

Alvogyl Dental Dressing: A Potential Cause of Complicated Postextraction Non-healing Sockets: A Clinicopathologic Study of 7 Cases

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Abstract

Background: Packing a socket is a common practice to control hemostasis, promote healing and prevent complications after difficult tooth extractions. Alvogyl is a paste composed of different substances. Active ingredients ensure antiseptic and analgesic effects, while the inactive ingredient, the fern-derived Penghawar djambi fibers have styptic effects. It is claimed to be a resorbable and self-eliminating paste with little complications.

Purpose: To investigate the occurrence and types of complications in postextraction nonhealing sockets after application of Alvogyl and to determine if the fibrous component is resorbable and self-eliminating.

Methods: We performed a retrospective chart review over four years of 40 patients with a history of tooth extractions.

Results: We found seven patients with nonhealing sockets and a history of Alvogyl dental dressings. Some developed complications (alveolar osteitis, abscess, sinus formation, bony erosion and gingivitis) that prevented subsequent tooth implants. Histologically, three cases showed foreign body giant cell reactions with variably shaped membranous fibrous components that were initially confused as fungal hyphae or parasitic ova.

Conclusion: Dentists and oral surgeons should be aware of these potential complications associated with Alvogyl and the fact that it is non resorbable and not always a self-eliminating oral paste. Pathologists should also be aware of the histological appearances of this foreign material to avoid a diagnostic pitfall and incorrect management since the history of dental dressings is not always provided.

Keywords: Alvogyl; Dental dressing; Tooth extraction; Nonhealing socket

Introduction

Dental extraction is a common procedure sometimes associated with nonhealing dry sockets (alveolar osteitis (AO) and local complications. Several different dental and oral medicaments are used to promote healing in extraction sockets, treat dry sockets and prevent complications [1-3]. Alvogyl is a well-known dental dressing that was first described in the German literature in 1951[4,5]. The first detailed account of its effects on the healing of extraction sockets was in 1979[6,7]. Although it is claimed by the manufacturer to be a safe and efficient oral and dental medicament, several studies demonstrated detrimental effects on the healing of extracted sockets, aggravating dry sockets and encouraging infections[6,8,9]. We report a case series of seven cases of postextraction nonhealing sockets after application of Alvogyl. Three patients demonstrated residual Alvogyl fibers with foreign body reaction and local complications. Histologically, the foreign bodies were initially confused with fungal hyphae and parasitic ova.

Materials and Methods

This descriptive histology-based case series review was approved by the medical research committee in Rashid hospital. The patients' medical records were obtained and the histology specimens were retrieved. The research has been conducted in full accordance with the World Medical Association Declaration of Helsinki. We conducted a retrospective review

of 346 oral and dental histology specimens over four years from May 2011 to February 2015. The collected data was anonymized and de-identified prior to analysis. Oral and dental specimens that were removed after tooth extractions were collected. Patients with a history of extraction sites that failed to heal or who developed complications, for example dry sockets after tooth extractions were selected and included in the study as cases. Patients with a history of uneventful recovery after tooth extractions without complaints or complications were excluded from the selected cases. A computer retrieval search was used to collect the oral and dental specimens that were clinically labeled as nonhealing sockets, dry sockets, postextraction complications and tooth extractions. The history of the application of dental dressings and packing and their types was retrieved from the patients' files. The age and gender of each patient was recorded. Clinical data regarding the clinical presentation, number of extracted teeth, their location, the preoperative clinical impression, as well as follow up data (when available) and any associated local oral lesions or systematic diseases were collected. History of other previous dental or oral surgical interventions or trauma was also explored. History of smoking, alcohol drinking, diabetes mellitus and osteoporosis was collected. Intake of oral contraceptive pills and postmenopausal status in women was also recorded. Sections of 4-6 µm thickness were stained with routine hematoxylin and eosin (H and E) stain for each collected case. All of the H and E slides for each collected case were reviewed. Special stains, for example periodic acid Schiff (PAS), PAS with diastase, Alcian

blue, Masson trichrome, von Kossa, Grocott methenamine (GMS) and Prussian blue iron stain were performed for each case. The sections were also examined under polarized light for the detection of any refractile foreign materials.

Results

We found 40 patients who had a procedure for tooth extractions during the study period. Seven patients developed nonhealing sockets and persistent complaints after tooth extraction. The remaining 33 patients had uneventful recovery. None of the 33 patients had a history of dental packing or dressing. The seven patients who developed postextraction complications had a history of application of different types of dental dressings/materials including Alvogyl, amalgam and gutta percha (Table 1). The age range was between 23 and 50 with a mean age of 37 years. The male to female ratio was 1.3:1. None had a history of previous trauma or traumatic tooth extractions. Each patient had one extracted tooth, mostly commonly a molar tooth of the upper jaw. The symptoms were mainly pain, but some developed bleeding. Clinically, they presented as tender nodules or lumps of variable sizes, but usually less than 2.0 cm. The clinical impression was varied and included infection, abscess, granulation tissue and cysts. Two cases were confused with neoplasms. All of the patients had Alvogyl, one in combination with amalgam and another patient had gutta percha points, as well. One patient (case 4) had her tooth extracted and dressing placed abroad. Another patient (case 7) had his tooth extracted in a private clinic. The remaining patients had their teeth extracted in our institution. Three of the patients developed AO, one with abscess and sinus formation and another one with bony erosion. Another patient had gingivitis. The remaining three patients had no complications. All of the patients had good oral hygiene, except one patient (case 2) who had a poor oral condition with generalized gum recession. Two of the female patients were married (case 1 and 4). They were being treated hormonally and medically for infertility. One unmarried female patient (case 2) was clinically suspected of intersex, but had not received medical or hormonal treatment. She was sexually inactive and had no history of oral contraceptive (OCP) intake. One patient (case 4) had a previous history of tuberculosis with chronic sinusitis. Another patient (case 7) was medically treated for recurrent deep vein thrombosis because of thrombophlebitis. We lost follow up of two patients. The remaining patients had a follow up that ranged from one year to three years. Two patients were not suitable for tooth implants because of their oral conditions and local complications. The patients without complications had successful tooth implants. All of the female patients were non-smokers and did not drink alcohol. None had OCPs intake, menopause or osteoporosis. The male patients were smokers, but had no history of alcohol intake.

Histologically, the cases showed inflammation that varied from mild nonspecific chronic inflammation to marked mixed inflammation with abscess formation (Table 2). The fibrosis was generally mild. Most of the cases showed calcifications that varied from micro calcifications to large chunks of calcified materials. None had osteoid formation. Three cases showed hemorrhage. None showed hemosiderin pigments deposition. Three cases showed foreign bodies with variable intensity of foreign body giant cell reaction. Four cases did not reveal foreign materials or foreign body reaction. Three cases showed squamous epithelium that was represented in the sections, two of which showed either perforated or ulcerated hyperplastic inflamed epithelium. Cases 1, 4 and 6 showed similar foreign bodies composed of variably sized and shaped membranous structures (Figures 1 and 2). Some were elongated broad walls, while others were smaller oval or round. Some were either partly or completely calcified (Figure 1B). Foreign body type multinucleated giant cells were seen adjacent to the walls of these structures or "inside" them (Figure 1B). No eosinophils or neutrophils were seen in the vicinity of these structures. We did not find epithelioid granulomas in the case with

a history of tuberculosis (case 4) or in the other cases. The walls of the fibers were polarizing. Some showed septated walls arranged in vegetable-like cell chambers. Some of these foreign materials were seen within an abscess or perforating through the surface epithelium with transepithelial elimination (Figure 2). These structures were positive for PAS and GMS (Figure 3). Some sections showed calcified *Schistosoma* ova-like or *Trichuris* ova-like structures (Figure 1B).

Discussion

Alvogyl is an oral and dental dressing paste composed of various ingredients and consists of a thick brown fibrous paste [10]. Active ingredients include butamben, iodoform and eugenol that ensure antiseptic and analgesic effects. Other inert ingredients include olive oil, spearmint oil, sodium lauryl sulphate, calcium carbonate and water. Of interest, is the fern-derived *Penghawar djambi*, a Malayan term for the Fern indigenous in Indonesia. This fiber material is known to have hemostasis styptic effects when applied to wounds and ulcers. The

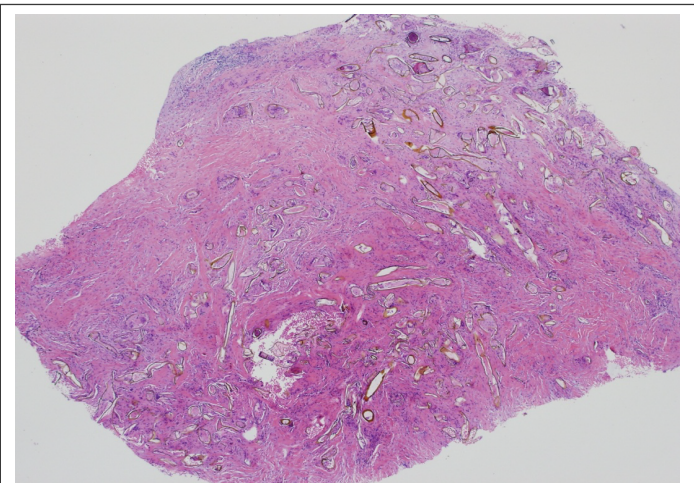


Figure 1: A) A fibrotic nodule studded with variably sized and shaped yellow to golden elongated membranous broad hyphae-like structures. Others were oval to round (hematoxylin-eosin, original magnification $\times 20$).

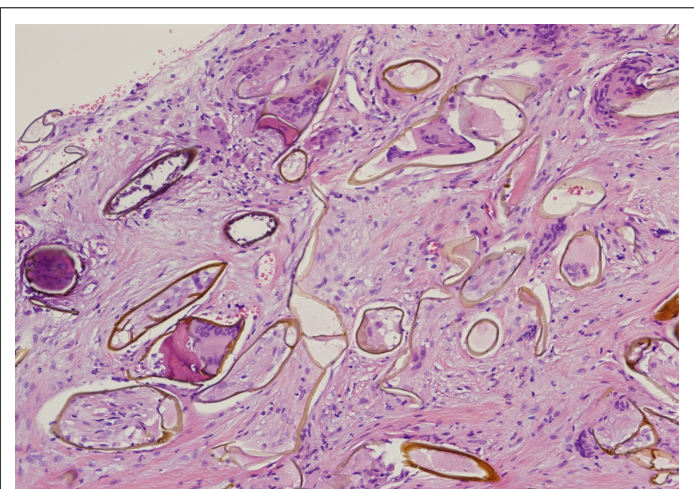


Figure 1: B) Multinucleated giant cells are seen partly engulfing the structures; some giant cells are seen "inside" the walls of the elongated membranous structures. Some of the structures were oval to round and partly calcified thus resembling parasitic eggs. Note the absence of eosinophils and neutrophils (H and E, $\times 200$).

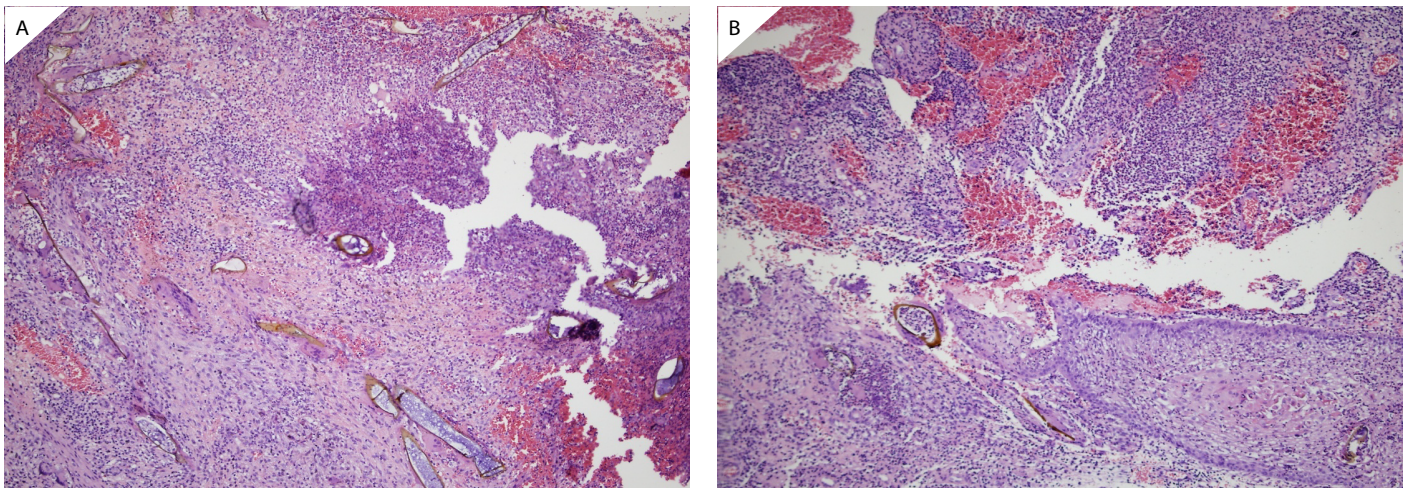


Figure 2: A) An abscess cavity filled with similar structures with scattered foreign type giant cells (H and E, ×200).
B) An inflamed sinus tract with similar structures perforating through the squamous epithelium (H and E, ×200).

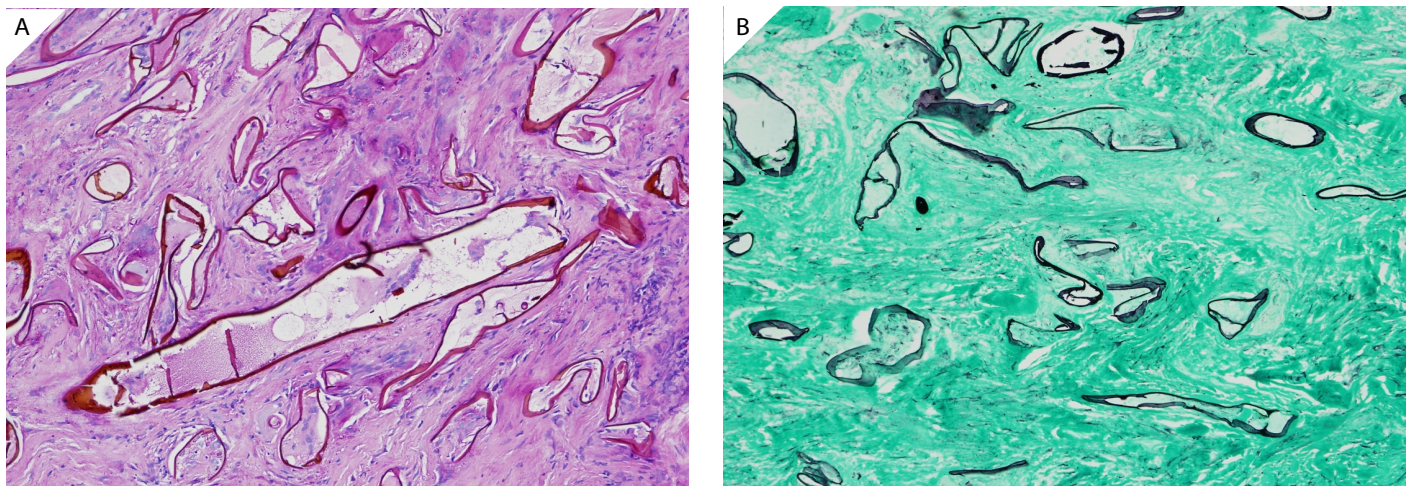


Figure 3: A) PAS special stain highlights the broad hypha-like walls, some with septae (H and E, ×200).
B) GMS special stain is also positive and highlights the broad hypha-like walls (H and E, ×200).

dressing of extraction socket by Alvogyl is considered by some to be a safe and effective management of dry sockets [3]. The product has been available and used in clinical practice for a long period. It is used mainly as a post extraction dressing in patients with a history of dry sockets and traumatic extractions. However, there are no manufacturer instructions of how long the paste remain in the socket since it is claimed to be self-eliminating [10].

On the other hand, there have been reports of adverse side effects associated with Alvogyl. A higher number of patients with infection of the extraction sockets after application of Alvogyl have been reported [8,9]. In addition, serious complications can occur if the dressing remains in place for a long period. One study demonstrated retarded wound healing after application of Alvogyl compared to controls [6]. This was found within one to two weeks after extraction. Some authors claim that the systematic application of Alvogyl after tooth extraction and treatment of post extraction infection and complications should not be advocated [6,11]. The treatment of non healing sockets after application of Alvogyl is removal of the dressing, profuse irrigation of the socket, a course of

antibiotics and oral mouth wash. Some emphasized regular observation of the healing process, as well [8]. There are many different ways of treating dry sockets[3]. Some authors advise alternative approaches to promote postextraction healing. Some recommend the use of broad spectrum antibiotics supplemented with resorbable clot stabilizing substances[2].

Others endorse the use of chlorhexidine gel directly applied to the socket[12]. Some authors have studied the use of bone graft, bioactive glass, freeze dried gel and laser[13,14]. However, it seems there is no consensus on the best option for treating complicated tooth extractions and AO[12]. If it is necessary to use Alvogyl or other applications, it is advisable to regularly observe the healing process and remove any residual dressing within days rather than weeks to ensure efficient spontaneous healing and prevent foreign body reaction and further complications[8,9]. Several local and systematic factors (smoking, trauma, OCPs) were found to have negative effects on the healing process after tooth extraction[15-17]. Local factors include tooth site, traumatic extraction and multiple extraction sites. Systematic factors might include old age, smoking, OCPs, hypertension and diabetes mellitus. No gender differences were observed.

Case	Age	G	Previous procedure/trauma	Location	Symptoms/Signs	Clinical impression	Dressing	Complications	Oral condition/lesion	Clinical conditions	Follow up
1	35	F	Tooth extraction (6 mths)/No	Upper left 6 tooth	Pain (5 mths)/lump	Abscess	Alvogyl	Alveolar osteitis	Good/ None	Infertility	No
2	50	F	Tooth extraction (3 yrs)/No	Upper left 6 tooth	Pain (3 yrs)/lump	Infection	Alvogyl+Gutta percha	Gingivitis	Poor/ Gum recession	Intersex	2 yrs (No implant)
3	23	M	Tooth extraction (1 mth)/No	Upper right 4 tooth	Pain (1 mth)/lump	Granuloma, cyst	Alvogyl	None	Good/None	None	2 yrs (implant)
4	48	F	Tooth extraction (5 wks)/No	Lower left 8 tooth	Pain (1 mth)/lump and pus discharge	Granulation tissue TB, malignancy	Alvogyl+ Amalgam	Abscess+ Alveolar osteitis	Good/None	Sinusitis, TB pericarditis, infertility	1 yr (No implant)
5	27	M	Tooth extraction (3 wks)/No	Upper left 6 tooth	Pain (3 wks)/lump	Granuloma, cyst	Alvogyl	None	Good/None	None	2 yrs (implant)
6	40	M	Tooth extraction (3 wks)/No	Upper left 5 tooth	Bleeding (2 wks)/lump	PGCG, infection	Alvogyl	Bone erosion + Alveolar osteitis	Good/None	None	No
7	37	M	Tooth extraction (3 wks)/No	Lower right 7 tooth	Bleeding (2 wks)/lump	Granulation tissue	Alvogyl	None	Good/None	Thrombophlebitis+ DVT, Angiolipomas	3 yrs (implant)

Table 1: The clinical features of the collected cases of non healing sockets after tooth extraction.

G: gender, F: female, mths: months, yrs: years, M: male, wks: weeks, TB: tuberculosis, PGCG: peripheral giant cell granuloma, DVT: deep vein thrombosis.

Case	Inflammation	Fibrosis	Calcification	Hemorrhage	Foreign bodies	Multinucleated giant cells	Epithelium
1	Mild focal chronic (nonspecific)	Mild	Focal microcalcification	No	Present (Alvogyl type)	Numerous foreign body type	Absent
2	Moderate chronic (plasma cell granuloma)	Mild	Focal microcalcification	No	Absent	None	Absent
3	Mild focal chronic (nonspecific)	No	Marked macrocalcification and focal osteoid formation	No	Absent	None	Absent
4	Marked mixed (abscess +sinus)	Moderate	Moderate macrocalcification	Moderate diffuse	Present (Alvogyl type)	Numerous foreign body type	Hyperplastic, perforated
5	Xanthogranulomatous (abscess)	No	No	No	Absent	None	Hyperplastic, intact
6	Marked mixed (abscess)	Mild	Focal microcalcification	Moderate diffuse	Present (Alvogyl type)	Few scattered foreign body type	Hyperplastic, ulcerated
7	Mild chronic (nonspecific)	Mild	No	Moderate focal	Absent	None	Absent

Table 2: The histological features of the collected cases.

In this review, the patients who had Alvogyl dressings developed dry sockets and further local complications that impeded their recovery and future option for implants. This review suggests that possible contributory detrimental factors could include hormonal disturbances, since two of the patients with complications were being hormonally treated for infertility. Our findings and other previous studies demonstrated that the fern-derived fibers are clearly non-resorbable and not always self-eliminating. Histologically, the large, broad and long Penghawar djambi fibers could be confused by the unwary pathologists, particularly without prior knowledge of a history of dental dressing, with the broad hyphae of mucormycosis. Mucormycosis is a recognized complication in the oral cavity in compromised patients. Hints to the correct recognition are the presence of foreign bodies around and "inside" these structures, presence of septa and absence of neutrophils around these structures. In addition, the smaller calcified structures can mimic old calcified Schistosoma eggs. Some noncalcified oval structures could resemble Trichuris ova. Clues to avoid misinterpretation are the presence of foreign body reaction, absence of eosinophils and absence of the lateral or terminal spines or knobs. In addition, parasitic ova in the oral cavity are rare findings. Other

plant derived cellulose fibers were described in periapical lesions, cysts, postendodontic granulomas and extraction sockets[18,19]. Pathologists should be able to differentiate between these foreign bodies by morphology and use of histochemical stains and polarizing microscopy. Knowledge of a history of previous dental dressing should help.

In conclusion, Alvogyl related fibers are non-resorbable and not always self-eliminating. If left for a long period, they may elicit a foreign body giant cell reaction which can lead to further local complications. Clinicians should be alert to the potential side effects of dental and oral dressings, in particular those with non-resorbable materials. Without a prior knowledge of a history of dental or oral dressings, pathologists should be aware of the histomorphologic appearance of these fibers to correctly recognize them and guide the dentists and oral surgeons to the correct diagnosis and subsequent management.

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