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Comparative Evaluation of Oral Wound Dressing Materials: A Comprehensive Clinical Review

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ABSTRACT

In oral and maxillofacial surgery, a small number of drugs are used to treat wounds, pain, infection, and healing. The ingredients, uses, and effects of these drugs on oral tissues are not well understood, despite their widespread usage. The purpose of this study is to identify the ideal material for the treatment of intraoral wounds. Among the materials that can be used successfully are Alvogyl, Carnoy's solution (CS), bismuth iodoform paraffin paste (BIPP), zinc oxide eugenol (ZOE), and Whitehead's varnish (WV). Databases such as PubMed, Medline, and ScienceDirect will be used to conduct a systematic literature review spanning 2012 to 2022. "BIPP," "ZOE," "Alvogyl," and "intraoral wound dressing" will be the keywords used. The selection procedure for the articles that were searched will be explained using a PRISMA flowchart. There have been conflicting results, especially when deciding between ZOE and Alvogyl for intraoral wound dressings. Both of these materials have appropriate properties. However, because of the possibility of adverse consequences with prolonged use, BIPP has not been observed to be utilised regularly. Zinc oxide, eugenol, and alvogyl are equally suitable materials to use as intraoral dressings.

Keywords: Alvogyl, Bismuth Iodoform Paraffin Paste, Zinc Oxide Eugenol, Intraoral Wound Dressing

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Introduction

Since ancient times, wound dressings have been used to clean, cover, and shield wounds from outside dangers. The goal of a wound dressing is to promote the best possible healing while simultaneously keeping the site clean and free of harmful microbes. During dressing changes, the ability to remove dressings without further damaging the wound surface is crucial [1].

A hydrocolloid or semipermeable film covering is commonly used to heal abrasions because of the limited amount of fluid produced by wounds; in partial-thickness wounds like burns, donor sites, and superficial traumatic injuries, as well as in some surgical wounds, foam gauze or hydrocolloid dressings can be used to speed up healing rates; they also reduce discomfort and improve overall health [2]. The selection of a wound dressing is influenced by the site, the type of wound, the presence or risk of infection, and the length of the wound.

In oral and maxillofacial surgery, a small number of drugs are utilised to treat wounds, pain, infection, and healing [3-5]. The ingredients, uses, and effects of these drugs on oral tissues are little understood, despite their extensive usage. Among the materials that can be utilised successfully are Alvogyl, Carnoy's solution (CS), bismuth iodoform paraffin paste (BIPP), Whitehead's varnish (WV), and zinc oxide eugenol (ZOE) [6, 7]. BIPP can be used to bandage open wounds and fractures. This product can help prevent dry sockets [8]. Bismuth iodide and paraffin paste (BIPP) was initially reported by Rutherford Morison. Wounds heal faster and are less likely to become infected when bismuth and iodoform are added to paraffin. During World War I, when gunshots and

massive open wounds were widespread, the urgency of the situation led to this discovery. The chemical compound triiodomethane, also referred to as iodoform, has the formula CHI3.

Alveolar osteitis is the most common condition for which Alvogyl is prescribed. Butamben, sometimes referred to as butyl 4-aminobenzoate in science, is a topical ester anaesthetic. Iodoform is an antibacterial agent based on iodine. The aforementioned active components are combined with a wide variety of other chemicals to produce this paste-like consistency (Figure 1). The composition of Alvogyl as supplied by the manufacturer is listed in this table. Alvogyl was found by researchers to impede the healing of extraction sockets [9, 10].

Figure 1. Alvogyl

An aloe vera extract called Alvogyl and low-level laser therapy are used to treat burns. The researchers found that the Alvogyl treatment resulted in a significant increase in fibrous tissue, inflammatory reaction, and large cells. Patients found that areas treated with Alvogyl were less painful than those that weren't. One Alvogyl extraction socket was treated, while the other was left untreated. Samples were taken one week and two weeks after extraction to compare healing rates. The two therapies were contrasted. All of the therapies considerably decreased discomfort when compared to curettage alone [11, 12].

In the past, eugenol and its derivatives were employed to induce anaesthesia since zinc oxide and eugenol-based dressings were aware for their advantageous qualities. The fact that zinc oxide compounds are not antimicrobial should not be overlooked. Zinc oxide can be used as a cement or plaster to fill extraction sockets and gingival tissue. These materials physically block the passage of food and other objects [13].

Eugenol-containing and Eugenol-free components can be found in several goods (**Table 1**). Derivatives of the chemical eugenol have been used for inducing general anesthesia in clinical trials. When there is inflammation, possessing these characteristics frequently reduces postoperative discomfort. High concentrations of this compound have been connected to cytotoxicity, whereas low dosages have been linked to contact allergy.

Table 1. Zinc oxide containing different materials

Eugenol-containing	Non-eugenol-containing
Kalzinol	Coe-pak
Novitec	Perio care

Alemán Navas *et al.* [14] documented this case of dry socket using a zinc oxide and eugenol treatment in 2010. It was quite painful when left in the alveolus [14]. The surgery cannot start until these bandages are taken off. Products without ZOE remove the risk of allergy and cytotoxicity.

The Rationale of the Study

The outcomes of this systematic review will allow oral surgeons to make better decisions when choosing wound dressing materials.

Study Hypotheses

The properties of BIPP as an intraoral wound dressing are superior to those of ZOE and Alvogyl.

Aims of the Study

The purpose of this study is to identify the ideal material for intraoral wound treatment.

Materials and Methods

A systematic literature review from 2012 to 2022 was performed using databases such as PubMed, Medline, and ScienceDirect. The keywords used were “BIPP”, “ZOE”, “Alvogyl”, and “intraoral wound dressing” (**Table 2**). The PRISMA flowchart was used to describe the selection process of searched articles (**Figure 2**).

Table 2. Inclusion and exclusion criteria

№	Inclusion criteria	Exclusion criteria
1.	Case-control and randomized control studies, case reports, and case series	Systematic reviews or meta-analyses or expert opinions, or narrative reviews
2.	Published between 2012 and 2022	Out of the specified time range
3.	Studies including BIPP, ZOE, and Alvogyl.	Studies with treatment options other than these three dressing materials.
4.	The English language of publication	Language other than English
7.	In vivo (humans)	In vitro

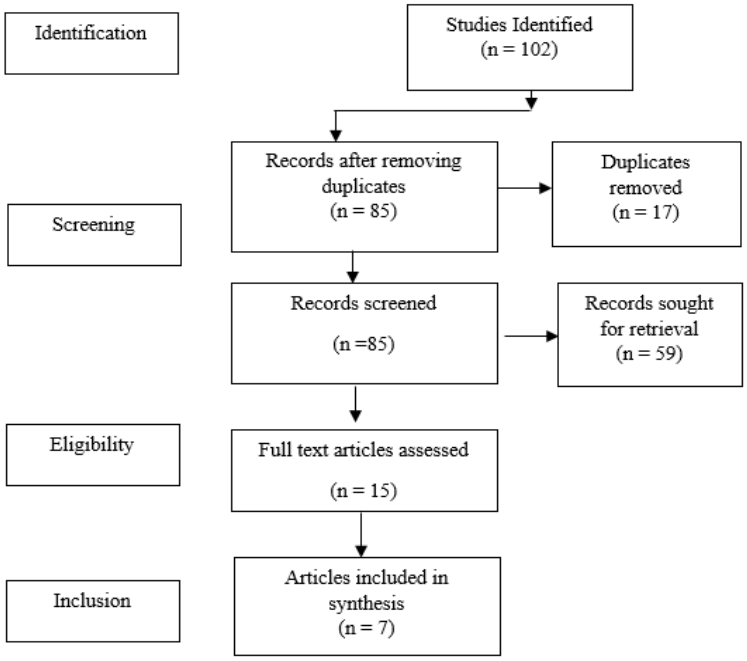

Figure 2. PRISMA flow diagram

Risk of Bias Assessment

The quality of the included studies was evaluated using the Cochrane risk of bias assessment technique (Table 3).

Table 3. Summary of Cochrane risk of bias assessment

Study	Selection bias/appropriate control selection/baseline characteristics similarity	Selection bias in randomization	Selection bias in allocation concealment	Performance-related bias in blinding	Reporting bias/Selective reporting of outcomes	Detection bias blinding outcome assessors	Accounting for confounding bias
Atwal and Cousin [15]	+	+	-	+	+	+	+
Agrawal *et al*. [16]	+	+	-	+	+	+	+
Charlu *et al*. [17]	+	+	+	-	+	+	+
Chaurasia *et al*. [18]	+	+	+	+	+	+	-

Faizel *et al*. [19]	+	+	+	+	+	-	+
Supe *et al*. [20]	+	+	+	-	+	+	+

Results and Discussion

Bismuth iodoform paraffin packs' distinctive qualities when applied as a wound dressing material were noted by Atwal and Cousin [15]. Reactions to BIPP packets are rare but well-known, they said. The most prevalent condition is a type IV hypersensitivity reaction to iodoform, which occurs in up to 10.9% of patients on repeat use and 2% of patients on primary exposure (pain, itching, rash). Bismuth poisoning has been reported in numerous cases. Poor intestinal absorption suggested that bismuth had been absorbed hematogenously over the large region of exposed raw cancellous bone inside the cystic cavity, even though it may seep into swallowed saliva.

Bismuth has topical antibacterial properties and can be used as an astringent, according to Agrawal *et al.* [16]. This feature supports BIPP's antibacterial properties by releasing diluted nitric acid upon hydrolysis. Because bismuth is known to interfere with the brain's oxidative metabolism, it can induce adverse consequences like neurotoxicity. Its toxicity manifests as stomatitis, nausea, and headaches. The patient may be spared a supra-major surgery, such as periodontal surgery, free fibular flap, or mandibular excision, with the use of BIPP and prolonged, cautious follow-up. The sole drawback is the higher risk of pathological fracture throughout the follow-up period. For a long time, the patient should be advised to follow a soft diet. This BIPP-based conservative therapy method can be used for benign lesions, cystic lesions, etc., but not for malignancies, where a hostile approach is still the preferred course of treatment.

Charlu *et al.* [17] assessed the qualitative features of BIPPs as intraoral wound dressing agents. The following parameters were scored during the intraoperative and postoperative periods: operability, haemostatic standing, pain relief, feeding state, epithelialisation, scar contracture, and biocompatibility. The results showed that, of the 10 patients, BIPP was used for the buccal mucosal defect in 6 of them, the labial mucosal defect in 2 of them, and the tongue and palatal defects in one each. The raw wound after resection was covered with a BIPP pack and held steady with Vicryl sutures in all of the patients. All patients accepted the BIPP dressing after surgery, and there were no adverse events or discomforts. The use of BIPP to cover the intraoral wound following surgery produced a satisfactory result [21].

To examine the effectiveness of the two most commonly used medicines (Zinc oxide eugenol and Alveogyl) for the treatment of dry sockets, Chaurasia *et al.* [18] assessed the prevalence and likely risk factors. After 30 minutes, 7 days, and 10 days, it was shown that the ZOE group's pain scores were significantly higher than those of the Alveogyl group. Consequently, it was determined that ZOE is superior to Alveogyl in the treatment of dry sockets for both immediate and long-term pain alleviation. To compare the effects of these materials on the healing of extraction sites, the authors advise more interventional research with a larger sample size.

Faizel *et al.* [19] carried out a similar study in which they evaluated the epidemiological characteristics associated with dry socket and prospectively measured and compared the effectiveness of Alvogyl and zinc oxide eugenol (ZOE) intra-alveolar dressings for the treatment of the disease [19]. The results showed that Alvogyl provided pain relief more quickly but not for very long. The most affordable and easily available medication for dressing was ZOE. But instead, action is started as soon as a diagnosis is made.

The impact of ZOE and Alvogyl in the treatment of dry sockets was also examined by Supe *et al.* [20]. Alvogyl is the most effective combination for treating dry sockets, according to this study. ZOE is an inexpensive and readily available dressing medication. Alvogyl was quicker to provide long-term pain relief and required fewer bandages, even though both medications showed promising results. However, even though Alvogyl is expensive for practicing dental surgeons, a bigger sample size is required to prove that it is unquestionably better than ZOE. Additionally, patients with systemic disorders should be considered in future studies.

Khalifah [22] reported another intriguing study result, stating that there is no widely accepted treatment of choice for alveolar osteitis, and multiple authors have recommended ZOE and alvogyl. Furthermore, no comparative studies for two or more materials existed before 2014. But in mild and moderate situations, ZOE performed better in this study than alvogyl. However, in circumstances of extreme and excruciating pain, neither agent worked.

The purpose of this systematic review was to evaluate the efficacy of several intraoral wound dressing materials, such as Alvogyl, ZOE, and BIPP. Numerous studies have detailed the different qualities and applications of these materials, and it is evident from the results above that ZOE and Alvogyl are the most widely accepted materials

of choice. Further research is necessary to support the use of BIPP in routine intraoral operations; nevertheless, it has not been reported to be utilised more frequently.

The results suggest that the key to selecting the appropriate agent is the adverse effects of intraoral dressing materials. As previously stated, BIPP has shown promising results; nevertheless, its use has been hindered and discontinued due to unintended consequences. Its utility as the dressing material for major surgeries like the removal of inflammatory dentigerous cysts has been supported by comparatively less research. In packing the cystic cavity, BIPP worked well as a dressing material since it healed the defect quickly, caused less discomfort for the patient, and was safe to use. During its brief use, the patient experienced no adverse local or systemic consequences. But its continued use is still dubious [23, 24].

In addition to the traditional ZOE, other treatments such as topical metronidazole, clindamycin, buccoadhesive metronidazole pills, and thick 2% lidocaine jelly have also been used to treat dry sockets. Nonetheless, most clinics still treat dry sockets with a zinc oxide eugenol dressing that is firmly placed in the extraction socket and irrigation with warm normal saline. Zinc oxide eugenol's accessibility and price, along with the satisfactory outcomes it produced, seem to have encouraged its continued usage. Furthermore, despite the literature's list of potential negative reactions to zinc oxide eugenol, including foreign body response, its use is nonetheless seen to be widespread [25].

It is important to differentiate between the type of injury in terms of the location and type of tissue involved (e.g., periodontium, extraction site, or extensive resection site) and the reason for the particular type of dressing (e.g., preventing infection, tissue coverage, haemostasis) when applying the matter of wound healing in patients. The dentist must always exercise caution and care when it comes to the aforementioned situations. This entails recording the patient's medical history and background as well as providing appropriate documentation of the method's rationale and the desired outcome. The potential challenges of the expected effect should be taken into account and, if necessary, addressed as a result [26].

All three of the materials covered in the present investigation should be included in future research to provide realistic comparisons that will aid dental surgeons in making decisions.

Conclusion

Alvogyl and zinc oxide eugenol are equally suitable materials of choice for use as intraoral dressings. Additional research is required to verify the effectiveness and safety of BIPP as a commonly used intraoral wound dressing material.

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Conflict of Interest: None

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