

Are Routine Blood Investigations Mandatory before Periodontal Surgical Procedures? A review of literature and informed view

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Citation

David K, Shetty M, Karmakar S. Are Routine Blood Investigations Mandatory Before Periodontal Surgical Procedures? A Review of Literature and Informed View. *Kathmandu Univ Med J.* 2026; 94(1): 99-112.

ABSTRACT

The routine recommendation of preoperative blood investigations before periodontal surgical procedures remains controversial. Traditionally, laboratory tests have been advised to identify occult systemic diseases and minimize perioperative complications. However, increasing evidence questions the utility of indiscriminate testing in clinically healthy individuals undergoing elective periodontal surgery.

To critically evaluate the current evidence regarding the necessity and clinical utility of routine preoperative blood investigations in patients undergoing periodontal surgical procedures and to provide evidence-based recommendations for clinicians.

A narrative review of the literature was conducted using electronic databases including PubMed/MEDLINE, Scopus, Web of Science, Google Scholar, and the Cochrane Library. Literature published between January 1975, and January 2026 was searched. Medical Subject Headings (MeSH) and free-text terms including "Preoperative Care," "Periodontal Surgical Procedures," "Laboratory Tests," "Blood Glucose," "Hemostasis Tests," "Coagulation Tests," "Medical History Taking," "Risk Assessment," and "Personalized Medicine" were used individually and in various combinations. Systematic reviews, narrative reviews, observational studies, randomized controlled trials, clinical guidelines, consensus statements, and relevant textbook chapters published in English were considered.

Available evidence consistently demonstrates that routine laboratory investigations in clinically healthy individuals undergoing minor and moderate periodontal surgical procedures rarely influence treatment planning or improve postoperative outcomes. Comprehensive medical history taking and physical examination remain the most effective methods for identifying patients requiring additional investigations. Selective laboratory testing may be indicated in patients with significant systemic diseases, suspected bleeding disorders, diabetes mellitus, anticoagulant therapy, immunosuppressive conditions, or when extensive regenerative or implant procedures are planned.

Current evidence does not support mandatory routine blood investigations for all periodontal surgical patients. An individualized risk-based approach integrating medical history, clinical examination, systemic health status, medication profile, and procedural complexity should guide the decision to request laboratory investigations. Future periodontal practice should increasingly incorporate personalized dentistry principles and point-of-care diagnostics.

KEY WORDS

Blood coagulation tests, Laboratory tests, Periodontal surgical procedures, Precision medicine, Preoperative care, Risk assessment

INTRODUCTION

Periodontal surgical procedures are an important component of modern periodontal therapy and include a variety of procedures such as gingivectomy, gingivoplasty, crown lengthening, open flap debridement, regenerative procedures, mucogingival surgery, soft tissue grafting, periodontal plastic surgery, peri-implant surgery, and implant placement. These procedures are routinely performed in specialist and general dental practice and are generally considered low- to moderate-risk surgical interventions. However, despite their favorable safety profile, postoperative complications such as excessive bleeding, delayed wound healing, postoperative infection, impaired regeneration, flap necrosis, and compromised treatment outcomes may occasionally occur, particularly in patients with underlying systemic disorders. Hence, preoperative patient assessment is fundamental to ensuring safe and predictable periodontal surgical outcomes. Traditionally, dentists and physicians have used a combination of detailed medical history taking, clinical examination, and laboratory investigations to identify conditions that may adversely affect perioperative management. Routine laboratory investigations such as complete blood counts, coagulation profiles, bleeding and clotting tests, blood glucose estimation, and biochemical analyses have traditionally been ordered before elective surgical procedures with the aim of detecting occult disease and minimizing perioperative risk. The practice of ordering routine preoperative blood tests has historically been driven by medico-legal concerns, institutional policies, and the belief that occult systemic disease could be detected before surgery. However, over the last three decades, substantial evidence has emerged challenging this traditional approach. Systematic reviews and clinical studies have consistently demonstrated that routine laboratory testing in asymptomatic patients rarely alters clinical management, has poor predictive value for postoperative complications, and frequently increases healthcare expenditure without improving patient outcomes.^{1,2} This issue is particularly relevant in periodontology because most periodontal surgical procedures are performed in an outpatient setting under local anesthesia. Unlike major medical procedures associated with substantial blood loss or physiological stress, periodontal surgeries generally involve limited tissue trauma and minimal systemic impact. Modern healthcare is increasingly moving away from a “one-size-fits-all” model toward individualized risk assessment based on patient-specific characteristics, systemic health status, medication use, and procedure complexity.³⁻⁵

Hence, the objective of this narrative review is to critically evaluate the available evidence regarding the necessity and clinical usefulness of routine blood investigations before periodontal surgical procedures and to provide evidence-based recommendations for clinicians.

Historical background

The concept of routine preoperative laboratory testing emerged during the mid-twentieth century when perioperative morbidity and mortality were substantially higher than they are today. Limited diagnostic capabilities and inadequate understanding of perioperative physiology prompted clinicians to employ extensive screening strategies before surgery. The introduction of automated laboratory analyzers during the 1970s and 1980s dramatically reduced the cost and turnaround time of diagnostic testing. Consequently, routine laboratory investigations became deeply incorporated into clinical practice, and many institutions adopted standardized testing protocols for all surgical patients irrespective of health status or procedural complexity.² Concerns regarding indiscriminate laboratory testing soon emerged. Early investigators such as Korvin, Robbins and Rose, and Sandler demonstrated that routine investigations were often normal and rarely altered clinical management.⁶⁻⁸ Furthermore, abnormal findings frequently represented false-positive results, leading to unnecessary repeat testing, delayed treatment, increased healthcare expenditure, and patient anxiety. Subsequent landmark investigations further questioned the value of universal screening. Turnbull et al. demonstrated that careful medical history taking and physical examination were superior to indiscriminate laboratory investigations for identifying clinically significant abnormalities.⁹ Similarly, Munro et al., in their influential systematic review, concluded that routine preoperative investigations in healthy individuals had limited clinical value and rarely influenced perioperative outcomes.¹⁰ These findings subsequently influenced international guidelines. Recommendations from the National Institute for Health and Care Excellence (NICE) and other professional organizations advocate selective laboratory testing based on clinical indications rather than universal screening.^{11,12}

A similar transition has occurred in dentistry. Historically, blood investigations were frequently requested before extractions, periodontal surgery, and implant procedures because of concerns regarding postoperative bleeding and healing complications. However, evidence-based dentistry increasingly supports individualized patient assessment rather than routine testing. The concept of precision dentistry has emerged as an extension of personalized medicine. Precision dentistry integrates medical history, biomarkers, genetic information, environmental exposures, and lifestyle factors to improve diagnosis, risk assessment, and treatment planning.^{3,13} This paradigm shift suggests that laboratory investigations should be prescribed selectively and only when additional diagnostic information is likely to improve patient care.

Basic science considerations underlying laboratory investigations in periodontal surgery

Successful healing of periodontal wounds is a complex biological process involving a cascade of highly

orchestrated cellular and molecular events. Generally, the healing cascade is divided into four overlapping phases: hemostasis, inflammation, proliferation, and remodeling. Disturbance at any stage may adversely affect clinical outcomes following periodontal surgery.

Blood Clotting

The first phase of periodontal wound healing involves blood clot formation, which controls bleeding and provides a matrix for subsequent tissue repair. Normal vascular integrity, platelet function, and coagulation pathways are therefore essential for successful healing. Patients with inherited or acquired coagulation abnormalities may experience increased intraoperative or postoperative bleeding. Conditions such as thrombocytopenia, von Willebrand disease, liver dysfunction, anticoagulant therapy, and platelet disorders may impair hemostatic mechanisms and increase bleeding risk following periodontal procedures.¹⁴⁻¹⁶ Therefore, selective laboratory investigations such as platelet counts, prothrombin time (PT), international normalized ratio (INR), and activated partial thromboplastin time (aPTT) may be indicated in patients with suggestive medical histories.

Inflammation and Immune Responses

Inflammation is essential for periodontal wound healing. Following surgical trauma, neutrophils, macrophages, lymphocytes, and other inflammatory cells migrate to the wound site to eliminate microorganisms and initiate tissue repair. Systemic disorders associated with immune dysfunction, including diabetes mellitus, leukemia, HIV infection, autoimmune diseases, and immunosuppressive therapy, may alter inflammatory responses and compromise healing outcomes. Laboratory investigations may therefore assist in the identification of underlying abnormalities that could influence treatment planning and postoperative management.^{17,18}

Glycemic Control

Diabetes mellitus is one of the most significant systemic conditions affecting periodontal wound healing. Chronic hyperglycemia impairs neutrophil function, collagen metabolism, angiogenesis, and growth factor expression. Elevated blood glucose levels have been associated with delayed wound healing, increased postoperative infection, and compromised regenerative outcomes following periodontal surgery. Several investigations have demonstrated that poor glycemic control adversely affects treatment outcomes and healing following periodontal therapy.^{19,20} Consequently, blood glucose testing or glycated hemoglobin (HbA1c) estimation may be justified in patients with diagnosed diabetes or in those presenting with risk factors suggestive of previously undiagnosed disease.

Oxygen Transport and Tissue Repair

Adequate tissue oxygenation is critical for collagen synthesis, fibroblast proliferation, angiogenesis, and

epithelialization. Anemia may compromise oxygen delivery to healing tissues and thereby delay postoperative recovery. Although mild anemia may not significantly affect minor periodontal surgery, moderate to severe anemia may negatively influence healing after extensive regenerative or implant-related procedures. Therefore, complete blood count assessment may be warranted in selected patients presenting with signs or symptoms suggestive of anemia.²¹

Regenerative Procedures and Implant Surgery

Regenerative procedures incorporating bone grafts, biologic mediators, growth factors, and implant placement increasingly form part of contemporary periodontal therapy. These advanced procedures require optimal wound-healing conditions for predictable success. Systemic conditions affecting bone metabolism, angiogenesis, or immune competence may adversely influence regenerative outcomes. Consequently, selective laboratory investigations may be particularly valuable for patients undergoing complex regenerative and implant procedures, especially when systemic risk factors are present.^{17,22}

METHODS

A structured literature search was conducted to identify publications evaluating the role of preoperative laboratory investigations in periodontal surgical practice. To enhance transparency and methodological consistency, the literature search and study selection followed a structured workflow informed by the principles of the PRISMA 2020 statement; however, this review was conducted as a narrative review rather than a formal systematic review. Accordingly, Figure 1 presents a schematic overview of the literature search and study selection process rather than a formal PRISMA flow diagram.



Figure 1. Legend Schematic workflow of the literature search and study selection process

Electronic databases including PubMed/MEDLINE, Scopus, Web of Science, Google Scholar, and the Cochrane Library were searched for relevant publications. In addition, clinical practice guidelines, consensus statements, textbook chapters, and recommendations issued by professional organizations and governmental agencies were reviewed to identify current standards for preoperative patient assessment. The search strategy incorporated combinations of Medical Subject Headings (MeSH) and free-text terms including "Preoperative Care," "Periodontal Surgical Procedures," "Periodontal Surgery," "Laboratory Tests," "Blood Investigations," "Hemostasis Tests," "Blood Glucose," "Coagulation Tests," "Medical History Taking," "Risk Assessment," "Elective Surgery," "Personalized Medicine," and "Precision Dentistry." Boolean operators ("AND" and "OR") were used to refine the search strategy.

Publications published in English between January 1975 and January 2026 were considered for inclusion. Eligible sources included systematic reviews, narrative reviews, randomized controlled trials, cohort studies, case-control studies, cross-sectional studies, observational studies, clinical practice guidelines, consensus recommendations, and relevant textbook chapters. Studies addressing preoperative laboratory investigations in general surgery, ambulatory surgery, anesthesiology, oral and maxillofacial surgery, implant dentistry, and periodontal surgery were included because of their relevance to perioperative patient assessment. Particular emphasis was placed on evidence evaluating the diagnostic yield of routine laboratory investigations, their influence on clinical decision-making, prediction of perioperative complications, and impact on healthcare costs and patient outcomes.

Articles focusing exclusively on emergency surgery, trauma surgery, acute medical emergencies, or non-surgical patient populations were excluded. Publications lacking relevance to preoperative laboratory investigations or perioperative patient assessment were also excluded.

The selected literature was critically evaluated with respect to:

1. The prevalence of clinically significant abnormalities detected through routine laboratory investigations.
2. The impact of abnormal laboratory findings on treatment planning and perioperative management.
3. The predictive value of laboratory investigations for postoperative complications.
4. The comparative utility of routine versus selective testing strategies.
5. The role of laboratory investigations in medically compromised patients undergoing periodontal surgery.
6. The applicability of personalized medicine, precision dentistry, and patient-specific risk assessment in determining investigation requirements.

The findings were synthesized narratively to evaluate whether routine preoperative blood investigations are justified for all patients undergoing periodontal surgical procedures or whether a selective, risk-based approach provides a more evidence-based and clinically appropriate strategy. Any differences regarding article inclusion were resolved through discussion until consensus was achieved. The overall literature search and study selection workflow is summarized in figure 1.

Human studies and clinical evidence

For several decades, the necessity of routine preoperative laboratory investigations in healthy individuals undergoing elective surgical procedures has remained a topic of considerable debate. A substantial body of evidence from anesthesiology, general surgery, oral and maxillofacial surgery, and dental literature indicates that indiscriminate laboratory testing in asymptomatic patients provides limited clinical benefit and rarely alters patient management. One of the earliest comprehensive evaluations was conducted by Turnbull and Buck, who reviewed the value of preoperative screening investigations in otherwise healthy individuals and demonstrated that routine testing contributed little information beyond that obtained through careful history-taking and physical examination.⁹ Similarly, Korvin reported that abnormal laboratory findings were identified in only a small proportion of routinely screened patients and concluded that routine investigations should not be mandatory in the absence of specific clinical indications.⁶ Robbins and Rose evaluated routine coagulation screening and found that abnormalities identified by laboratory testing could frequently be predicted from a detailed bleeding history. They concluded that routine coagulation testing had limited value when used indiscriminately in healthy individuals.⁷ The economic implications of unnecessary investigations were highlighted by Sandler, who reported that comprehensive medical history-taking and physical examination were adequate for perioperative assessment in the majority of patients. Furthermore, unnecessary testing often generated false-positive results, resulting in additional investigations, treatment delays, increased patient anxiety, and higher healthcare expenditure.⁸ A landmark systematic review by Munro et al. critically evaluated the evidence supporting routine preoperative investigations and concluded that there was insufficient evidence to justify routine laboratory testing in asymptomatic patients undergoing elective surgical procedures.¹⁰ The review further demonstrated that investigations such as bleeding time, prothrombin time, and activated partial thromboplastin time rarely identified clinically important abnormalities and were poor predictors of perioperative complications. Subsequently, Bryson demonstrated that routine laboratory investigations altered perioperative management in only a small proportion of American Society of Anesthesiologists (ASA) Class I and II patients undergoing elective surgery.²⁹ Most abnormal results did not influence anesthetic or surgical decision-

making. The ASA classification system used in perioperative risk assessment has been further elaborated and validated by Daabiss.³⁰ Similarly, Soares et al. prospectively evaluated routine laboratory investigations in low-risk patients undergoing minor and intermediate surgical procedures and found that although abnormal results were occasionally detected, very few investigations resulted in modification of the planned treatment approach.²³ The value of eliminating routine testing has also been investigated in ambulatory surgical settings. Chung et al. demonstrated that omission of routine preoperative investigations in ambulatory surgery did not adversely affect perioperative outcomes, postoperative complications, or patient safety.³¹ These findings further support the concept that selective testing represents a more rational approach than universal screening. In a large study assessing the utility of preoperative investigations, Kannaujia et al. evaluated thousands of laboratory tests performed before elective surgery and reported that only a small proportion yielded clinically significant abnormalities.¹ Importantly, most abnormal findings had already been suspected during the preoperative assessment based on patient history and clinical examination. The investigators estimated that nearly 70% to 80% of routinely ordered investigations were unnecessary. The role of routine blood glucose assessment has also been questioned. In a systematic review evaluating preoperative glucose and glycated hemoglobin testing, Bock et al. found insufficient evidence to support universal screening in otherwise healthy individuals undergoing elective non-cardiac surgery.¹⁹ However, selective testing may be appropriate for patients presenting with risk factors suggestive of diabetes mellitus. Evidence from dental practice has produced similar findings. Miller and Westgate investigated comprehensive medical screening in dental patients and identified previously undiagnosed systemic conditions, including diabetes mellitus and hypertension.³² While these findings emphasized the importance of opportunistic screening in dentistry, the authors concluded that investigations should be guided by individual risk assessment rather than prescribed routinely. More recent evidence from oral and maxillofacial surgery further supports a selective testing strategy. Seo et al. evaluated the necessity of preoperative laboratory investigations in office-based oral and maxillofacial surgery and reported that routine testing seldom altered treatment decisions in healthy individuals.²⁵ The authors recommended that investigations should be individualized according to systemic health status, patient age, and procedural complexity. Similarly, Mishra et al. examined the utility of preoperative laboratory testing in ASA I and ASA II patients undergoing ambulatory surgery and concluded that elimination of routine investigations did not compromise patient safety or surgical outcomes.²⁷ In another important analysis of low-risk ambulatory surgical procedures, Benarroch-

Gampel et al. demonstrated substantial overutilization of laboratory investigations and emphasized the need for evidence-based guidelines to reduce unnecessary testing and optimize healthcare resource utilization.²⁶

Collectively, the available evidence consistently demonstrates that routine laboratory investigations in asymptomatic patients undergoing elective procedures rarely influence treatment planning, infrequently detect unsuspected clinically significant disease, and have limited ability to predict perioperative complications. The current literature strongly supports an individualized, risk-based approach in which laboratory investigations are ordered selectively according to the patient's medical history, systemic health status, medication profile, and planned surgical procedure rather than as part of a universal screening protocol.^{1,2,9,10,19,23,25-27,29,31}

The literature evaluating preoperative laboratory investigations comprises evidence of varying methodological quality. To facilitate interpretation of the available data, the studies and recommendations reviewed in this article were categorized according to conventional evidence hierarchies (Table 1). Most high-quality evidence originates from systematic reviews, clinical guidelines, and large observational studies in anesthesiology, ambulatory surgery, general surgery, and oral and maxillofacial surgery. In contrast, direct periodontal-specific evidence remains limited.

As shown in table 1, the strongest available evidence consistently demonstrates that routine preoperative laboratory investigations provide limited benefit in medically healthy individuals undergoing low-risk surgical procedures. However, because much of the evidence has been derived from broader surgical populations rather than periodontal patients specifically, caution should be exercised when extrapolating recommendations directly to periodontal surgical practice. Consequently, current recommendations support selective laboratory testing guided by patient-specific risk factors, systemic health status, medication use, and procedural complexity.

To further illustrate the evidence underpinning current recommendations, the principal studies evaluating the diagnostic yield, clinical utility, and impact of routine preoperative laboratory investigations are summarized in table 2.

Although the available literature consistently supports a selective approach to preoperative laboratory testing, careful consideration must be given to both the strengths and limitations of the current evidence base. Table 3 summarizes the principal advantages and shortcomings of the available literature relevant to periodontal surgical practice.

Table 1. Hierarchy and Strength of Evidence Supporting Selective Preoperative Laboratory Testing

Level of Evidence	Type of Evidence	Representative References	Principal Findings	Strength of Recommendation
Level I	Clinical practice guidelines and systematic reviews	NICE Guidelines. ¹¹ Munro et al. ¹⁰	Routine laboratory investigations are not recommended for healthy individuals undergoing elective surgery; investigations should be requested only when clinically indicated.	Strong
Level II	Randomized controlled trials*	Limited direct periodontal evidence; available surgical RCTs and prospective interventional studies	Routine testing rarely alters perioperative management or improves clinical outcomes in low-risk patients.	Moderate
Level III	Prospective cohort and observational studies	Benarroch-Gampel et al. ²⁶ Seo et al. ²⁵ Soares et al. ²³ Mishra et al. ²⁷ Kannaujia et al. ¹	Routine investigations detect few clinically significant abnormalities and rarely influence treatment planning; selective testing is more cost-effective.	Moderate
Level IV	Narrative reviews, expert reviews, and textbook chapters	Smetana and Macpherson, ² Krishnan and Parida. ¹⁷ Lupp and Almeida-Silva. ¹⁸	Emphasize individualized patient assessment based on medical history, systemic disease, medications, and surgical complexity.	Moderate to Low
Level V	Expert opinion and biological rationale	Historical reports, physiology of wound healing, precision dentistry concepts. ^{3-5,13}	Laboratory investigations should complement—not replace—clinical judgment and comprehensive medical evaluation.	Low

Table 2. Summary of Key Studies Evaluating Routine Preoperative Laboratory Investigations

Author (Year)	Study Design	Population/Setting	Key Findings	Clinical Implications for Periodontal Surgery
Korvin (1975)	Observational study	Surgical patients undergoing routine admission screening	Routine investigations identified few clinically important abnormalities and rarely influenced management.	Supports selective testing based on clinical indications rather than universal screening.
Robbins and Rose (1979)	Observational study	Patients undergoing coagulation screening	Abnormal coagulation test results were often predictable from bleeding history alone.	Routine coagulation testing is unnecessary in patients without a positive bleeding history.
Turnbull and Buck (1987)	Review of preoperative investigations	Healthy individuals undergoing elective surgery	Medical history and physical examination were more valuable than indiscriminate laboratory testing.	Thorough preoperative assessment should remain the cornerstone of periodontal treatment planning.
Munro et al. (1997)	Systematic review	Elective surgical patients	Insufficient evidence supports routine laboratory testing in asymptomatic patients.	Provides high-level evidence against mandatory preoperative blood investigations.
Chung et al. (2009)	Prospective study	Ambulatory surgical patients	Elimination of routine investigations did not increase perioperative complications.	Supports omission of routine testing in healthy periodontal patients undergoing minor procedures.
Soares et al. (2013)	Prospective observational study	Low-risk patients undergoing minor and intermediate surgery	Few abnormal results resulted in changes in perioperative management.	Routine investigations are unlikely to alter periodontal treatment decisions in low-risk patients.
Bock et al. (2015)	Systematic review	Elective non-cardiac surgery	Limited evidence supports universal preoperative glucose or HbA1c testing.	Glycemic assessment should be targeted toward individuals with diabetes or risk factors for dysglycemia.
Benarroch-Gampel et al. (2012)	Large observational study	Patients undergoing low-risk ambulatory surgery	Significant overutilization of laboratory investigations was identified.	Highlights economic and resource implications of unnecessary testing.
Miller and Westgate (2014)	Cross-sectional screening study	Dental patients presenting for care	Previously undiagnosed systemic diseases were identified, but screening should be risk-directed.	Supports opportunistic screening in selected periodontal patients rather than universal blood testing.
Kannaujia et al. (2020)	Observational study	Elective surgical patients	Most abnormal laboratory findings were predictable from medical history and examination; many tests were unnecessary.	Reinforces individualized risk assessment before requesting investigations.
Seo et al. (2023)	Retrospective observational study	Office-based oral and maxillofacial surgery patients	Routine investigations seldom altered treatment planning or surgical management.	Represents the most directly applicable evidence supporting selective testing in periodontal and implant surgery.

Table 3. Suggested Laboratory Investigations According to Clinical Indication

Clinical Scenario	Suggested Investigation(S)	Rationale
Healthy ASA I patient undergoing minor periodontal surgery	None routinely required	Medical history and examination usually sufficient
Known diabetes mellitus	Fasting blood glucose, HbA1c	Assess metabolic control and healing potential
Suspected undiagnosed diabetes	Random blood glucose, HbA1c	Detect occult dysglycemia
Warfarin therapy	INR	Assess anticoagulation status
DOAC therapy	Usually, no routine coagulation testing	Management based on drug timing and procedural risk
History of unusual bleeding	CBC, platelet count, PT, INR, aPTT	Identify coagulation abnormalities
Liver disease	CBC, PT/INR, liver function tests	Evaluate bleeding risk and metabolic function
Chronic kidney disease	CBC, renal function tests	Assess anemia and renal status
Extensive regenerative surgery or implant placement with systemic risk factors	Disease-specific investigations	Optimize healing and risk management

DISCUSSIONS

Although this review adopted a structured literature search based on PRISMA 2020 principles to improve transparency, it should be interpreted as a narrative review and not as a formal systematic review. The findings of the broader surgical literature are of considerable importance for periodontal surgical practice. Most periodontal procedures are performed on an outpatient basis under local anesthesia and are associated with limited surgical trauma, minimal blood loss and negligible physiological stress. Therefore, the indiscriminate use of routine laboratory investigations prior to periodontal surgery warrants critical appraisal.

Minor Surgical Procedures in Periodontics

The findings from the broader surgical literature are highly relevant to periodontal practice. Most periodontal surgical procedures are performed in outpatient settings under local anesthesia and are associated with minimal blood loss, limited tissue trauma, and negligible physiological stress. Consequently, the routine prescription of laboratory investigations before periodontal surgery warrants critical evaluation. Minor periodontal procedures such as gingivectomy, gingivoplasty, frenectomy, crown lengthening, and uncomplicated open flap debridement generally exhibit low postoperative morbidity. In healthy individuals classified as ASA I, the probability of routine laboratory investigations identifying clinically significant abnormalities is extremely low. Current evidence suggests that detailed medical history taking combined with appropriate clinical examination provides adequate information for preoperative assessment in the majority of such patients.^{2,10,29} Routine complete blood counts, coagulation profiles, biochemical investigations, and metabolic screening tests therefore cannot be universally justified for healthy individuals undergoing minor periodontal procedures. Furthermore, indiscriminate testing may paradoxically expose patients to potential harm through false-positive findings, unnecessary specialist referrals, delays in treatment, increased patient anxiety, and additional financial burden.^{1,8,10}

Advanced Periodontal and Regenerative Therapy

Contemporary periodontal practice increasingly incorporates advanced regenerative procedures, including guided tissue regeneration, bone grafting, biologic mediators, growth factors, soft-tissue grafting, periodontal plastic surgery, and implant placement. These procedures often involve greater surgical complexity, longer operative times, and increased dependence on optimal healing responses. Although routine laboratory investigations remain unjustified in healthy patients undergoing such procedures, selective testing may be appropriate in individuals presenting with systemic conditions known to influence healing and regeneration. Patients with poorly controlled diabetes mellitus, chronic kidney disease, liver dysfunction, autoimmune disease, malnutrition, osteoporosis, or immunosuppressive therapy may demonstrate impaired wound healing and less predictable regenerative outcomes.^{17,19,22} Accordingly, laboratory investigations such as complete blood counts, fasting blood glucose estimation, glycated hemoglobin (HbA1c), renal function tests, liver function tests, and other disease-specific investigations may be considered clinically indicated. The decision to request such investigations should be individualized and based on the patient's medical status, planned surgical procedure, and anticipated healing requirements.

Bleeding Risk Assessment

Excessive bleeding remains one of the principal concerns during periodontal surgery. However, substantial evidence indicates that routine coagulation screening of all surgical patients is unnecessary and provides limited additional diagnostic value. A comprehensive bleeding history remains the most reliable predictor of perioperative hemorrhagic risk. Clinicians should specifically inquire about:

- Previous excessive bleeding following surgery or dental extraction.
- History of spontaneous bleeding episodes.
- Easy bruising.

- Prolonged bleeding from minor wounds.
- Family history of bleeding disorders.
- Current anticoagulant or antiplatelet therapy.
- Liver disease.
- Alcohol abuse.
- Known hematological disorders.

Studies evaluating coagulation screening have demonstrated that routine laboratory testing contributes little when bleeding history is unremarkable.^{7,15,16} Patients with known coagulation disorders, liver disease, thrombocytopenia, or those receiving anticoagulant therapy may require selective laboratory evaluation before surgery. Monitoring the international normalized ratio (INR) remains particularly important in patients receiving vitamin K antagonists such as warfarin.^{14,24} Importantly, current evidence suggests that many periodontal procedures can be performed safely without interruption of anticoagulant therapy when appropriate local hemostatic measures are employed. Treatment decisions should therefore be individualized and discussed with the patient's physician whenever necessary.

Diabetes Mellitus and Periodontal Surgery

Diabetes mellitus represents one of the most important systemic modifiers of periodontal disease progression and periodontal wound healing. Poor glycemic control has been associated with impaired neutrophil function, delayed soft-tissue healing, reduced regenerative potential, increased susceptibility to infection, and lower implant survival rates. Given the substantial prevalence of undiagnosed diabetes worldwide, periodontal practitioners are uniquely positioned to identify individuals at risk. Clinical findings such as severe periodontitis, recurrent periodontal abscesses, xerostomia, delayed healing, recurrent oral infections, obesity, and a positive family history should prompt consideration of underlying dysglycemia.²⁰ Selective screening through chairside glucose assessment and glycated hemoglobin (HbA1c) testing may therefore be valuable in appropriately selected patients.^{19,20} However, current evidence remains insufficient to justify universal glucose screening in every patient undergoing periodontal surgery. Consequently, glucose testing should be guided by medical history, clinical findings, risk factors, and planned treatment complexity rather than applied indiscriminately.

Patients with Medical Challenges

The aging global population and advances in healthcare have resulted in an increasing number of medically compromised patients seeking periodontal treatment. Consequently, preoperative assessment must be individualized according to each patient's systemic health status. Patients with cardiovascular disease, chronic kidney disease, hepatic dysfunction, autoimmune disorders, malignancies, transplant history, immunodeficiency, or

immunosuppressive therapy frequently require additional evaluation before surgical intervention.^{17,18,22} Selective laboratory investigations may be indicated to:

1. Evaluate bleeding risk.
2. Assess glycemic control.
3. Determine immune competence.
4. Evaluate renal or hepatic function.
5. Optimize medication management.
6. Reduce the likelihood of postoperative complications.
7. In these patients, laboratory investigations should not be considered routine but rather targeted tools employed to answer specific clinical questions and facilitate safe surgical management.

Table 1 was added to distinguish the relative strength of evidence supporting each recommendation and to acknowledge that many current periodontal recommendations are derived from higher-level evidence generated in related surgical disciplines rather than from periodontal-specific randomized clinical trials.

Personalized Dentistry and Precision Medicine

The evolution of personalized medicine has important implications for periodontal surgery and perioperative assessment. Personalized dentistry seeks to tailor prevention and treatment strategies according to an individual's biological, genetic, behavioral, environmental, and systemic characteristics. Traditional approaches often relied upon standardized investigation protocols applied uniformly across patient populations. In contrast, contemporary precision-based healthcare emphasizes individualized risk assessment and evidence-based decision-making.^{3,4} Recent advances suggest that laboratory data should be interpreted within the context of comprehensive patient assessment rather than used as standalone screening tools. Integration of medical history, systemic disease burden, lifestyle factors, biomarkers, and risk profiles may improve clinical decision-making and treatment predictability.^{3-5,28} Future periodontal practice may increasingly incorporate:

- Point-of-care diagnostic technologies.¹³
- Salivary biomarkers for disease detection and monitoring.¹³
- Genetic susceptibility testing.³
- Digital health records and predictive analytics.^{4,5}
- Personalized risk assessment models.^{4,5}

Such approaches have the potential to identify patients who genuinely require additional laboratory investigations while simultaneously minimizing unnecessary testing in low-risk individuals. Overall, the available evidence strongly supports a transition from indiscriminate routine

Table 4. Controversies in Preoperative Testing

Clinical Question	Viewpoint Supporting Testing	Viewpoint Against Routine Testing	Current Recommendation
Should HbA1c be measured before implant placement?	Identifies uncontrolled diabetes and healing risk	Limited evidence supporting universal screening	Selective testing in high-risk patients
Should INR be obtained before every periodontal procedure in warfarin users?	Confirms therapeutic anticoagulation level	Minor procedures often safe with therapeutic INR and local hemostasis	INR assessment generally appropriate, individualized
Should DOAC users undergo coagulation testing?	Concern regarding perioperative bleeding	Routine testing rarely useful	Usually not required
Should platelet function tests be used?	May identify rare platelet dysfunction	Poor correlation with routine bleeding risk	Reserved for selected cases

testing toward individualized, evidence-based, and patient-centered assessment strategies. Selective laboratory investigations should be prescribed only when the results are expected to influence diagnosis, treatment planning, perioperative management, or clinical outcomes. Despite broad agreement that routine laboratory investigations should not be universally prescribed, several areas of preoperative assessment remain the subject of ongoing debate. Differences in study populations, procedural complexity, systemic disease burden, and evolving pharmacotherapy have resulted in uncertainty regarding the optimal use of selected laboratory investigations. Table 4 summarizes key controversies, differing viewpoints, and current evidence-based recommendations relevant to periodontal and implant surgical practice.

Strengths and Limitations of the Current Evidence

The evidence evaluating the utility of routine preoperative laboratory investigations consists of a heterogeneous body of literature that includes systematic reviews, clinical practice guidelines, prospective cohort studies, retrospective observational studies, cross-sectional investigations, and expert opinion. The highest-quality evidence is derived primarily from systematic reviews and large observational studies conducted in anesthesiology, general surgery, ambulatory surgery, and oral and maxillofacial surgery settings. Although these studies consistently demonstrate that routine laboratory investigations rarely alter perioperative management in medically healthy individuals, relatively few studies have directly examined periodontal surgical populations. Consequently, much of the current guidance for periodontal practice is based on extrapolation from related surgical disciplines rather than direct periodontal evidence.

Several limitations of the available literature should be considered. First, considerable heterogeneity exists among studies with respect to patient populations, healthcare settings, surgical procedures, laboratory investigations evaluated, and outcome measures reported. Such variability limits direct comparison between studies and precludes quantitative synthesis of findings. Second, the majority of studies focus on low-risk elective surgical procedures and therefore may not adequately reflect the circumstances encountered during advanced periodontal regenerative procedures, peri-implant surgery, or extensive

reconstructive interventions. Third, many investigations assessed the diagnostic yield of laboratory tests rather than their direct impact on clinically relevant outcomes such as wound healing, implant success, postoperative complications, or long-term treatment outcomes.

Sample size also varies substantially across the literature. While several large population-based studies evaluated thousands of patients and provide valuable information regarding test utilization and healthcare costs, other studies included relatively small cohorts and may have been underpowered to detect uncommon but clinically significant adverse events. Furthermore, the prevalence of systemic disease and abnormal laboratory findings differs among study populations, potentially influencing the generalizability of reported results.

The applicability of the existing evidence to periodontal surgery therefore warrants careful consideration. Most periodontal procedures are performed in outpatient settings under local anesthesia and are associated with limited blood loss and physiological stress, making the conclusions of ambulatory and minor surgical studies highly relevant. However, periodontal regenerative and implant procedures differ from many other outpatient surgical interventions because successful outcomes are heavily dependent on optimal wound healing and host-response factors. Consequently, the direct transferability of evidence from broader surgical disciplines may be limited in selected patient groups, particularly those with poorly controlled systemic diseases or multiple comorbidities.

The risk of bias within the available evidence should also be acknowledged. Many studies are observational in nature and are therefore susceptible to selection bias, confounding variables, institutional practice variations, and reporting bias. In addition, publication bias cannot be excluded because studies demonstrating no benefit of routine testing may be more likely to be published than studies reporting neutral findings. Clinical practice guidelines and expert recommendations, although valuable, may also be influenced by variations in healthcare systems, resource availability, and local practice patterns. Nevertheless, despite these limitations, the consistency of findings across multiple study designs and healthcare settings strengthens the overall conclusion that routine preoperative laboratory investigations provide limited benefit in medically healthy

individuals undergoing low-risk surgical procedures.

Overall, the current evidence strongly supports a selective, patient-specific approach to laboratory investigations rather than indiscriminate routine testing. However, there remains a clear need for well-designed periodontal-specific prospective studies evaluating the impact of laboratory investigations on surgical decision-making, wound healing, regenerative outcomes, implant success, and patient safety.

Areas of Controversy and Current Recommendations for Preoperative Laboratory Testing

Despite increasing evidence supporting selective rather than routine laboratory testing before periodontal surgery, several aspects of preoperative assessment remain controversial. These controversies largely arise from limited periodontal-specific evidence, differences in procedural complexity, and variation in patient-related risk factors.

Should HbA1c Be Assessed Before Implant Placement?

The role of preoperative glycated hemoglobin (HbA1c) testing before implant placement remains a topic of ongoing debate. Proponents argue that poor glycemic control is associated with impaired wound healing, increased susceptibility to infection, peri-implant inflammation, and reduced implant survival. Furthermore, a considerable proportion of adults may have undiagnosed diabetes mellitus, making preoperative HbA1c assessment an attractive screening tool before advanced periodontal and implant procedures. However, opponents of universal screening note that current evidence does not demonstrate improved implant outcomes through routine HbA1c testing in all patients. Most available studies evaluate patients with established diabetes rather than healthy implant candidates. Consequently, a selective approach appears more appropriate, with HbA1c assessment reserved for patients with known diabetes, symptoms suggestive of dysglycemia, significant risk factors, severe periodontitis, or those undergoing extensive regenerative and implant procedures.^{19,36,37}

Is INR Required in All Patients Receiving Warfarin?

The necessity of routine international normalized ratio (INR) assessment before periodontal surgery in patients receiving warfarin remains another area of discussion. Traditionally, INR measurement has been considered an essential component of perioperative risk assessment because excessive anticoagulation may increase bleeding risk. Nevertheless, growing evidence suggests that many minor periodontal and oral surgical procedures can be safely performed without interruption of warfarin therapy when the INR remains within the therapeutic range and appropriate local hemostatic measures are employed. Some authors therefore question whether repeated INR testing is required before every periodontal procedure, particularly in patients with stable anticoagulation and recently documented INR values. However, because warfarin

exhibits substantial interindividual variability and may be influenced by medications, diet, and systemic disease, INR assessment remains advisable when recent results are unavailable, when extensive surgery is planned, or when concerns exist regarding anticoagulation control.^{14,24,38,39}

How Should Patients Receiving Direct Oral Anticoagulants Be Managed?

The increasing use of direct oral anticoagulants (DOACs), including dabigatran, rivaroxaban, apixaban, and edoxaban, has introduced new challenges in perioperative dental care. Unlike warfarin, DOACs demonstrate relatively predictable pharmacokinetic profiles and generally do not require routine laboratory monitoring. Conventional coagulation tests provide limited information regarding their anticoagulant activity, and no universally accepted monitoring strategy exists for routine periodontal procedures. Current evidence suggests that most minor periodontal and dentoalveolar surgical procedures can be performed safely without interruption of DOAC therapy, provided appropriate local hemostatic measures are available. However, uncertainty persists regarding their management in patients undergoing extensive regenerative surgery, multiple implant placement, or procedures associated with an increased risk of bleeding. In such situations, individualized assessment and consultation with the patient's physician may be warranted. At present, routine coagulation testing for all patients receiving DOACs is not supported by available evidence.⁴⁰⁻⁴²

Should Platelet Function Testing Ever Be Used?

Routine platelet function testing before periodontal surgery remains controversial and is generally not recommended. Supporters argue that platelet function assays may help identify occult platelet dysfunction in selected patients, particularly those receiving antiplatelet medications or presenting with unexplained bleeding histories. However, numerous studies have demonstrated poor correlation between platelet function test results and actual perioperative bleeding risk. In addition, such investigations are costly, technically demanding, and not widely available. Consequently, platelet function testing should not be used as a routine screening tool before periodontal surgery. Its use should be restricted to carefully selected patients with suspected platelet disorders, unexplained bleeding tendencies, or when specifically recommended by a hematologist after specialist evaluation.^{16,43,44}

Overall Perspective

Collectively, these controversies highlight that the principal challenge is not whether laboratory investigations should be routinely performed, but rather identifying which patients are most likely to benefit from additional testing. The current body of evidence increasingly supports an individualized, risk-based approach that integrates medical history, systemic health status, medication use, procedural complexity, and anticipated healing requirements. Until

high-quality periodontal-specific prospective studies become available, clinical judgment will continue to play a central role in determining the need for preoperative laboratory investigations.^{1,2,10,11,19}

Clinical recommendations

Based on the available evidence from anesthesiology, general surgery, oral and maxillofacial surgery, and dental literature, a selective and individualized approach to laboratory investigations appears to be more appropriate than universal screening for all periodontal surgical patients.^{1,2,9,10,19,23,25-27,29,31}

The following clinical recommendations may be considered:

1. Routine blood investigations are not mandatory for all periodontal surgical patients

Current evidence does not support the routine prescription of preoperative laboratory investigations for every patient undergoing periodontal surgery. In asymptomatic and medically healthy individuals, routine testing rarely alters treatment planning or improves surgical outcomes.^{1,2,10,23,26,27,29}

2. Comprehensive medical history remains the cornerstone of preoperative assessment.

A detailed medical history, including current systemic diseases, medication use, allergies, previous surgical experiences, bleeding tendencies, and relevant family history, should form the foundation of preoperative evaluation.^{9,10,34,35}

In many cases, careful history taking and clinical examination provide more useful information than indiscriminate laboratory investigations and are often sufficient for identifying patients who require further assessment.⁶⁻¹⁰

3. Routine laboratory investigations are generally unnecessary for healthy patients undergoing minor periodontal procedures.

Patients classified as ASA I and undergoing procedures such as gingivectomy, gingivoplasty, frenectomy, crown lengthening, soft-tissue contouring, and uncomplicated flap surgery generally do not require routine blood investigations when medical history and clinical examination are non-contributory.^{10,23,25-27,29,30,31}

4. Laboratory investigations should be prescribed selectively according to clinical indications.

The decision to request laboratory tests should be determined by:

- Existing systemic disease.
- Significant medical history.
- Current medication use.
- Clinical findings.

- Suspected undiagnosed disease.
- Extent and complexity of planned surgery.
- Previous history of surgical complications.

Such an individualized approach is supported by current evidence and clinical guidelines.^{2,11,12,24,28,33}

5. Patients with diabetes mellitus may require glycemic assessment.

Blood glucose estimation and/or glycated hemoglobin (HbA1c) assessment may be appropriate in:

- Patients with known diabetes mellitus.
- Individuals with poor glycemic control.
- Patients showing clinical signs suggestive of undiagnosed diabetes.
- Patients scheduled for extensive regenerative or implant procedures.

Selective glucose assessment may facilitate improved treatment planning and reduce the risk of impaired postoperative healing.^{19,20,32}

6. Patients with bleeding risk factors require targeted hemostatic assessment.

Specific coagulation investigations should be considered in patients presenting with:

- History of excessive bleeding
- Family history of bleeding disorders
- Liver disease
- Hematologic disorders
- Anticoagulant therapy
- Antiplatelet therapy
- Suspected coagulation abnormalities

When indicated, investigations may include platelet count, prothrombin time (PT), international normalized ratio (INR), and activated partial thromboplastin time (aPTT).^{14-16,24}

7. Medically compromised patients may require procedure-specific investigations.

Additional laboratory investigations may be appropriate in patients with:

- Chronic kidney disease
- Hepatic disease
- Cardiovascular disease
- Autoimmune disorders
- Immunodeficiency
- Organ transplantation

- Malignancy
- Immunosuppressive therapy

The choice of investigations should be based on the patient's underlying condition and anticipated surgical requirements.^{17,18,21,22}

8. Advanced regenerative and implant procedures may justify more comprehensive assessment.

Although routine screening remains unjustified, patients undergoing advanced regenerative procedures, extensive bone augmentation, or implant therapy may benefit from selective assessment when systemic risk factors capable of influencing healing or osseointegration are present.^{17,19,22,25}

9. Unnecessary investigations should be avoided.

Routine investigations performed without specific clinical justification may result in:

- False-positive findings
- Additional consultations and referrals
- Increased healthcare expenditure
- Patient anxiety
- Delays in treatment

Clinicians should therefore request laboratory tests only when the results are expected to influence clinical decision-making or perioperative management.^{1,8,10,26}

10. Personalized risk-based assessment should be adopted.

Modern periodontal care should move away from universal testing protocols toward patient-centered risk assessment models. Decisions regarding laboratory investigations should integrate:

- Medical history
- Clinical findings
- Systemic health status
- Medication profile
- Surgical complexity
- Individual risk factors

Such an approach is consistent with the principles of personalized medicine and precision dentistry and is likely to optimize patient safety while minimizing unnecessary resource utilization.^{3-5,13}

Summary Recommendation

In contemporary periodontal practice, laboratory investigations should be regarded as adjunctive diagnostic tools rather than routine prerequisites for surgery. Their use should be guided by clinical judgment, patient-specific risk factors, and the likelihood that test results will influence treatment planning or postoperative management.^{2,3-5,11,12,28}

Future perspectives

The recommendations regarding preoperative laboratory investigations in periodontal surgery are largely extrapolated from evidence generated in anesthesiology, general surgery, ambulatory surgery, and oral and maxillofacial surgery. Although this evidence consistently supports selective rather than routine testing, there remains a relative scarcity of periodontal procedure-specific studies evaluating the direct impact of laboratory investigations on surgical outcomes. Future research should therefore focus on the development of evidence-based, periodontal-specific preoperative assessment guidelines that account for the unique biological and clinical characteristics of periodontal and peri-implant surgical procedures.^{2,11,17,25} Prospective clinical studies are needed to evaluate:

- The prevalence of clinically significant laboratory abnormalities among periodontal surgical patients.
- The influence of selective laboratory investigations on treatment planning and perioperative decision-making.
- The relationship between laboratory parameters and periodontal wound-healing outcomes.
- The cost-effectiveness of selective testing strategies in periodontal practice.
- The impact of systemic diseases on regenerative and implant-related treatment outcomes.^{17,19,25,27}

An important future direction involves the development and validation of comprehensive periodontal surgical risk-assessment models. Such models may integrate demographic factors, systemic health status, medication use, behavioral risk factors, and procedure-related variables to assist clinicians in identifying patients who may benefit from additional investigations.^{4,5} Advances in personalized medicine and precision dentistry are also expected to transform preoperative patient assessment. Rather than relying upon generalized testing protocols, future approaches will likely focus on individualized diagnostic pathways that provide patient-specific information relevant to surgical risk and healing potential.³⁻⁵

Emerging technologies that may influence future periodontal assessment include:

- Point-of-care diagnostic testing capable of providing rapid chairside information regarding glucose levels, inflammatory status, and systemic health indicators.¹³
- Salivary biomarker analysis for the assessment of inflammatory burden, disease activity, host response, and treatment prognosis.¹³
- Genetic and epigenetic profiling to identify individuals at increased risk of periodontal disease progression, impaired healing, or adverse treatment outcomes.³
- Digital health records and integrated clinical decision-support systems that facilitate real-time risk stratification and evidence-based treatment planning.^{4,5}

- Artificial intelligence-assisted predictive models capable of combining clinical, radiographic, laboratory, and behavioral data to support individualized perioperative decision-making.^{4,5}

The growing emphasis on value-based healthcare further highlights the importance of avoiding unnecessary investigations while ensuring patient safety. Future assessment strategies should therefore strive to maximize diagnostic benefit while minimizing healthcare costs, delays in treatment, and patient burden.^{1,8,26} Ultimately, the future of periodontal surgical assessment is likely to move away from indiscriminate laboratory screening toward a precision-based model in which investigations are prescribed selectively according to individual patient risk, systemic health status, and procedural complexity. Such an approach has the potential to improve treatment predictability, optimize resource utilization, and enhance overall patient care.³⁻⁵

CONCLUSION

The available evidence does not support the routine prescription of blood investigations for all patients undergoing periodontal surgical procedures. Studies from anesthesiology, general surgery, ambulatory surgery, oral and maxillofacial surgery, and dental practice consistently indicate that routine laboratory investigations in asymptomatic and medically healthy individuals rarely alter treatment planning, infrequently predict postoperative complications, and generally do not improve clinical outcomes. Comprehensive medical history taking and careful clinical examination remain the most important components of preoperative assessment.

In the majority of patients, these measures are sufficient to identify systemic diseases, medication-related concerns, bleeding tendencies, and other conditions that may influence periodontal surgical management. Laboratory investigations should therefore be requested selectively and based on specific clinical indications rather than as part of a universal screening protocol. Patients with diabetes mellitus, bleeding disorders, anticoagulant therapy, hepatic dysfunction, renal disease, anemia, immunosuppressive conditions, or other significant systemic illnesses may benefit from targeted investigations tailored to their individual risk profile and treatment requirements. Similarly, patients undergoing complex regenerative procedures, extensive bone augmentation, mucogingival surgery, or implant therapy may require a more comprehensive preoperative assessment when systemic or local factors capable of influencing wound healing and treatment outcomes are present. The growing emphasis on evidence-based practice, personalized medicine, and precision dentistry supports a transition from indiscriminate laboratory screening toward individualized risk assessment. Future advances in point-of-care diagnostics, salivary biomarkers, predictive analytics, and precision-based treatment planning may further improve the identification of patients who truly require laboratory investigations while minimizing unnecessary testing. In conclusion, the most rational approach to preoperative assessment in periodontology is a patient-centered, risk-based strategy that integrates medical history, clinical examination, systemic health status, medication profile, and procedural complexity. Laboratory investigations should be regarded as adjunctive diagnostic tools and prescribed only when their results are expected to influence clinical decision-making, enhance patient safety, or improve treatment outcomes.

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