

Foreign Body Reaction to Oral Tissue: Iatrogenic Factors

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Abstract

Foreign body reaction is a response of biological tissues to any foreign material when it comes in contact. These reactions can be due to either trauma or any foreign material used for treatment purposes. The various foreign body reaction due to iatrogenic causes includes due to suture material, prosthetic implants, glove powder, gauze piece etc. The events for foreign body reaction include protein adsorption, monocyte adhesion, macrophage adhesion and activation, macrophage fusion and foreign body giant cell formation.

Keywords: Foreign Body; Foreign Body Giant Cell; Gauze; Glove Powder; Prosthetic Implants; Suture Material.

Introduction

Foreign body ingestion in oral cavity are uncommon, but it can be deposited either due to trauma or iatrogenic. Motor vehicle accidents, assaults bullet wounds and iatrogenic surgical faults are the most common causes of tissue reaction to foreign materials when embedded in the oral cavity that leads to a granuloma formation. Tissue reactions to foreign bodies are commonly encountered in the oral cavity [1].

The oral cavity is very sensitive and easily approachable for the accidental penetration of the foreign bodies. These foreign substances when introduced into oral cavity or any part of human body may elicit inflammatory and foreign body reaction. It can also be introduced during any surgical procedure which includes suture material, glove powder, gauze and prosthetic implants [2].

Introduction of foreign body into oral cavity may cause local pain, stay inert (asymptomatic), induce

local abscess formation or spread down to produce deep infections (Danforth & Brown 1963).

Etiopathogenesis

Unlike the pathogenesis of other inflammatory processes, foreign body reactions are dynamic in nature. It seems that the initial response against a foreign substance in the skin involves a neutrophilic infiltrate, which usually fails to deal with the foreign body. This neutrophilic infiltrate is later replaced by histiocytes and macrophages that engulf the foreign material [3].

Sometimes macrophages are successful in digesting the foreign body, but more often the foreign material resists degradation and remains within the cytoplasm of macrophages. Macrophages containing foreign body material within their cytoplasm are activated leading to secretion of different cytokines, which attract additional macrophages to the inflammatory focus. This result in the formation of a granuloma around the foreign body, which attempts to isolate the rest of the body from the sequestered indigestible material. Individual macrophages coalesce to form multinucleated foreign body giant cells, and T lymphocytes and fibroblasts are also components of the inflammatory response [3].

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Foreign Body Reaction to Suture Material

The use of appropriate suture material and

technique assist wound closure in any surgery. The aim of wound closure is to assist efficient healing and return to their original function as well as to maintain the esthetics of surgical site [4]. Sutures play an important role in wound healing after the surgical interventions and thus selection of suture material, especially in oral procedures should be made carefully.

The selection of suture materials for any oral procedures should be made carefully as this location differs from the other body sites due to constant presence of saliva, specific microbiota, high vascularization as well as its functions related to speech, mastication and swallowing. The search for more appropriate suture material has resulted in a variety of natural and synthetic, absorbable and non absorbable sutures that are available commercially. These features influence the biological reactions to the suture, permitting a great diversity of clinical application [5].

The basic property of an ideal suturing material includes biocompatibility, ease to handle and presence of smooth surface to prevent the wicking effect of oral fluids & bacterial overgrowth [6].

Researchers have shown that reduced accumulation of inflammatory cells around the suture material will accelerate wound healing. Tissue reaction to suture material is very important particularly in patients who are susceptible to infection (like diabetic patients or patients taking immunosuppressive drugs)[6].

Foreign Body Reaction to Prosthetic Implants

When an oral implant is to be placed in bone, the sequence starts by preparing the defect. Surgical preparation results in breakage of blood vessels, destruction of bone tissue with a necrotic border developing inevitably, and an acute inflammatory response. The latter is an important step in the healing cascade leading to the preferred bony anchorage of the implant [7].

Thereafter, possible events follow the placement of the implant: Either a foreign body response develops, characterized by a chronic inflammatory response with the implant shielded off from the rest of the organism by an enveloping bone tissue layer that gradually condenses or the foreign body response results in the implant being embedded (encapsulated) in soft tissues, thereby representing a primary clinical failure as with modern implants placed by trained clinicians but was a more common problem in the infancy of osseointegration [7].

Foreign Body Reaction to Gauze

Forgotten or missed foreign bodies, such as cotton sponges, gauze or instruments, after any surgical procedures are considered a misadventure and is associated with several legal problems. The term "gossypiboma" denotes a mass of cotton retained in the body after any intervention [8].

This term is derived from the latin, gossypium for "cotton" and the Swahili word boma for "a place of concealment." Other terms used for gossypiboma include "textiloma", "cottonoid", "cottonballoma" "muslinomas" or "gauzeoma". Gossypiboma is rarely reported in literature and the reports of this technical oversight are the tip of an iceberg because the symptoms of gossypiboma are usually nonspecific and some patients remain asymptomatic. Some textilomas cause infection or abscess formation in the early stage, whereas others remain clinically silent for many years [8].

However, some remain clinically asymptomatic for many years, and then cause a foreign body reaction in the surrounding tissue, with new clinical signs indicating significant mass effect. Foreign bodies that are left behind during operations may organize and increase in size but such changes are not correlated with time [9].

In such cases, the diagnosis of gossypiboma and the second surgical operation needed for removal of medical problem can lead to start of legal problem between the patient and the surgeon at fault.

Foreign Body Reaction to Glove Powder

Gloves containing Natural Rubber Latex (NRL) represent an important hand barrier and their use is an integral part of dental practice. Although they provide excellent protection against the transmission of infectious agents, they have been associated with adverse reactions when used [10].

Glove powders are modified corn starches used to assist in the donning of the glove. Powder in manufacturing process are used to prevent blocking or adherence of NRL surface.

The introduction of glove powder into body can impair normal physiological functions causing complications associated with the introduction of foreign body like contamination of implants or transplant organs.

The presence of glove powder can result in many other undesirable effects, such as interference in laboratory testing causing false results (i.e. PCR - Polymerase Chain Reaction, enzyme immunoassay or some HIV tests) and powder granulomas being

misdiagnosed as metastatic carcinoma [11].

Researchers have also shown powdered gloves to be a risk factor for post-operative wound infections. As with most foreign bodies, glove powder decreases the inoculums of bacteria required to produce abscesses. In addition, powder also delays wound healing and alters the normal reparative process while at the same time increases the wounds inflammatory response.

However glove powder can act not only as a vehicle for latex antigens but also for opportunistic and pathogenic microorganisms, which increase the occupational risks to both health care workers and patients.

Diagnosis

Although foreign body reactions are commonly associated with trauma related events and sometimes due to iatrogenic, it is important to investigate and evaluate them with utmost care. A proper history, clinical evaluation and the appropriate investigation will help us in diagnosis and treatment of these conditions with accuracy.

Radiographically these foreign bodies appear as radio opaque areas surrounding the particular tissue [12].

Histologically abundant chronic inflammatory cell infiltrate, presence of foreign material which appear as eosinophilic areas and few giant cells surrounding the foreign material [13].

Treatment

Surgical excision of the foreign material is the treatment of choice.

Conclusion

Clinical evaluations and diagnosis of foreign body reactions pose a challenge as they mainly depend on the type of foreign body involved, the duration of its presence, symptoms associated and the clinical picture. Although foreign body reactions are commonly associated with trauma related events it is important to investigate and evaluate them with

utmost care and iatrogenic cause of foreign body reaction must be prevented.

References

1. Tatti S, Durga Prasad KVN, Kumar PB, Majeed J, Surekha A. An Unusual Foreign Body in Upperlip : A Case Report. *Journal of Evolution of Medical and Dental Sciences* 2015; 4(6):1072-75.
2. Selvig KA, Biagiotti GR, Leknes KN, Wikesjö UM. Oral tissue reactions to suture materials. *Int J Periodont Rest Dent* 1998; 18:474-87.
3. Molina Ruiz AM, Requena L. Foreign Body Granulomas. *Dermatol clin* 2015; 3:497-523.
4. Hupp JR: Principles of uncomplicated exodontias. In: Hupp JR, Ellis III E, Tucker MR, editors. *Contemporary Oral and maxillofacial surgery*, 5th Edition. St. Louis: Mosby Elsevier, 2008.p.95-126.
5. Lilly GE. Reaction of Oral Tissues to Suture Materials, *Oral Surg, Oral Med, Oral Path* 1968; 26:128-33.
6. Katz S, Izhar M, Mirelman D. Bacterial adherence to surgical sutures. A possible factor in suture induced infection. *Ann Surg* 1981; 194:35-41.
7. Katz S, Izhar M, Mirelman D. Bacterial adherence to surgical sutures. A possible factor in suture induced infection. *Ann Surg* 1981; 194:35-41.
8. Lilly GE. Reaction of Oral Tissues to Suture Materials, *Oral Surg, Oral Med, Oral Path* 1968; 26:128-33.
9. Albrektsson T et al. Is Marginal Bone Loss around Oral Implants the Result of a Provoked Foreign Body Reaction? *Clinical Implant Dentistry and Related Research* 2013.p.1-12.
10. Garg M, Aggarwal AP. A Review of Medicolegal Consequences of Gossypiboma. *J Indian Acad Forensic Med*; 32(4):358-61.
11. Tzang JE, Wei CK, Chang SM, Lin CW. Surgical Gauze Pseudotumor (Gauzoma)- A Case Report. *Tzu Chi Med J* 2006; 18(1):49-51.
12. Edelstam, J. et al. Glove powder in the hospital environment – consequences for healthcare workers. *Int. Arch. Environ. Health* 2002; 75:267-71.
13. Granady LSJ. The history and diagnosis of latex allergy. *Immunol Allergy Clin North Am* 1995.p.22.
14. Hunter TB, Talijanovic MS. Foreign bodies. *Radiology* 23:731-57.
15. Donath K, Laass M, Gunzl HJ. The histopathology of different foreign body reactions in oral soft tissue and bone tissue. *Virchows Arch A PatholAnat Histopathol* 1992; 420(2):131-7.