

Diagnosing Peri-implantitis in Practice: Integrating Clinical Findings and Radiographic Change

A structured workflow for examination, baseline comparison, imaging and diagnostic certainty



Conceptual medical illustration. It does not represent an individual diagnostic image.

Core message: peri-implantitis diagnosis requires the integration of inflammatory signs, changes in peri-implant tissue dimensions and radiographic evidence of supporting bone loss.

Educational material for dentists, periodontists, implant clinicians and postgraduate trainees

Purpose and learning outcomes

This material presents a reproducible clinical workflow for diagnosing peri-implantitis and communicating the level of diagnostic certainty. It focuses on findings that can be recorded consistently during routine implant maintenance and problem-oriented assessment.

After completing the material, the reader should be able to:

- Perform a structured six-site peri-implant examination using gentle probing.
- Interpret bleeding, suppuration, probing depth and mucosal recession as related but distinct findings.
- Apply case definitions when baseline records are available and when they are missing.
- Evaluate marginal bone levels on reproducible radiographs and recognise the limitations of two-dimensional imaging.
- Identify diagnostic mimics, technical limitations and reasons for an indeterminate diagnosis.

Diagnostic principle

Bleeding or suppuration identifies inflammation. Increasing probing depth or apical migration of the mucosal margin signals soft-tissue change. Radiographic comparison identifies loss of supporting bone. Peri-implantitis becomes the most defensible diagnosis when these domains converge.

Baseline information

A post-restorative clinical and radiographic reference allows the clinician to demonstrate progression directly. When no baseline exists, threshold-based case definitions support classification, but the resulting diagnosis carries more uncertainty.

A single measurement rarely settles the diagnosis. The pattern across sites, change over time and image comparability determine how confidently the findings can be interpreted.

The structured peri-implant examination

Component	How to record it	Diagnostic contribution
Probing depth	Measure six sites with light force and document values by site.	Detects changes in tissue resistance and pocket dimensions when compared with baseline.
Bleeding on probing	Record presence and distribution after gentle probing.	Sensitive sign of mucosal inflammation, but insufficient alone for peri-implantitis.
Suppuration	Record the exact sites where exudate appears.	Raises concern for advanced inflammation, but does not quantify bone loss.
Mucosal margin	Measure recession or coronal position relative to a stable restoration landmark.	Identifies apical migration that can mask tissue loss when probing depth appears unchanged.
Plaque and access	Document plaque, deposits and areas obstructed by restoration contour.	Explains local inflammatory exposure and limits in diagnostic reliability.

Gentle probing is necessary

Routine probing with light force provides essential information about bleeding, pocket depth and the mucosal margin. Evidence indicates that careful probing does not cause lasting injury to peri-implant tissues. Avoiding probing because an implant is present can delay recognition of inflammation and progressive tissue change.

No universal probing-depth threshold

Healthy implants can have relatively deep sulci because soft-tissue thickness, implant position and prosthetic design vary. A deep measurement should prompt comparison with inflammatory findings and baseline records rather than an automatic diagnosis. A smaller increase at one site may be more meaningful than an isolated large value that has remained stable.

**Technique matters: use consistent sites, light force and a stable reference point.
Record when prosthetic contours prevent reliable probe positioning.**

Inflammatory signs and tissue change

Bleeding, suppuration and probing depth describe different aspects of the site. Combining them prevents both overdiagnosis and underdiagnosis.

Finding	What it supports	What it cannot establish alone
Bleeding on probing	Current mucosal inflammation when elicited by gentle probing.	Progressive supporting bone loss or the distinction between mucositis and peri-implantitis.
Suppuration	Active inflammatory exudate and a greater probability of advanced disease.	The amount, distribution or rate of bone loss.
Increasing probing depth	Change in tissue resistance, pocket dimensions or defect anatomy.	Disease when baseline technique or prosthetic access differs.
Mucosal recession	Apical movement of the soft-tissue margin and potential exposure of the implant surface.	The current inflammatory activity of the lesion.

Recession can conceal progression

Probing depth may remain numerically stable when the mucosal margin migrates apically. Record the margin and probing depth separately. Their combined change provides a conceptual estimate of attachment alteration around the implant, although periodontal clinical attachment terminology does not transfer perfectly to implant tissues.

Bleeding without progressive bone loss

Peri-implant mucositis can produce extensive bleeding without continuing marginal bone loss. Radiographic comparison is therefore essential before an inflamed implant is classified as peri-implantitis. Conversely, limited bleeding at one visit does not exclude historical bone loss or a partially treated lesion.

Clinical integration: inflammatory findings identify the active soft-tissue lesion; longitudinal clinical and radiographic change identify destructive disease.

Diagnosis with and without baseline records

Situation	Required interpretation	Diagnostic wording
Reliable baseline available	Inflammation plus increasing probing depth or recession and bone loss beyond initial remodelling.	Progression can be demonstrated directly.
No baseline available	Bleeding and/or suppuration, probing depth at least 6 mm and bone level at least 3 mm apical to the most coronal intra-osseous implant portion.	Threshold-based peri-implantitis diagnosis is probable.
Baseline or current data inadequate	Image geometry, probing access or documentation does not permit a reliable comparison.	Indeterminate until better information is obtained.

Initial remodelling

Early crestal bone adaptation after implant placement and prosthetic loading does not automatically represent peri-implantitis. Timing, inflammatory status and subsequent change determine whether the finding reflects expected remodelling or pathological progression. A reference radiograph after completion of the prosthetic phase provides the most useful clinical anchor.

Stable landmarks

Measure the bone level relative to a reproducible implant landmark, such as the implant shoulder or a known interface. Record the method so the same landmark can be used at later visits. Serial radiographs should reproduce sensor position and beam angulation as closely as possible.

Diagnostic certainty

- Confirmed: comparable longitudinal records demonstrate inflammation and progressive supporting bone loss.
- Probable: current clinical and radiographic findings meet the accepted threshold-based definition without baseline records.
- Indeterminate: imaging, access or competing explanations prevent a defensible classification.

Documentation should state the case definition used. This allows another clinician to understand how the diagnosis was reached.

Radiographic assessment

Standardised intraoral periapical radiographs remain the primary method for serial evaluation of marginal bone levels. Their diagnostic value depends on projection reproducibility and integration with clinical findings.

Issue	Practical response	Reason
Projection geometry	Use a paralleling technique and a reproducible holder when possible.	Changes in vertical or horizontal angulation can mimic bone-level change.
Reference landmark	Measure from the same stable implant feature on every image.	A consistent origin makes serial comparisons interpretable.
Image quality	Confirm adequate exposure, sharpness and visibility of the implant-bone interface.	Blur or overlap can hide small marginal changes.
Mesial and distal bias	Recognise that periapical images display interproximal bone most clearly.	Buccal and lingual defects can remain hidden by superimposition.
Advanced imaging	Use three-dimensional imaging only when the additional information can change management.	Higher information content must be balanced against radiation and artefact.

Limits of two-dimensional imaging

A normal-looking interproximal bone level does not exclude a buccal, lingual or circumferential defect. Metallic artefacts and superimposition also limit interpretation. When clinical findings are disproportionate to the periapical image, reassess projection, probe access and the differential diagnosis before escalating imaging.

Defect morphology

Peri-implant defects often contain circumferential components and can combine intrabony and supracrestal loss. Surgical access may reveal morphology that two-dimensional imaging underestimates. Defect configuration influences surgical access, decontamination and the potential for regenerative therapy, but morphology is not required to establish the initial diagnosis.

Radiographs complement the examination. They do not show inflammation and should not be interpreted without current clinical findings.

Prosthetic access, mimics and diagnostic limits

A technically correct workflow still depends on access. Bulky emergence profiles, deep restoration margins and unfavourable implant position can prevent the probe from reaching the peri-implant sulcus in a reproducible direction.

Problem	Possible presentation	Verification
Residual cement or foreign material	Local bleeding, suppuration or focal bone loss.	Inspect restoration margins and consider targeted removal when indicated.
Implant or component fracture	Pain, mobility, recurrent screw problems or local radiolucency.	Assess prosthetic integrity, component fit and implant stability.
Occlusal or technical complication	Discomfort, loosening or fracture without the complete inflammatory pattern.	Evaluate occlusion and the restorative complex while also examining tissues.
Malposition or poor prosthetic contour	Restricted hygiene access, persistent plaque and unreliable probing.	Document inaccessible surfaces and assess whether prosthetic modification is feasible.
Non-inflammatory bone change	Radiographic alteration without concordant mucosal inflammation.	Review timing, baseline images, loading history and alternative pathology.

When access limits confidence

Do not convert an inaccessible site into a false negative. State which surfaces could not be examined and why. Prosthetic modification or removal may be necessary when improved access can change diagnosis or treatment. The risk and benefit of any intervention should remain proportionate to the clinical problem.

Biomarkers remain adjunctive

Inflammatory mediators such as interleukin-1 beta and tumour necrosis factor alpha may be elevated at diseased sites, but overlap between health, mucositis and peri-implantitis limits diagnostic discrimination. No single biomarker currently replaces probing and radiographic comparison in routine care.

Competing explanations should be tested. A diagnosis becomes stronger when technical causes and imaging artefacts have been considered explicitly.

A practical diagnostic workflow

Step	Action	Required documentation
1. Review context	Check symptoms, periodontitis history, supportive-care attendance, medical changes and restoration history.	Relevant changes since the previous visit.
2. Examine six sites	Record plaque, probing depth, bleeding, suppuration and mucosal margin with light force.	Site-specific chart plus access limitations.
3. Compare with baseline	Review the post-restorative examination and previous radiographs.	Magnitude and location of clinical change.
4. Assess bone level	Use a comparable periapical image and stable implant landmarks.	Measured change, image quality and projection limitations.
5. Consider alternatives	Evaluate remodelling, cement, fracture, malposition and technical complications.	Findings that support or weaken each explanation.
6. State certainty	Classify the diagnosis as confirmed, probable or indeterminate.	Case definition, evidence and next diagnostic step.

Common diagnostic errors

- Classifying peri-implantitis from bleeding alone without evaluating bone levels.
- Using one probing-depth cut-off for every implant regardless of baseline anatomy.
- Comparing radiographs with different projection geometry as if the measurements were directly equivalent.
- Ignoring mucosal recession when probing depth appears stable.
- Assuming that a normal mesial and distal image excludes buccal or lingual bone loss.
- Failing to document inaccessible sites, image limitations or the case definition applied.

Key learning points

- Gentle six-site probing is safe, necessary and most informative when repeated consistently.
- Bleeding indicates inflammation, while progressive bone loss distinguishes peri-implantitis from mucositis.
- Baseline clinical measurements and a post-restorative radiograph provide the strongest diagnostic anchor.
- Two-dimensional images can underestimate circumferential, buccal and lingual defects.
- Explicit communication of diagnostic certainty improves referrals, treatment planning and follow-up.

Selected references

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Educational use and limitations

This material supports professional education and does not replace individual clinical assessment, appropriately selected diagnostic imaging or specialist consultation. Radiation exposure should always be justified, and three-dimensional imaging should be reserved for situations in which the result can change management.

This work was co-funded by the European Union under grant agreement No. 2024-1-PL01-KA220-HED-000251208. Views and opinions expressed are those of the author(s) only and do not necessarily reflect those of the European Union or the Foundation for the Development of the Education System (FRSE). Neither the European Union nor FRSE can be held responsible for them.