International Journal of Science and Research (IJSR)
ISSN: 2319-7064
ResearchGate Impact Factor (2018): 0.28 | SJIF (2019): 7.583

Ivermectin and Turpentine Oil in the Management of Oral Myiasis - A Case Report

Prasamita Mishra[1], Rajesh Kshirsagar[2], Pratik Warade[3], Vikram Singh[4], Pranave P.[5], Amruta Sardeshmukh[6]

[1]Oral & Maxillofacial Surgery Resident,
Bharati Vidyapeeth Dental College & Hospital, Pune, Maharashtra, India
mishra.prasamita[at]gmail.com

[2]HOD, Oral & Maxillofacial Surgery,
Bharati Vidyapeeth Dental College & Hospital, Pune, Maharashtra, India

[3]Oral & Maxillofacial Surgery Resident,
Bharati Vidyapeeth Dental College & Hospital, Pune, Maharashtra, India

[4]Lecturer, Oral & Maxillofacial Surgery Resident, Bharati Vidyapeeth Dental College & Hospital, Pune, Maharashtra, India

[5]Oral & Maxillofacial Surgery Resident, Bharati Vidyapeeth Dental College & Hospital, Pune, Maharashtra, India

[6]Oral & Maxillofacial Surgery Resident, Bharati Vidyapeeth Dental College & Hospital, Pune, Maharashtra, India

Abstract: ***Zumpt defined myaisis as the infestation of live human and vertrebrate animals with diphterous larvae which feed on living or necrotic tissues, living body substances, or ingested food. Although myiasis is a worldwide phenomenon, the incidence is higher in tropical and subtropical zones. Conditions that don't allow maintenance of good oral hygiene like mouth-breathing, mental incapabilites, oral malignancies, alcoholism, senility have shown to facilitate the development of myiasis. Diagnosis of myiasis is based on clinical identification of maggots/larvae and treatment consists of removal of maggots. This can be achieved manually or with the application of various topical agents. Systemic medications have also been employed to aid the process.***

Keywords: Myiasis, Maggots, Ivermectin, Turpentine, Upper Lip, Oral Myiasis

1. Introduction

The term myiasis (Greek: myia=fly) was coined by Hope in 1840[1], and later defined by Zumpt as the infestation of live human and vertrebrate animals with diphterous larvae which feed on living or necrotic tissues, living body substances, or ingested food.[2]

Prevalence of myiasis – a worldwide phenomenon - is expounded to latitude and the lifecycle of varied species of flies. The flies responsible for the condition prefer a warm and humid environment.[3]

Fly species that normally breed in meat or carrion attracted to necrotic tissue odours colonize pre-existing wounds, known as wound myiasis. Many different species of flies can be associated with this type of myiasis, the most common belonging to the family Calliphoridae (blow flies), followed to a lesser extent by the Sarcophagidae (flesh flies), Muscidae (house flies) and Phoridae (scuttle flies).[4]A singular case of oral myiasis caused by *Chrysomyabezziana* involving both maxillary and mandibular arches, in a patient of cerebral palsy has also been reported.[5]

Body myiasis is well recognized in animals but is rare in humans. Body cavities like the ears and nostrils, and occasionally the mouth is involved in the head and neck region.[5] The rationale for oral myiasis being uncommon may be attributed to the fact that the oral tissues are not permanently exposed to the external environment.[1] Eye involvement is secondary to nasal and ear lesions. Nasal myiasis has been noted to be common in patients with leishmaniasis.[6]

Poor oral hygiene, mouth-breathing during sleep, alcoholism, senility may facilitate the development of myiasis. Local factors such as halitosis caused by necrotic suppurating tissues can attract the flies.[7]

Differently abled patients suffering from mental disorders, cerebral palsy, autism, hemiplegiaetc, who have difficulty in maintaining oral hygiene by themselves are at a higher risk of being infected. Additionally, if these patients have anterior open bite, mouth breathing or incompetent lips as it will provide a conducive environment for flies to lay their eggs and larvae to pupate. Patients having undergone tooth extraction, or neglected mandibular fractures, or undergoing mechanical ventilation are also at risk of infestation. Oral malignancies may also present as predisposing factors for this condition.[8]

We present to you a case of oral myiasis reporting to our hospital with necrosis of a wound on the upper lip following trauma.

2. Case Report

A 66-year-old man, suffering from epilepsy, reported to our hospital and presented with acute upper lip swelling with an extensive necrotic area and fetid odour. Clinical examination revealed a contused lacerated wound (CLW) following trauma at his farm 1 week ago, which had not been cleaned

or sutured. The upper lip on the right side showed diffused indurated swelling, nonfluctuant on palpation. The under surface of the swelling revealed a number of maggots. The patient complained of pain, and reflected poor oral and general hygiene. The management was performed by Oral and Maxillofacial Surgery residents' on-call at the hospital.

Etiology of the incidence of myaisis in this case may be attributed to trauma to the upper lip which was left untreated in an individual in a state of diminished ability to maintain poor personal hygiene.

Diagnosis was clinical. Wound was thoroughly debrided with hydrogen peroxide and betadine solution before each episode of manual removal of maggots was done daily. Turpentine oil was topically applied and oral antibiotics administered were: Tab. Ivermectin 6mg once daily, Tab. Doxycycline 100 mg twice daily and Metronidazole 400 mg three times daily.

Parasitological examination of the larvae was not performed in our case.

3. Discussion

Myiasis is a rare condition in human beings. Main parasites being flies of order of Diptera (maggots), feed on the host's dead or living tissue. In oral myaisis, the soft-tissue parts of the oral cavity are invaded by parasitic larvae of these flies. Hope et al., described the first incidence of this parasitosis in 1840, common infestations being reported in open wounds and dead tissues; but, cavities such as ears, nose and oral cavity may be involved.[1]

On performing an online literature search using PubMed and Medline indices with the term "oral myiasis", only 37 reports were identified most of which were from India and Brazil. (39, and 33% respectively). There was no age predilection with cases ranging from 4 to 82 years. However, males appear to be more affected than females (69% and 31% respectively). The reason for this may likely be because they tend to spend more time outdoors, and more frequently tend to neglect their oral hygiene when compared to females. Such predilection to males was seen also in cases of cutaneous myiasis among travellers returning from South America and Africa.[3]The most common sites for oral myiasis were anterior maxilla or upper lip and associated tissues.[9]Review of the available literature on oral myiasis shows that infestation by multiple larvae is common.[3]

Life Cycle

Myiasis occurs by dipterous larvae developing in decaying tissues and the developmental transition via the larval stage requires an intermediate host and the number of developing larvae depends on the number of viable eggs deposited. Methods of infestation in humans may occur in two ways, either accidentally with direct inoculation by the fly or by ingestion of infected material such as meat. In most described cases, the location of the lesions in the anterior part of the oral cavity suggests a direct inoculation of the tissues.[3]

Eggs are laid by the adult female on live mammalian tissues. It lays around 150-200 eggs at the site of the wound. The eggs hatch after 12-18 hours. The first stage of larvae, white in color and 15 mm in length, will emerge from the eggs and then burrow into the wound or wet tissues.[9] This burrowing may cause separation of the mucoperiosteum from the bone, leading to tissue inflammation ensuing discomfort. They are photopohobic and therefore tend to hide deep into the tissues helping them secure a suitable niche for pupa development.[2] They position their heads down so that the posterior spiracles could become exposed to the open air to make respiration possible.[4] The second stage is when they grow to 18 mm in length.[9] After 5-7 days, larvae fall to the ground and pupate. The pupae are transformed into adult flies around 7 days later.[9]

Sood *et al* described that the larva can be divided into three stages depending upon the size and life span. During the first and second stages, the larva has segmental hooks which are directed backward. These hooks help the larva to anchor itself to the surrounding tissue. The presence of these hooks made removal of the larva from its host difficult.[10]

Chrysomyabezziana differs from other maggot infestations by its ability to cause tissue invasion even without pre-existing necrosis. They burrow into the host's healthy tissue in a screw like fashion feeding on the living tissue.[9]

Larvae release toxins to destroy the host tissue. Proteolytic enzymes released by the surrounding bacteria decompose the host tissue and the larvae feed on this rotten tissue. The infected tissue releases foul smelling discharge, the interaction of toxin or enzyme released by the larvae-bacteria can also cause bony erosions.[4]

The requisites for the egg laying and the survival of the larvae are the moisture, necrotic tissue and suitable temperature. This makes wounds, open sores, scabs and ulcers contaminated with discharges ideal for infestation.[4]

The rupture of larvae may cause allergic or foreign body reaction and secondary infection so care must be taken not to rupture maggots.[2]

Various classifications have been reported to assess this condition:

1) **Depending on viability of the tissue:**
   - Primary (larvae feed on the living tissue)
   - Secondary (larvae feed on dead tissue)

2) **Depending on the condition of the involved tissue:**
   - Accidental myiasis (larvae ingested along the food)
   - Semi-specific myiasis (larvae laid on the necrotic tissue in wounds)
   - Obligatory myiasis (larvae affecting undamaged skin)

3) **Depending on the site:**
   - Cutaneous
   - External orifice
   - Internal organs
   - Generalized

- Nose
- Eye
- Lungs
- Ears
- Anus
- Vagina
- Oral (rare)[8]

4) They have been classified also as[2]

- Those in which the larvae live outside the body
- Those in which the larvae burrow into unbroken skin & development
- Those which live in the intestinal or urinary passages
- Those in which eggs or young larvae are deposited into the wounds or natural cavities in the body.

The parasitological classification is based on both the biological behavior of the larvae and the type of the invaded tissue, separating them into three categories: mandatory, optional and accidental.[11]

Radiological investigation is important to define the extent of tissue damage. In a study conducted by Shinohara *et al.*, patient's CT scan showed gas bubbles in the soft tissue in the anterior maxilla to indicate tissue damage.[12]

Diagnosis of myiasis is based on clinical identification of maggots/larvae and treatment consists of removal of maggots.

Treatment

Standard guidelines for treatment of oral myiasis do not exist. The most traditional and commonly used treatment described in case reports includes mechanical removal of the maggots with tweezers under local anesthesia.[9]Debridement is curative, although a foreign body response may occur if parts of the larvae remain in the surgical site.[3]Additionally, the process of maggot removal can create damage to tissues or be painful for the patient, and young larval stages may be too small or well hidden within the wound to be detected. When there are multiple larvae and in advanced stages of maggots' development and tissue destruction, application of wound cleansing agents, and/or a combination of both chemical and mechanical have been used and proven to be effective in complete removal of all larvae.

Reported cleansing agents used in the treatment of cutaneous myiasis include;

- Saline solution
- Hydrogen peroxide (3%)
- Diluted chloroform (with 5–15% light vegetable oil or milk)
- Iodine
- Dakin's solution
- Ethyl chloride
- Chlorohexadene
- Ivermectin in a propylene glycol solution
- Mercuric chloride
- Creosote
- Turpentine oil
- Systemic Butazohdine and Thiobendazole[7]
- turpentine larvicidal drug like Negasunt (by Bayer)
- Mineral oil
- Ether

Application of such materials force the aerobic larvae into a moresuperficial position where it is possible to remove them easily with less damage to the tissues.[3]

Occlusion of the wound by pressure dressing promotes a decrease of oxygen which kills the larvae or induces them to move more superficially where they can be removed more easily.[11] Together with surgical debridement, turpentine oil was our choice of topical agent, and Ivermectin tablets for oral administration. Turpentine oil is a toxic chemical which induces tissue necrosis. On topical application, it produces epithelial hyperplasia, hyperkeratosis and ulceration. However, the damage is reversible, and the hyperplasia can be noted only as long as the stimulus is continuously applied and regresses once it is withdrawn.[10]

Ivermectin is a semi-synthetic macrolide antibiotic, isolated from *Streptomyces avermitilis*.[12]

This drug which is commonly used in vetenirary medicine its use is well documented in large animals for the control of gastrointestinal and pulmonary parasitosis.[12]In1993, ivermectin was reported to be safe for human use and has been indicated for the treatment of filaria, scabies and strongyloidosis in humans. Ribeiro et al. evaluated the use of oral ivermectin in human cavity infestations, and reported that no patient presented alterations in hepatic or renal function after the oral ingestion of ivermectin, thus concluding that its safety and non-toxicity.[13]

Mechanism of action of ivermectin is assumed to beblockade of nerve impulses on the ending nerve through the release of gamma aminobutyric acid (GABA), linking to the receptors and causing palsy and death. Acetylcholine being the main peripheral neurotransmitter in mammalians is not affected by ivermectin, thus maintaining a security margin when it is used at the recommended dose.[13]

Shinohara et al documented successful treatment of oral myiasis with only 6mg orally and repeated after 24 hours. This is especially helpful in cases wherein accessibility is difficult like nasopharynx and orbit, and in patients where medical fitness for general anaesthesia is not possible.[9]Duque et al. treated oral myiasis with *SC*ivermectin, 2 of the 3 cases additionally used phenol mixture (10% creolin) as a local measure for the control of larvae.

A new topical agent, nitrofurazone, has been used with high success in treatment for oral myaisis. It is a topical antiparasitic agent whose derivatives possess antibacterial, antiprotozoal and antiparasitic properties. Used at as concentration of 0.2% which was used topically for 3 consecutive days.[9]

It isunclear what might result if the condition were not treated.[7]

The information and instructions to families, caregivers and long-stay hospitals, regarding oral and environmental care, and routine assessment of oral health status of these patients are the main preventive strategies. The care of patients with special needs for debilitating diseases or behavioral disorders (such as the case of patients with alcohol and illicit drugs abusive use) requires special attention. The immediate attention and proper is essential for satisfactory prognosis. Adequate corporal hygiene and sanitary education by specific training of the population and health professionals are important factors and combat indirectly a series of other diseases, aiming to improve the quality of life of the general population.[11]

4. Conclusion

This article provides information about the potential use of chemical cleansing treatments and oral medications in treatment of patients suffering from oral myiasis. We conclude that proper oral hygiene maintenance is the prime requisite for the prevention of oral myiasis, especially in susceptible patients, and further research is necessary in the development of a standard effective wound treatment protocols.

Clinical Photographs

Figure 1: Upper lip showing necrosis due to maggot infestation

Figure 2: Satisfactory wound healing after 2 weeks following manual removal, turpentine oil application and oral ivermectin

Figure 3: Maggots removed from wound