
The Absorption Rate Of Absorbable Sutures In Oral Surgery Patients

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Abstract

Absorbable sutures are a type of suture material that undergo degradation and are gradually absorbed by body tissues over a certain period, eliminating the need for manual removal. To provide an understanding of the absorption characteristics of absorbable sutures, which is essential for clinicians in selecting the most appropriate material for each oral surgical procedure. This study is a qualitative research in the form of a literature review using secondary data collected in April 2026 from three scientific databases: PubMed, ScienceDirect, and Scopus. Articles were retrieved from various online scientific journal sources using the keywords "absorbable sutures," "absorption rate," "oral surgery," and "dental surgery sutures." The absorption rate of absorbable sutures is a crucial factor influencing wound healing outcomes in oral surgical procedures. Unlike other body tissues, the oral cavity has a unique and more aggressive environment, characterized by high moisture due to saliva, the presence of various enzymes (proteases and esterases), fluctuations in pH and temperature, and a high level of microbial colonization. Fast-absorbing sutures, such as polyglactin, are suitable for mucosal tissues as they reduce inflammatory reactions and improve patient comfort. However, suture selection must still be tailored to the wound condition and the required tissue strength.

Keywords: Absorbable Sutures; Absorption Rate; Oral Surgery; Wound Healing; Dental Sutures.

INTRODUCTION

Oral surgery is a procedure frequently performed in dental practice to manage various pathological and traumatic conditions of the oral cavity, including impacted tooth extraction, tissue biopsy, periodontal surgery, and dental implant placement (Fitri, 2023). One of the most important stages in oral surgical procedures is wound closure, which aims to maintain tissue stability, reduce bleeding, and accelerate the wound healing process (Pasca et al., 2022). Wound closure is commonly performed using suture materials that function to reapproximate tissues separated during surgery, thereby allowing optimal tissue regeneration to occur. The selection of an appropriate suture material is an important factor because it may influence wound stability, tissue response, and the success of postoperative healing (Rosyada et al., 2022).

Suture materials used in oral surgical procedures are generally classified into two main groups, namely absorbable and non-absorbable sutures. Absorbable sutures are materials capable of degradation and absorption by body tissues within a certain period without requiring manual removal (D’Cunha et al., 2022). The main advantage of absorbable sutures is the increased patient comfort due to the absence of additional visits for suture removal and the reduced risk of tissue trauma associated with the removal procedure. Therefore, absorbable sutures are widely used in various oral surgical procedures, particularly in intraoral mucosal tissues, which possess relatively rapid healing capacity (Protin et al., 2023).

In general, absorbable sutures can be classified based on their constituent materials into natural and synthetic types. Examples of natural absorbable sutures include catgut, whereas synthetic absorbable sutures commonly used in oral surgery include polyglactin 910 (Vicryl), polyglycolic acid (PGA), poliglecaprone, and Vicryl Rapide (Manfredini et al., 2022). The degradation mechanisms of absorbable sutures also vary, in which natural materials generally undergo enzymatic degradation, while synthetic materials degrade through hydrolysis. These differences in degradation mechanisms may affect the absorption rate, tensile strength, and inflammatory tissue response surrounding the surgical wound (Yaman et al., 2022).

The absorption rate of suture materials is one of the important characteristics that should be considered when selecting sutures for oral surgery. Sutures with excessively rapid absorption may lose

tensile strength before tissue healing is complete, thereby increasing the risk of wound dehiscence (Anushya et al., 2022). Conversely, sutures that persist too long within the tissue may cause tissue irritation, increase bacterial accumulation, and trigger prolonged inflammatory reactions. Therefore, selecting suture materials with an appropriate absorption rate is essential to ensure wound stability and support optimal tissue healing in oral surgery patients (La Rosa et al., 2024).

In addition to the type of suture material, several other factors may influence the absorption rate within the oral cavity, including the oral environment, the presence of saliva, masticatory activity, and the degree of bacterial colonization on the suture surface. The oral cavity represents a unique environment characterized by high humidity and a large microbial population, which may accelerate the degradation process of suture materials compared with other body tissues. Therefore, understanding the absorption characteristics of suture materials is highly important for clinicians in determining the most suitable material for each oral surgical procedure (Kandathil et al., 2023).

Based on these considerations, a literature review regarding the absorption rate of absorbable sutures in oral surgery patients is important to provide scientific insight into the characteristics of various suture materials used in clinical practice. A comprehensive understanding of the absorption properties of suture materials is expected to assist dentists in selecting the most appropriate material, thereby improving wound healing outcomes and minimizing postoperative complications in oral surgery patients.

RESEARCH METHODS

This study was a qualitative study in the form of a literature review using secondary data collected during April 2026 from three scientific databases, namely PubMed, ScienceDirect, and Scopus, through access to various online scientific journal sources. The article search was conducted using the keywords “absorbable sutures,” “absorption rate,” “oral surgery,” and “dental surgery sutures.”

The selected articles met the following inclusion criteria: articles published within the last five years (2021–2026), articles discussing the use of absorbable sutures in oral surgical procedures, articles explaining the absorption rate or absorption process of suture materials, articles available in full text, and articles written in English or Indonesian. The exclusion criteria included articles that did not explain the absorption characteristics of absorbable sutures, articles discussing the use of sutures in non-oral surgical procedures, articles lacking clear clinical data regarding wound healing or suture absorption, as well as non-scientific publications such as editorials, opinions, or conference abstracts.

Articles obtained from the databases were subsequently screened according to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flow diagram, resulting in several primary articles used as references in this literature review. In the final stage of article selection, quality assessment was performed using critical appraisal tools to ensure that the included articles possessed good scientific quality and relevance to the research topic. Secondary data obtained from the literature search process were then organized and filtered until a number of key articles relevant to the research topic were identified. The article selection process is illustrated in the PRISMA flow diagram (Figure 1) below.

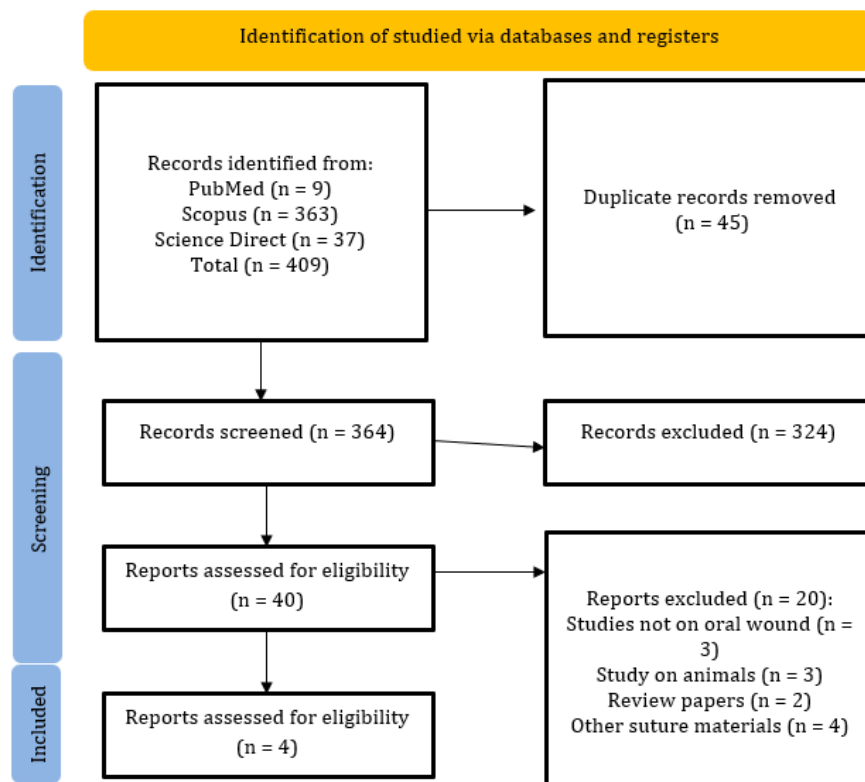


Figure 1. PRISMA Flow Diagram

In the initial stage of the literature search, a total of 409 articles were identified from the three databases, consisting of 9 articles from PubMed, 37 articles from ScienceDirect, and 364 articles from Scopus. All identified articles underwent duplicate removal, after which the remaining articles were screened based on title and abstract according to the predetermined inclusion and exclusion criteria. Following the initial screening process, the articles were further assessed for content relevance to the research topic, resulting in a number of articles available in full text. At this stage, several articles were excluded because they did not specifically discuss the absorption rate of absorbable sutures in oral surgical procedures or did not provide relevant clinical data. In the final stage of selection, the included articles were analyzed to identify the characteristics of the studies, the types of absorbable sutures used, the absorption rates of the sutures, and their effects on the wound healing process in oral surgery patients.

RESULTS AND DISCUSSION

The results of the analysis from the selected articles were subsequently presented in the form of descriptive tables containing information regarding the authors, year of publication, study design, type of suture material used, and research findings related to the absorption rate of absorbable sutures, as presented in Table 1.

Table 1. Summary of Studies on the Absorption Rate of Absorbable Sutures in Oral Surgery

No	Authors	Journal Title	Year	Study Design	Type of Suture	Absorption Rate Findings
1	Jingjing et al.	The Effect of Absorbable Collagen Suture for Oral Implant Repair on Wound Healing and Inflammation Factors	2025	Prospective, randomized, single-blind trial	Absorbable collagen suture	The absorption time in the absorbable suture group was shorter compared to the conventional suture group, and the

		of Gingival Crevicular Fluid				difference was statistically significant (P<0.05).
2	Szabelski et al.	Short-Term Hydrolytic Degradation of Mechanical Properties of Absorbable Surgical Sutures: A Comparative Study	2024	Comparative study	SafilQuick+, Monosyn Quick, Novosyn, Monosyn, and MonoPlus absorbable sutures	SafilQuick+ demonstrated the fastest absorption time, approximately 42 days.
3	de Romero et al.	Oral Post-Surgical Healing with Polyglycolic Acid Suture	2022	Prospective analytical clinical research	Polyglactin 910 resorbable suture	Polyglactin 910 (Vicryl Rapide®) showed a higher absorption rate compared to catgut and PGA sutures.
4	Tajmiri et al.	Effect of the Absorption Rate of Suture Material on Oral Mucosal Scar Formation: A Triple-Blind Randomized Controlled Trial	2023	Triple-blind randomized controlled trial	Vicryl Rapide resorbable suture	Vicryl Rapide demonstrated faster absorption, lower wound dehiscence, and reduced local tissue reactions.

The analysis of the reviewed articles also identified several types of absorbable sutures commonly used in surgical procedures, including their material composition and estimated absorption time, as presented in Table 2.

Table 2. Types, Composition, and Estimated Absorption Time of Absorbable Sutures

No	Authors	Type of Suture	Composition	Estimated Absorption Time
1	Jingjing et al.	Collagen (Catgut)	Natural collagen protein derived from animal intestinal tissue (sheep/cattle)	Approximately 70–90 days; initial tensile strength loss within 7–10 days
2	Szabelski et al.	Safil Quick+	Polyglactin 910 (copolymer of glycolic acid and lactic acid)	Approximately 42 days
3	de Romero et al.	Monosyn Quick	Glyconate copolymer (glycolide, trimethylene carbonate, ε-caprolactone)	Approximately 56 days
4	Tajmiri et al.	Novosyn	Polyglactin 910 (copolymer of glycolide and lactide)	Approximately 56–70 days
5	de Romero et al.	Polyglactin 910	90% glycolide and 10% L-lactide	Approximately 56–70 days
6	Tajmiri et al.	Vicryl Rapide	Specially processed fast-absorbing Polyglactin 910	Approximately 42 days

Suturing is a technique used in surgical procedures to reapproximate separated tissues or wounds using specialized thread materials to facilitate optimal wound healing. The use of collagen-based absorbable sutures has several advantages that have been reported in various studies. These sutures are derived from natural collagen with high biocompatibility, allowing them to be well accepted by body tissues while minimizing inflammatory reactions. In addition, collagen sutures possess natural absorption capabilities through enzymatic degradation, eliminating the need for suture removal following wound healing. According to a study by Sarkarat et al., absorbable collagen sutures

demonstrated good hemostatic properties and supported tissue healing because the collagen structure contributes to blood clot stabilization at the wound site. Another study by de Romero et al. also reported that collagen sutures provided favorable tissue adaptation and facilitated handling during suturing procedures, making them frequently used in soft tissues with rapid healing capacity, such as the oral mucosa (Iqbal et al., 2024).

The absorption rate of absorbable sutures is one of the crucial factors determining the success of wound healing in oral surgical procedures. Unlike other body tissues, the oral cavity possesses a unique and more aggressive environment characterized by high humidity due to saliva, the presence of various enzymes (proteases and esterases), fluctuations in pH and temperature, and extensive microbial colonization (Al-Balawi et al., 2023). These conditions significantly affect the degradation process of biomaterials, including suture materials, through hydrolytic and enzymatic mechanisms. Therefore, the selection of absorbable sutures must consider the balance between absorption rate and the ability to maintain tensile strength during the initial healing phase (Hagh et al., 2024).

In general, absorbable sutures are designed to undergo gradual degradation after fulfilling their function in maintaining tissue approximation. This degradation process primarily occurs through hydrolysis of ester bonds in synthetic polymers such as polyglycolic acid (PGA), polylactic acid (PLA), and copolymers such as polyglactin 910 (Vicryl). In addition, some materials undergo enzymatic degradation, particularly natural sutures such as catgut (Romero, 2022). The absorption rate is highly influenced by chemical composition, molecular weight, degree of crystallinity, and the physical structure of the suture material (monofilament or multifilament). One of the most commonly used sutures in oral surgery is Vicryl Rapide, which is a modified form of polyglactin 910 with a faster absorption profile. This suture loses tensile strength significantly within 7–10 days and is almost completely absorbed within approximately 42 days. These characteristics are highly suitable for oral mucosal tissues, which possess rapid regenerative capacity. Rapid absorption may reduce the duration of foreign body presence within tissues, thereby decreasing the risk of inflammatory reactions, infection, and excessive scar formation (Szabelski, 2024).

Several studies have demonstrated that the use of Vicryl Rapide provides favorable clinical outcomes, including high healing rates, low incidence of wound dehiscence, and minimal tissue reactions. These findings are particularly evident in minor surgical procedures such as third molar extraction, periodontal surgery, and endodontic procedures. Furthermore, compared with sutures such as Dexon (PGA) and catgut, Vicryl Rapide has been reported to offer advantages in terms of patient comfort, ease of handling, and lower inflammatory response. Nevertheless, rapid absorption also presents potential disadvantages, particularly if tensile strength is lost before the tissue achieves adequate healing strength (Tajmiri & Etemadi, 2024). During the early phase of wound healing (approximately the first 5–7 days), sutures must maintain wound stability to prevent dehiscence. Therefore, suture selection should be adjusted according to wound size, location, and tissue tension. In high-risk cases such as large wounds, highly mobile areas, or patients with systemic conditions such as diabetes mellitus, sutures with longer absorption times may be required to ensure tissue stability (Aktı et al., 2024).

In addition to material composition, suture structure also plays an important role in determining absorption rate and tissue response. Multifilament sutures, such as Vicryl, possess good flexibility and tensile strength; however, they have a larger surface area, making them more susceptible to fluid absorption and bacterial colonization. In contrast, monofilament sutures have smoother surfaces, making them more resistant to infection and associated with slower absorption rates, although they tend to be less elastic and more prone to breakage under certain pressures (Davide et al., 2026). Vicryl Rapide is a synthetic resorbable suture composed of polyglactin 910, a copolymer consisting of approximately 90% glycolide and 10% L-lactide. This suture is commonly coated with substances such as calcium stearate to reduce friction during tissue penetration and facilitate suturing. Vicryl Rapide is specifically designed for rapidly healing tissues because it undergoes rapid tensile strength reduction, losing approximately 50% of its strength within 5 days and nearly all tensile strength within 10–14 days. Total absorption by the body occurs within approximately 42 days through hydrolysis.

Consequently, this suture is frequently used in oral mucosal closure, skin closure, and soft tissue approximation that do not require prolonged mechanical support (Agung et al., 2023).

Studies have also demonstrated that suture integrity is closely associated with infection control and wound healing quality. Premature loss of sutures may increase the risk of complications such as edema, pain, erythema, and delayed healing. Clinical studies have shown that inflammatory symptoms such as pain and swelling tend to decrease significantly within 15–30 days postoperatively, particularly with the use of absorbable sutures that elicit minimal tissue reactions compared with non-absorbable sutures such as silk. In the context of modern oral surgery, the use of absorbable sutures is increasingly recommended because they provide several advantages, including the elimination of suture removal procedures, improved patient comfort, and greater efficiency in treatment time and cost (Upijaju et al., 2025). This is especially important in pediatric patients or individuals with limited access to healthcare services.

Overall, the absorption rate of absorbable sutures should be tailored to specific clinical requirements. Rapidly absorbable sutures such as Vicryl Rapide are highly suitable for oral mucosal tissues with rapid healing and small wounds, whereas slower-absorbing sutures such as polydioxanone (PDS) are more appropriate for tissues requiring long-term mechanical support. A comprehensive understanding of material characteristics, tissue environment, and patient conditions will assist clinicians in selecting the optimal suture material to minimize complications and improve postoperative wound healing outcomes in oral surgery (Klim et al., 2025).

CONCLUSION

The absorption rate of absorbable sutures greatly influences the success of wound healing in oral surgery. Rapidly absorbable sutures, such as specially processed polyglactin, are well suited for mucosal tissues because they reduce inflammatory reactions and improve patient comfort. However, suture selection must still be tailored to the wound condition and the required tissue strength in order to prevent complications such as wound dehiscence and infection.

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