normal audiogram with open mouth, the operation was cancelled. The patient did also deny any intervention for the bone defect in the ear canal and lymphangioma.

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Oral Myiasis

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Abstract: Human myiasis results from parasitic tissue infestation by maggots. It often develops in open or necrotic wounds and has its highest prevalence among poor populations in tropical regions. This study reports 2 cases of human myiasis in the oral cavity and describes its clinical aspect and treatment.

Key Words: Myiasis, larva, Diptera

Myiasis is a maggot infestation of human or animal tissues during which, at least for some time, the larvae feed on live or dead host tissues, body fluids, or foods ingested by the host.[1]

According to species biology, maggots are classified into 2 parasite categories: obligate, whose larvae invade normal tissue or recent wounds, and facultative, whose larvae are secondary parasites and act as saprophagous parasites in wounds, previously infected cavities, or areas already infested with obligate larvae.[2] Oral myiasis is usually caused by the larvae of the Diptera fly, which generally develop in wounds, and the necrotic wound tissue is their preferred site of infection.[3–6] Mammals, their usual hosts, are infected most often by species such as *Cochliomyia hominivorax*, *Chrysomya bezziana*, *Dermatobia hominis*, and *Calliphorida*.[1,7–9]

Cases of oral myiasis have been reported in patients with predisposing factors, such as poor oral hygiene, lip incompetence, malnutrition, mouth breathing, alcohol abuse, senility, hemiplegia, facial trauma, and low physical resistance.[10]

Mazzonetto et al[2] found that previous oral lesions, the release of fetid odors, and the habit of sleeping outdoors during the day are factors that predispose to oral myiasis.[2] In addition, patients with epilepsy and lacerated lips after biting, as well as children with incompetent lips and thumb-sucking habits, also are also exposed to higher risks according to the literature.[11]

When they find favorable conditions, flies lay about 10 to 300 eggs in a cluster. Incubation lasts from 12 to 20 hours. After that, the

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FIGURE 1. Patient 1: Patient with multiple sclerosis unable to close his mouth.

larvae hatch and feed voraciously, rapidly destroy tissues, and keep their anterior end (mouthpart) immersed in the tissue, while their posterior end (spiracles) is in contact with the air.[1]

Parasitism lasts 4 to 8 days, after which the larvae tend to leave the host to continue their biological cycle. Symptoms, as well as the severity of myiasis, vary according to site of infection and number of larvae.[12]

Oral myiasis often affects the lips, tongue, hard palate, buccal mucosa, and periodontium.[2,5,7] It is classified as a fast-progressing, severe condition often associated with intense tissue destruction, strong odor, discomfort, and pain.[5,9,10]

The lesion has the appearance of inflammatory, erythematous, edematous tissue that may pulsate because of the movement of the larvae and had several tunnels through which the larvae may be seen. Sometimes they separate the mucoperiosteum from the bone and tend to migrate, which results in severe tissue destruction.[13–15] In addition to tissue inflammation, ulcerations and necrosis may be found, as well as bone involvement and penetration.[16]

Larval movements facilitate the diagnosis of oral myiasis. However, when there is no larval movement, other tests, such as clinical exploration and histological analysis, may be necessary in addition to clinical examinations to establish a final diagnosis.[10] Depending on the site of infection, magnetic resonance or ultrasound imaging may be used to determine the size and closeness of noble structures.[9]

Soni[17] reported that larvae may be found in 1 of 3 stages according to their size: stage 1—up to 3 mm, stage 2—2 to 7 mm, and stage 3—7 to 9 mm. Larvae in stages 1 and 2 may be more difficult to diagnose and remove.

A differential diagnosis may have to be made because myiasis may occur at the same time as other pathological events.[18,19]

Oral myiasis is treated by removing the larvae as fast as possible.[18] As larvae tend to move deeper into the tissues, removal may be difficult and require the use of chemical substances to force their exit or surgical debridement and careful exploration.[10,20] Broad-spectrum antimicrobial agents should be used to control secondary infections.[4]

After the larvae are removed, the wound should be carefully debrided, cleaned, and sutured. Special care should be defined and discussed with the patient.[21]

According to studies, the chemical substances more often used to force larval exit from tissues are ether, iodoform, ethyl chloride, calomel, mercuric chloride, creosote, saline solution, and turpentine oil and thiabendazole. These substances are believed to volatilize and release gases that irritate the larvae and force their exit from the tissue or that block their oxygen supply.[15]

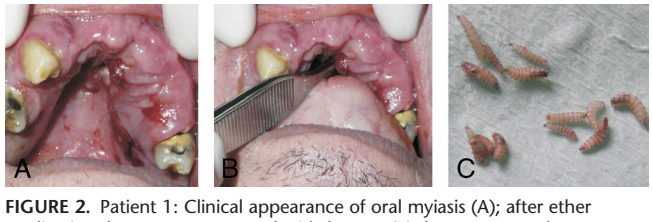

FIGURE 2. Patient 1: Clinical appearance of oral myiasis (A); after ether application, larvae were removed with forceps (B); larvae removed from wound (C).

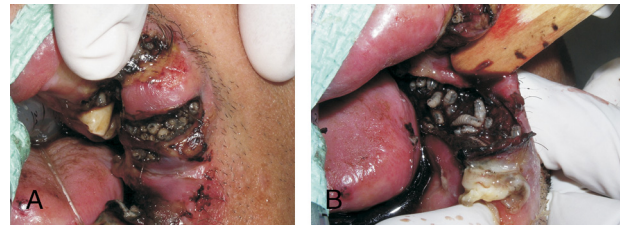

FIGURE 3. Patient 2: Clinical aspect of lesion; inflammatory, erythematous, and edematous tissue that pulsated because of movement of larvae (A); exit of larvae after the use of eucalyptol (B).

Hand instruments are used for the removal of superficial larvae. Endoscopy facilitates the access to difficult areas and provides a direct and more accurate visualization, which results in less debridement of necrotized tissue, a better prognosis, and shorter hospitalization times.[17]

In the case of institutionalized children and the elderly, who have mental or physical disabilities, those responsible for their care should receive instructions about hygiene and general patient health care and detailed information about factors that may favor the development of myiasis.[13]

CLINICAL REPORT

Patient 1

A 65-year-old man with multiple sclerosis was referred to Hospital de Pronto Socorro in Porto Alegre, Brazil. The physical examination revealed lip incompetence (Fig. 1), poor oral hygiene, periodontal pockets, and inflammation with edema and erythema in the anterior hard palate. Intraoral examination revealed progressive destruction of soft and hard tissues, cavitation, and movement of larvae, which were visualized. After the diagnosis of oral myiasis was made, a piece of cotton soaked with ether was applied to the wound to force the exit of deeper larvae. This substance made the larvae exit the tissue, after which they were collected using forceps (Fig. 2). After that, the necrotized tissue was debrided.

Analgesic and antimicrobial medications were prescribed: intravenous administration of 500 mg dipyrone every 4 hours and 1 g cephalothin every 6 hours. The patient was followed up for 72 hours, and no other larvae were seen in the wound.

Their family members received instructions about the importance of oral hygiene and general patient care, and the wound healed satisfactorily.

Patient 2

A 40-year-old man was the victim of physical aggression, and head trauma was suspected. The patient was referred to the Neurology

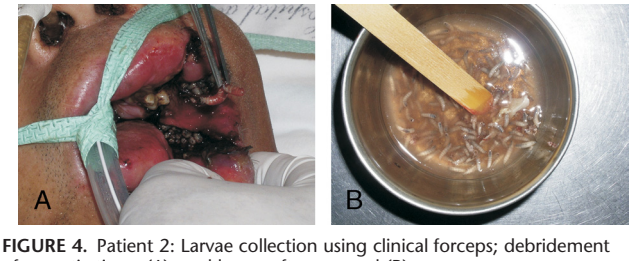

FIGURE 4. Patient 2: Larvae collection using clinical forceps; debridement of necrotic tissue (A); and larvae after removal (B).

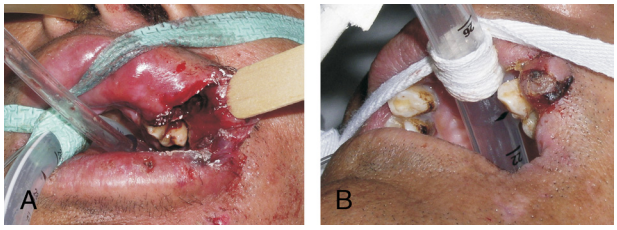

FIGURE 5. Patient 2: Clinical appearance after second surgical procedure to remove more larvae (A); clinical appearance after the 12th day (B).

Service of Hospital de Pronto Socorro in Porto Alegre, Brazil. After computed tomography scanning, a subdural hematoma was diagnosed, and the patient underwent decompressive craniectomy to drain the hematoma. After the neurosurgical procedure, the patient remained in the intensive care unit. The oromaxillofacial surgery service was called 48 hours later by the intensive care unit nursing service to examine a cut that the patient had in the upper lip and that extended to the left lip commissure. According to the nurses, the fetid odor was unbearable.

The physical examination revealed lip incompetence, deficient oral hygiene, and severe periodontal disease. The intraoral examination revealed an inflammatory, erythematous, and edematous lesion that pulsated because of the movement of the larvae. After oral myiasis was diagnosed, eucalyptol (S.S. WHITE, Rio de Janeiro, Brazil) was applied with gauze to force the exit of the larvae from the tissue (Fig. 3). The larvae were collected with clinical forceps, and the necrotized tissue was debrided surgically (Fig. 4). After 48 hours, the patient underwent another surgical exploration, and dozens of larvae were removed using the same technique (Fig. 5).

Antimicrobial medication was prescribed: intravenous administration of 1 g cephalothin every 6 hours and oral hygiene with an antiseptic solution (0.12% chlorhexidine digluconate).

Twelve days later, the lesion had improved, and no larvae were found.

DISCUSSION

Myiasis is an unusual pathological condition in which flies lay their eggs on living beings and the larvae develop as parasites. In human beings, the etiology is directly associated with poor socioeconomic and cultural conditions in which personal hygiene and body cleanliness are inadequate. Therefore, myiasis may be classified as a public health problem.[10]

Oral hygiene and basic sanitation policies, as well as the improvement of socioeconomic conditions, are extremely important measures to prevent oral myiasis.[20,21] In addition, individuals exposed to risk factors should be carefully monitored to ensure adequate oral hygiene, protection of wounds and cavities, and regular follow-up by health care professionals, such as dentists, doctors, nurses, and nursing assistants.[22]

According to the literature, treatment consists of manual removal of larvae either using or not topic substances to asphyxiate the larvae and to force their exit. Several substances, such as ether, chloroform, olive oil, calomel, iodoform, and phenol compounds, have been described as efficient in the treatment of myiasis. A recent study reported on the success of the use of ivermectin, an antibiotic agent, in the treatment of oral myiasis.[23]

In our first case, ether solution was used because it is a widely known substance whose efficacy has been confirmed in the literature. The eucalyptol solution (1-methyl, 4-isopropyl cyclohexane, 1-4-oxide) was used in the second case because it is less irritating to tissues, its smell is very similar to that of camphor, and its antibacterial and anti-inflammatory properties have already been confirmed.[24,25]

We believe that both solutions were efficient in the treatment of oral myiasis, but eucalyptol, because of its properties, availability, and reduced tissue toxicity, has become the substance currently used in the Oromaxillofacial Surgery and Trauma Department of the Hospital de Pronto Socorro de Porto Alegre in cases of oral myiasis.

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