work, the authors used ChatGPT (OpenAI) for language refinement, readability, text formatting, bibliographic style verification, and editorial organization. After using this tool, the authors reviewed and edited the content as needed and accept full responsibility for the substantive content of the publication.

References

- Baethge, C., Goldbeck-Wood, S., & Mertens, S. (2019). SANRA—a scale for the quality assessment of narrative review articles. *Research Integrity and Peer Review*, 4, 5. <https://doi.org/10.1186/s41073-019-0064-8>
- Blum, I. R. (2002). Contemporary views on dry socket (alveolar osteitis): A clinical appraisal of standardization, aetiopathogenesis and management: A critical review. *International Journal of Oral and Maxillofacial Surgery*, 31(3), 309–317. <https://doi.org/10.1054/ijom.2002.0263>
- Chow, O., Wang, R., Ku, D., & Huang, W. (2020). Alveolar osteitis: A review of current concepts. *Journal of Oral and Maxillofacial Surgery*, 78(8), 1288–1296. <https://doi.org/10.1016/j.joms.2020.03.026>
- Chybicki, M., & Janas-Naze, A. (2022). Pain relief and antimicrobial activity in alveolar osteitis after platelet-rich fibrin application—A non-randomized controlled study. *Applied Sciences*, 12(3), 1324. <https://doi.org/10.3390/app12031324>

- Daly, B. J. M., Sharif, M. O., Jones, K., Worthington, H. V., & Beattie, A. (2022). Local interventions for the management of alveolar osteitis (dry socket). *Cochrane Database of Systematic Reviews*, 2022(9), CD006968. <https://doi.org/10.1002/14651858.CD006968.pub3>
- Erinoso, O., Ogunbayo, O., Adesina, A., James, O., Ladeinde, A., Ogunlewe, O., & Olaitan, A. (2024). Effect of chlorhexidine gel on the prevention of alveolar osteitis and post-operative pain following transalveolar extraction of impacted mandibular third molars: A randomized study. *Oral Surgery*, 17(2), 113–121. <https://doi.org/10.1111/ors.12857>
- Gallagher, J., Ashley, P., Petrie, A., & Needleman, I. (2018). Oral health and performance impacts in elite and professional athletes. *Community Dentistry and Oral Epidemiology*, 46(6), 563–568. <https://doi.org/10.1111/cdoe.12392>
- Ghaeminia, H., Hoppenreijds, T. J. M., Xi, T., Fennis, J. P., Maal, T. J., Bergé, S. J., & Meijer, G. J. (2017). Postoperative socket irrigation with drinking tap water reduces the risk of inflammatory complications following surgical removal of third molars: A multicenter randomized trial. *Clinical Oral Investigations*, 21(1), 71–83. <https://doi.org/10.1007/s00784-016-1751-1>
- Ghosh, A., Aggarwal, V. R., & Moore, R. (2022). Aetiology, prevention and management of alveolar osteitis—A scoping review. *Journal of Oral Rehabilitation*, 49(1), 103–113. <https://doi.org/10.1111/joor.13268>
- Hita-Iglesias, P., Torres-Lagares, D., Flores-Ruiz, R., Magallanes-Abad, N., Basallote-Gonzalez, M., & Gutierrez-Perez, J. L. (2008). Effectiveness of chlorhexidine gel versus chlorhexidine rinse in reducing alveolar osteitis in mandibular third molar surgery. *Journal of Oral and Maxillofacial Surgery*, 66(3), 441–445. <https://doi.org/10.1016/j.joms.2007.06.641>
- Hoaglin, D. R., & Lines, G. K. (2013). Prevention of localized osteitis in mandibular third-molar sites using platelet-rich fibrin. *International Journal of Dentistry*, 2013, 875380. <https://doi.org/10.1155/2013/875380>
- Iqbal, N., Khalid, M. U., Janjua, O. S., Zafar, K. J., & Usama, M. M. (2023). Assessment of dry socket after mandibular third molar surgery using platelet-rich fibrin—A prospective clinical study. *Journal of the College of Physicians and Surgeons Pakistan*, 33(5), 504–508. <https://doi.org/10.29271/jcpsp.2023.05.504>
- Kamal, A., Salman, B., Abdul Razak, N. H., Qabbani, A. A., & Samsudin, A. R. (2020). The efficacy of concentrated growth factor in the healing of alveolar osteitis: A clinical study. *International Journal of Dentistry*, 2020, 9038629. <https://doi.org/10.1155/2020/9038629>
- King, E. M., Cerajewska, T. L., Locke, M., Claydon, N. C. A., Davies, M., & West, N. X. (2018). The efficacy of plasma rich in growth factors for the treatment of alveolar osteitis: A randomized controlled trial. *Journal of Oral and Maxillofacial Surgery*, 76(6), 1150–1159. <https://doi.org/10.1016/j.joms.2017.12.025>
- Kolokythas, A., Olech, E., & Miloro, M. (2010). Alveolar osteitis: A comprehensive review of concepts and controversies. *International Journal of Dentistry*, 2010, 249073. <https://doi.org/10.1155/2010/249073>
- Litaker, M. S., Gordan, V. V., Rindal, D. B., Fellows, J. L., Gilbert, G. H., & National Dental PBRN Collaborative Group. (2013). Cluster effects in a National Dental PBRN restorative study. *Journal of Dental Research*, 92(9), 782–787. <https://doi.org/10.1177/0022034513497752>
- Murad, M. H., & Wang, Z. (2017). Guidelines for reporting meta-epidemiological methodology research. *Evidence-Based Medicine*, 22(4), 139–142. <https://doi.org/10.1136/ebmed-2017-110713>
- Nagaja, S. A., John, R. S., & Krishnan, M. (2024). Efficacy of tranexamic acid in preventing alveolar osteitis in post-extraction sockets of first premolars. *Cureus*, 16(1), e51816. <https://doi.org/10.7759/cureus.51816>
- Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., ... Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ*, 372, n71. <https://doi.org/10.1136/bmj.n71>
- Rashid, H., Hussain, A., Sheikh, A. H., Azam, K., Malik, S., & Amin, M. (2018). Measure of frequency of alveolar osteitis using two different methods of osteotomy in mandibular third molar impactions: A double-blind randomized clinical trial. *Journal of Ayub Medical College Abbottabad*, 30(1), 103–106. <https://pubmed.ncbi.nlm.nih.gov/29504342/>
- Requena-Calla, S., & Funes-Rumiche, I. (2016). Effectiveness of intra-alveolar chlorhexidine gel in reducing dry socket following surgical extraction of lower third molars: A pilot study. *Journal of Clinical and Experimental Dentistry*, 8(2), e160–e163. <https://doi.org/10.4317/jced.52444>
- Rethlefsen, M. L., Kirtley, S., Waffenschmidt, S., Ayala, A. P., Moher, D., Page, M. J., Koffel, J. B., Blunt, H., Brigham, T., Chang, S., Clark, J., Conway, A., Couban, R., de Kock, S., Farrah, K., Fehrmann, P., Foster, M., Fowler, S. A., Glanville, J., ... Young, S. (2021). PRISMA-S: An extension to the PRISMA statement for reporting literature searches in systematic reviews. *Systematic Reviews*, 10, 39. <https://doi.org/10.1186/s13643-020-01542-z>
- Rutkowski, J. L., Fennell, J. W., Kern, J. C., Madison, D. E., & Johnson, D. A. (2007). Inhibition of alveolar osteitis in mandibular tooth extraction sites using platelet-rich plasma. *Journal of Oral Implantology*, 33(3), 116–121. [https://doi.org/10.1563/1548-1336\(2007\)33\[116:IOAOIM\]2.0.CO;2](https://doi.org/10.1563/1548-1336(2007)33[116:IOAOIM]2.0.CO;2)

- Shad, S., Shah, S. M. H., Tahir, M. W., Geelani, S. R. R., Khan, S. M., & Abbasi, M. M. (2018). Role of 0.2% bio-adhesive chlorhexidine gel in reducing incidence of alveolar osteitis: A randomized controlled trial. *Journal of Ayub Medical College Abbottabad*, 30(4), 524–528. <https://jamc.ayubmed.edu.pk/index.php/jamc/article/view/4494>
- Sridhar, V., Wali, G. G., & Shyla, H. N. (2011). Evaluation of the perioperative use of 0.2% chlorhexidine gluconate for the prevention of alveolar osteitis after the extraction of impacted mandibular third molars: A clinical study. *Journal of Maxillofacial and Oral Surgery*, 10(2), 101–111. <https://doi.org/10.1007/s12663-011-0206-0>
- Stamos, A., Mills, S., Malliaropoulos, N., Cantamessa, S., Darteville, J.-L., Gündüz, E., Laubmeier, J., Hoy, J., Kakavas, G., Le Garrec, S., Kaux, J., Ghrairi, M., Lohrer, H., & Engels-Deutsch, M. (2020). The European Association for Sports Dentistry, Academy for Sports Dentistry, European College of Sports and Exercise Physicians consensus statement on sports dentistry integration in sports medicine. *Dental Traumatology*, 36(6), 680–684. <https://doi.org/10.1111/edt.12593>
- Taberner-Vallverdú, M., Camps-Font, O., Gay-Escoda, C., & Sánchez-Garcés, M. A. (2022). Previous dry socket as a risk factor for alveolar osteitis: A nested case-control study in primary healthcare services. *Journal of Clinical and Experimental Dentistry*, 14(6), e479–e485. <https://doi.org/10.4317/jced.59586>
- Yüce, E., & Kömerik, N. (2019). Potential effects of advanced platelet rich fibrin as a wound-healing accelerator in the management of alveolar osteitis: A randomized clinical trial. *Nigerian Journal of Clinical Practice*, 22(9), 1189–1195. https://doi.org/10.4103/njcp.njcp_27_19