

## Foreign-body reaction to an alveolar dressing (Alvogyl®): Presentation of 4 cases

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### Abstract:

**Introduction:** Alvogyl® is a product used for prevention and management of alveolar osteitis/dry-socket. Its active ingredients, iodoform (antiseptic) and butamben (anaesthetic), are transported in Penghawar djambivegetable fibres that possess a hemostatic property. **Patients:** We present 4 clinical cases of a foreign-body reaction after retaining Alvogyl® in the extraction socket in two men and one woman, with a mean age of 52 years (37-66 years). Of these, two cases were in the maxilla and two in the mandible. All cases presented with a chronic inflammatory foreign-body reaction containing giant multinucleated cells and a fibrillar material. **Conclusion:** Alvogyl® is a product for the management of alveolar osteitis/dry-socket that should be removed from the alveolus once the pain has resolved for an adequate healing process to occur.

**Keywords:** Alvogyl; foreign body; alveolar osteitis; dry socket; persistence; complication

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## INTRODUCTION

*Alvogyl*<sup>®</sup> (Alveogyl) is a dressing used as a topical treatment to prevent or manage a symptomatic post-extraction dry-socket<sup>1</sup>. Its active ingredients are iodoform (antiseptic) and butamben (anesthetic), and are transported by vegetable fibres of the *Penghawar djambi* plant that possess hemostatic properties when introduced in the post-extraction alveolus<sup>2</sup>.

Its manufacturer indicates that, once placed in the post-extraction alveolus, it should not be removed by the clinician because the product is progressively and completely removed by the normal tongue movement guaranteeing proper bone healing<sup>2</sup>.

Nonetheless, in the decade of the 1970s, some post-extraction alveoli treated with this product showed delayed healing and, histologically, a foreign-body reaction of multinucleated giant cells encapsulating the material<sup>3</sup>.

In this paper, we present three cases of a foreign-body reaction to *Alvogyl*<sup>®</sup> in post-extraction alveoli and we analyze the main clinicopathological features, as well as its biological implications.

## PATIENTS AND METHODS

Since 2013, we have received on the Oral Medicine and Oral and Maxillofacial Pathology Units (University of the Basque Country/EHU) 4 patients that presented lesions related with the use of *Alvogyl*<sup>®</sup> that produced a foreign-body reaction and it is the cause of alterations in the healing of the soft and hard tissues. In all cases, the patients signed an informed consent in which they allowed their anonymized presentation.

### Case 1

A 37 year-old male with no relevant medical history presented on a routine dental examination with two black macules on the alveolar ridge of the third quadrant near the missing 3.6. The lesions were asymptomatic and the patient referred that the molar was extracted 5 years ago. The biopsy of the lesions was programed in order to identify the nature of the macules. When performing the mucoperiosteal flap, the lesions showed to be in the bone. The histopathological study showed trabecular bone tissue with areas of inter-trabecular fibrosis and an elongated brown-colored fibrillar material focally forming circular structures. There were abundant foreign-body multinucleated giant cells and macrophages surrounding this material. In some of these areas, the

material was integrated and in direct contact with the trabecular bone tissue (Figure 1).

### Case 2

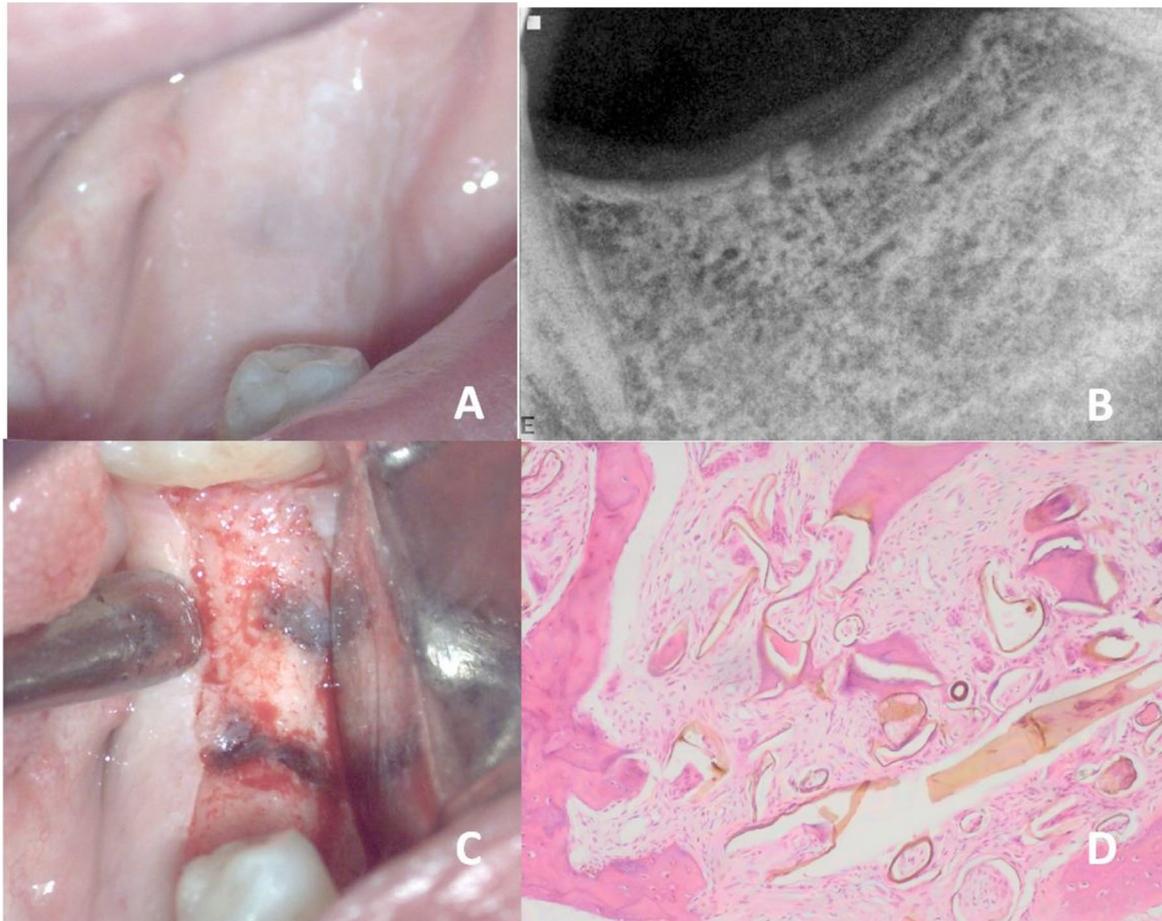
A 53 year-old male presented an asymptomatic, well-defined and well corticated unilocular radiolucent lesion in the edentulous area of the 2.3. The patient referred that this tooth had been extracted six months before. With this data, the initial presumptive diagnosis was of a residual cyst. The lesion was removed completely and sent for its analysis. The histopathological study showed a fibrocellular connective tissue with a mixed inflammatory infiltrate. Throughout the sample, there were foreign elongated, fibrillar and brownish elements together with an inflammatory infiltrate comprising abundant foreign-body multinucleated giant cells (Figure 2).

### Case 3

A 66 year-old woman presented a white homogenous plaque on the right maxillary posterior alveolar ridge. The lesion was asymptomatic and did not rub off. It was initially diagnosed as a homogenous leukoplakia vs. an alveolar ridge keratosis, which lead to an incisional biopsy. There was no relevant causative factor in the area and the patient was a non-smoker. The histopathological analysis showed the existence of epithelial hyperplasia with hyperkeratosis and no epithelial dysplasia, compatible with leukoplakia *versus* keratosis. Nonetheless, the submucous connective tissue presented an elongated brownish fibrillar material similar to that described in cases 1 and 2 and associated with an inflammatory response comprising foreign-body multinucleated giant cells forming pseudogranulomatous structures (Figure 3 A-B). The patient was unable to recall when or how the extractions of the missing teeth were performed.

### Case 4

A 52 years-old woman that had osteoporosis treated by ibandroic acid. The patient presented a missing healing and exposition of the alveolar bone after teeth extraction 5 month ago. The oral mucosa around the lesion was red and weak. No pus secretion. The clinical and radiographic diagnosis was bisphosphonate-related osteonecrosis. The lesion was removed completely and sent to analysis. The histopathological study showed a fibrocellular connective tissue with a mixed inflammatory infiltrate. There were foreign elongated and fibrillar and brownish elements together with an inflammatory infiltrate comprising some foreign-body multinucleated



**Figure 1.** Case 1: A) Black macular lesions on the alveolar ridge of the 3.6; B) Periapical radiograph showing unremarkable changes; C) Mucoperiosteal flap raised showing the pigmented lesion in the bone; D) Mature trabecular bone with interstitial fibrosis and a brownish fibrillar material associated with foreign-body multinucleated giant cells and macrophages. Some fragments adhered to the trabecular bone (H&E, 20X).

giant cells (Figure 3 C-D). After the surgical procedure the lesion had a well healing of the soft tissue and bone.

## DISCUSSION

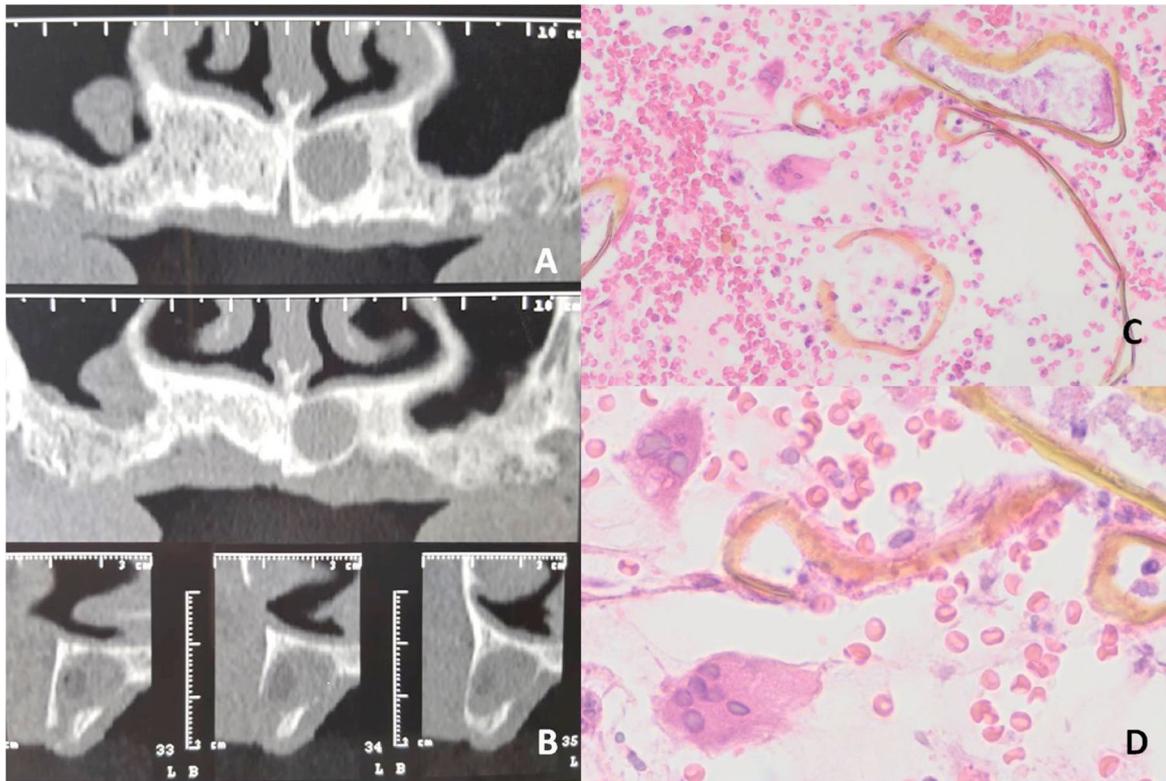
Foreign-body tissue reaction to dental materials has rarely been described in the literature<sup>4</sup>.

A foreign-body reaction (FBR) is a defense mechanism of the organism against exogenous materials in the tissues<sup>5</sup>. The FBR is histologically characterized by the presence of a foreign-body material surrounded by macrophages and multinucleated giant cells, and a variable number of other inflammatory cells, in occasions comprising granulomatous structures<sup>6,7</sup>.

In FBRs, the multinucleated giant cells that surround the foreign material are usually characterized by presenting the nuclei scattered irregularly throughout the cytoplasm<sup>6</sup>. In occasions, the foreign body is difficult to identify with optic microscopy requiring the use of

polarized light. In cases in which the material is difficult to identify, it is key to perform a good clinicopathological correlation, investigating any history of infiltration or application of an exogenous material, such as an alveolar dressing that is placed after an extraction.

Multiple dental materials have been associated with an intraoral FBR<sup>4</sup>. These reactions can be caused after a therapeutic product is introduced voluntarily, but that invades adjacent structures (gutta-percha, cement, etc.); or involuntarily introduced in the oral mucosa, such as following an accident or trauma<sup>8-10</sup>. Nevertheless, cosmetic materials injected periorally with an esthetic purpose are reported as the most frequent causative agents of orofacial FBRs<sup>8-10</sup>. Among these elements, it is worth highlighting those containing liquid silicone, bovine or human collagen, hyaluronic acid, etc.<sup>8-10</sup>. The histopathological aspect of an FBR from these materials varies, depending on its nature, and is characterized by a



**Figure 2.** Case 2: A) Panoramic CT reconstruction showing a round, well defined hypodense lesion; B) Sagittal CT sections showing the same lesion and its relation with the soft tissue; C) Internal aspect showing abundant hematic material, inflammatory cells and yellow-brown elongated fibrillar elements associated with foreign-body multinucleated giant cells (H&E 20X); D) Zoom of the anterior area (H&E 40X).

reactive connective response with chronic inflammation, fibrosis and underlining histiocytes and multinucleated giant cells<sup>9-11</sup>.

Less frequently, FBRs to hemostatic agents, such as alginate fibres, among others, have also been reported<sup>12</sup>. These materials are used as alveolar surgical dressings following dental extractions in order to avoid excessive post-operative bleeding<sup>12,13</sup>.

In relation to *Alvogyl*<sup>®</sup> alveolar dressing, different studies<sup>14-16</sup> have proven the efficacy in the symptomatic management of alveolar osteitis/dry-socket. Faizel *et al.*<sup>16</sup>, in a randomized comparative study using different dressings for the management of dry-socket, reported that *Alvogyl*<sup>®</sup> showed a greater initial reduction of pain when compared to other dressings.

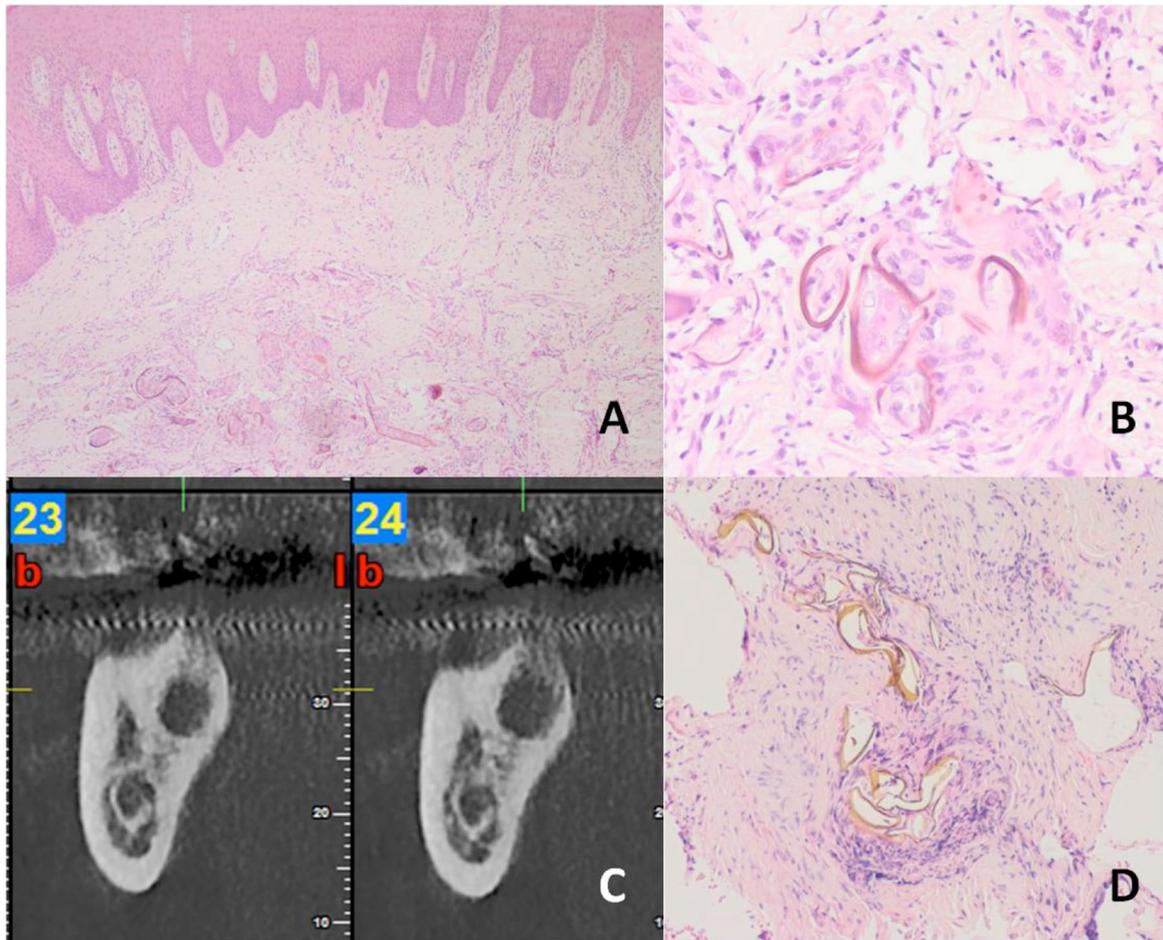
This product is indicated for the prevention or management of alveolar osteitis/dry-socket after performing complicated or traumatic extractions in patients with a history of alveolar osteitis/dry-socket<sup>2</sup>. Its use, according to the information provided by the manufacturer<sup>2</sup>, is simple thanks to its fibrous consistency and its easy adherence to the alveolar walls. The manufacturer<sup>2</sup> also indicates that the product is progressively eliminated with the movements of the tongue, without an

intervention from the clinician, favoring normal healing of the alveolus.

In view of the cases we present, as well as those described by AbdullGaffar *et al.*<sup>17</sup>, it is revealed that the product's fibres may remain in the alveoli and adjacent soft tissues. Therefore, if we consider that the vegetable fibres of this material are non-resorbable and that they have the capacity of generating an inflammatory response with a FBR, we believe that the manufacturer's recommendation of leaving the product indefinitely in the alveolus may not be adequate.

To this, we may add other possible adverse effects, such as those described by Wegenast in 2013<sup>13</sup>, with a case of a severe facial cellulitis requiring hospitalization. In this context, Ryalat *et al.*<sup>1</sup> demonstrated that this material reduces the post-operative pain following a dental extraction, but can also increase the incidence of alveolar osteitis/dry socket and a post-operative infection.

In 1979, Syrjänen *et al.*<sup>3</sup> compared the early phase of the healing process of post-extraction alveoli treated with and without *Alvogyl*<sup>®</sup>. In biopsies performed 7 and 14 days following the dental extractions, they observed a delay in the healing process in those alveoli treated with *Alvogyl*<sup>®</sup>. The biopsies showed malformation of the



**Figure 3.** Case 3: A) Epithelial hyperplasia and a reactive connective response in the submucosa (H&E, 5X); B) In this reactive fibrocellular connective tissue a brownish fibrillar material is observed (H&E 20X); Case 4: C) CT shows an irregular hypodense lesion in mandibular bone. D) Connective tissue with chronic inflammatory response around brownish fibrillar material (H&E, 10X).

connective tissue, persistence of the granulation tissue and inflammation with fibrin, as well as a FBR to the material involving multinucleated giant cells. More recently, AbdullGaffar.<sup>17</sup>, described several cases of non-healing alveoli after the application of *Alvogyl*<sup>®</sup>, also describing a FBR with giant cells. In other cases, microcalcifications, occasionally severe chronic inflammatory infiltrate, and abscess formation have been observed.

In the histopathological descriptions of FBRs associated with fibres or materials of vegetable-origin such as *Alvogyl*<sup>®</sup>, it is characteristic to observe such vegetable material surrounded by a dense inflammatory infiltrate with histiocytes and foreign-body multinucleated giant cells<sup>5, 18-20</sup>. The histological characteristics of the cases presented in this study are in agreement with those described in the literature<sup>5, 7, 18-20</sup>.

## CONCLUSION

To conclude, we can point out that even considering *Alvogyl*<sup>®</sup> as a valid material for the management of alveolar osteitis/dry-socket, we should advise, as opposed to the manufacturer, that the clinician should remove it from the alveolus once the acute symptoms of pain have been resolved and before the complete closure of the alveolus. This way, we may avoid the possibility of a foreign body reaction in the soft and hard tissues.

In cases in which it is not removed from the alveolus, there can be delayed alveolar healing or an incomplete recovery, possibly developing a FBR and increasing the risk of a post-operative infection. Furthermore, such a reactive process in the soft tissue and/or bone may, *a posteriori*, complicate rehabilitation treatments in edentulous areas, including dental implants.

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## DECLARATION OF PATIENT CONSENT

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

## CONFLICTS OF INTEREST

There are no conflicts of interest

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