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Uporaba ivermectina u potpornoj terapiji oralne mijaze

The Use of Ivermectin in the Adjunct Treatment of Oral Cavity Myiasis

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Sažetak

Oralna mijaza općenito je povezana s lošom higijenom usta, alkoholizmom, senilnošću te gnojnim lezijama i neoplazmama. Gotovo je redovita kod starijih pacijenata, posebice onih s mentalnim poremećajima i posebnim potrebama. U literaturi su opisane različite metode liječenja te oralne patologije, no ni jedna nije potpuno učinkovita. U ovom prikazu slučaja ističe se uporaba ivermectina kao alternativne terapije u liječenju mijaze. Ovaj lijek praktičan je u primjeni, dobro se apsorpira i razmjerno brzo postiže visoku koncentraciju u krvi. U ovom su članku predstavljena dva slučaja pacijenata iz doma za umirovljenike primljenih u hitnu službu bolnice Passo Fundo u São Vicente de Paulu u Brazilu s kritičnim stanjem oralne mijaze i apscesom zuba. Osim što su se uklanjale rukom, ličinke su isprane oksigeniranom vodom (10 vol.) i 0,12-postotnim klorheksadin-glukonatom (CHX). Kao pomoćna terapija tri je dana ordiniran ivermectin u dozi od 6 mg. Taj se lijek pokazao kao jednostavna pomoćna terapija u liječenju ove oralne patologije.

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Uvod

Izraz *mijaza* nastao je od dviju grčkih riječi – *myia* = muha i *ase* = bolest, a označuje zarazu kralježnjaka ličinkama koje se hrane živim ili mrtvim tkivom domaćina, tekućinama ili progutanom hranom (1,2). Takva vrsta zaraze češća je u ruralnim područjima. Infekcija se obično pojavljuje kod goveda i svinja te kućnih ljubimaca (psi i mačke), a mogu se zaraziti i ljudi pa predstavlja veliku opasnost za zdravlje (1–3).

Neke vrste ličinki mogu čak koristiti domaćinu jer uklanjaju nekrotično tkivo i zato su se u prošlosti rabile za terapijsko čišćenje rana (4). No uglavnom razaraju vitalno tkivo pa može nastati obilno i ponekad fatalno krvarenje. Pravilo je da manjak nekrotičnog tkiva u leziji skraćuje vrijeme potrebno za njezino zarastanje, te se s tim u vezi smanjuje i broj ličinki u njoj. U slučaju zakašnjele dijagnoze i većeg broja ličinki, tkivo može biti dosta razoreno, što često zahtijeva kiruršku korekciju. Broj jajašca ličinki smatra se odlučujućim za proširenost lezije (1–6).

Ova vrsta patologije može nastati u bilo kojem zemljopisnom području, a najčešća je u toplim i vlažnim krajevima.

Introduction

The term myiasis is derived from the Greek (*myia* = fly, *ase* = disease) defining a dipteran larvae infestation in vertebrate animals in at least one of the phases of their development, feeding from either living or dead tissues of the host, from liquid substances, or from ingested food (1,2). This type of infestation is more frequent in rural areas. These larvae affect animals such as bovine and swine, as well as pet animals such as dogs and cats, and they can also occur in humans, causing health hazards (1,2,3).

Some larvae species may be useful to the host once they help to extract the necrotic tissue, and therefore larvae were used in the past for therapeutic debridement of wounds (4). On the whole, larvae destroy vital tissues, leading to severe and even fatal hemorrhages (5). The absence of necrotic areas may eliminate the time of the lesion and therefore the number of larvae. The late diagnosis and greater number of larvae, more damaged the tissue will be, often requiring surgical correction of the affected site. The number of larvae eggs is considered a determining factor to the extension of the lesion (1,6).

Tropska klima u Brazilu pogoduje razvoju muha i ličinki, pa to povećava učestalost mijaze (7,8).

Ličinke se klinički mogu podijeliti na primarne i sekundarne. Biofagne se hrane živim tkivom i uzrokuju primarnu mijazu. Primarnim ličinkama često se zaraze goveda, a ljudi rijetko, a ako se i pojave potječu od insekta *Cochliomya hominivorax* koji na otvorenu ranu položi 20 do 400 jajašaca. Ličinke se pojave 24 sata nakon toga i jako su proždrljive, pa razaraju cijela tkiva što može uzrokovati krvarenje opasno za život (5, 9, 10).

Nekrofagne muhe hrane se mrtvim tkivom i uzrokuju sekundarnu mijazu. Lokalni gnojni iscjedak i loša higijena neki su od rizičnih čimbenika za nastanak bolesti.

Ličinke se također mogu podijeliti prema mjestu nastanka, biološkim osobitostima muhe i vrsti tkiva koje napadaju (1,3).

Preventivne metode su kontrola populacije muha, temeljito čišćenje rane te informiranje ljudi u područjima bez osnovnih sanitarnih uvjeta. U već spomenutim područjima povećan je rizik od mijaze, posebice kod mentalno zaostalih osoba i onih s uznapredovalom senilnošću i kaheksijom (1,10).

To se stanje tradicionalno liječi kirurškim uklanjanjem ličinki te sistemskim lijekovima ili bez njih. Unatoč tomu postoji uzlazni trend kod autora koji zagovaraju manje invazivne, ali vrlo uspješne metode liječenja. Tu ubrajamo uporabu ivermectina ili ispiranje nitrofurazonom (1,5,8,10,11,12).

U ovom članku opisana su dva slučaja fakultativne mijaze uspješno tretirane oralnim ivermectinom kod pacijenata s fizičkom i mentalnom retardacijom. Obrazac s informiranim pristankom potpisali su njihovi skrbnici.

Prikaz slučaja

Slučaj 1

Pacijentica u dobi od 58 godina s dijagnozom Alzheimerove bolesti, dehidrirana i kahektična dopremljena je u hitnu pomoć bolnice Passo Fundo u São Vicente de Paulu u Brazilu. Bila je u kritičnom stanju zbog oralne mijaze i apscesa zuba. U anamnezi je bio naveden povišeni krvni tlak i odgovarajuća terapija. Detaljnim pregledom liječnici su ustanovili nisku srčanu askultaciju, sniženu respiraciju te nekoliko bolnih mjesta na lijevom bedru, u sakralnom predjelu, infraskapularno i na peti. Nakon prijma pacijentici je 14 dana ordiniran antibiotik (Clavulin 1 g), infuzija, aerosol za vlaženje sluznice i 0,12-postotna otopina klorheksadinova glukonata (CHX).

Oralnim pregledom ustanovljeno je isušivanje labijalne sluznice te promjene u položaju donje čeljusti. Usta su joj bila stalno otvorena, a gornja usnica izrazito otečena i tvrda. U vestibularnom dijelu maksilarnog alveolarnog nastavka, u projekciji apeksa ostatka zuba 11, uočena je fistula i pomicanje ličinki. Sadržavala ih je palatinalna krvžica promjera dva centimetra. Oralna higijena pacijentice bila je zadovoljavajuća.

This pathology may occur in any region, however, it prevails in regions with hot and humid weather. Brazil's tropical weather favors the spreading of flies and therefore of larvae, increasing even more the occurrence of myiasis (7,8).

Clinically, larvae may be classified as primary and secondary. Biophagous larvae, which feed from living tissue, cause primary myiasis; they are common in bovine (called screwworms) and are rare in humans. However, when it happens, it is usually severe and produced by the insect *Cochliomya hominivorax* ("Blowfly"), which puts from 20-400 eggs on exposed wounds. Larvae outbreak occurs in 24 h. Larvae are ravenous and destroy whole tissues; they can also cause severe bleeding and are a life risk (5,9,10).

Necrophagous flies, which feed from dead tissue, cause secondary myiasis. Local suppuration and poor hygiene are some of the risk factors of this disease. These larvae are also classified according to location, biological features of the fly, and type of tissue in which they occur (1,3).

One of the prevention methods of myiasis in humans is fly population control, performing a thorough cleaning of sites and informing individuals who live in places with no basic sanitation, and therefore, are more subject to risk mainly affecting special patients with mental disorders, advanced senility, and cachexia (1,10).

Traditional treatment consists of surgical removal of the larvae, which may or may not be associated with the use of a systemic medication. However, there is a growing trend of authors who advocate treatment modalities considered less invasive and are very promising, such as the use of ivermectin or irrigation with nitrofurazone (1,5,8,10-12).

This paper describes two cases of facultative myiasis treated successfully with oral Ivermectin in patients with physical and mental deficiency. The informed consent form was presented to the patients' caretakers due to their neurologic condition, and it was given in both cases.

Case reports

Case 1

Patient, female, 58 years old, with Alzheimer's Disease, dehydrated, in severe cachectic stage, was referred to the Emergency Unit of the Hospital São Vicente de Paulo in Passo Fundo – RS (HSVP), with a critical condition of oral myiasis and septic teeth. She presented a case of hypertension controlled by medicines. According to the medical clinical assessment, the patient presented a low heart auscultation, decreasing respiration, and several pressure sores around her left thigh, sacral area, infrascapular and calcaneus. Upon admission, antibiotic therapy (Clavulin 1g) was prescribed and maintained during 14 days with medications that the patient was already taking, parenteral hydration, nebulization, and oral hygiene with 0.12% Chlorhexidine Gluconate (CHX).

The physical examination showed drying of the labial mucosa, modification of the usual jaw posture, as well as its relaxation. The oral cavity remained constantly open. The superior lip was extremely swollen and hardened. The anterior area of the maxillary ridge presented fistula in the apex of radicular remains of the dental element 11, where larvae

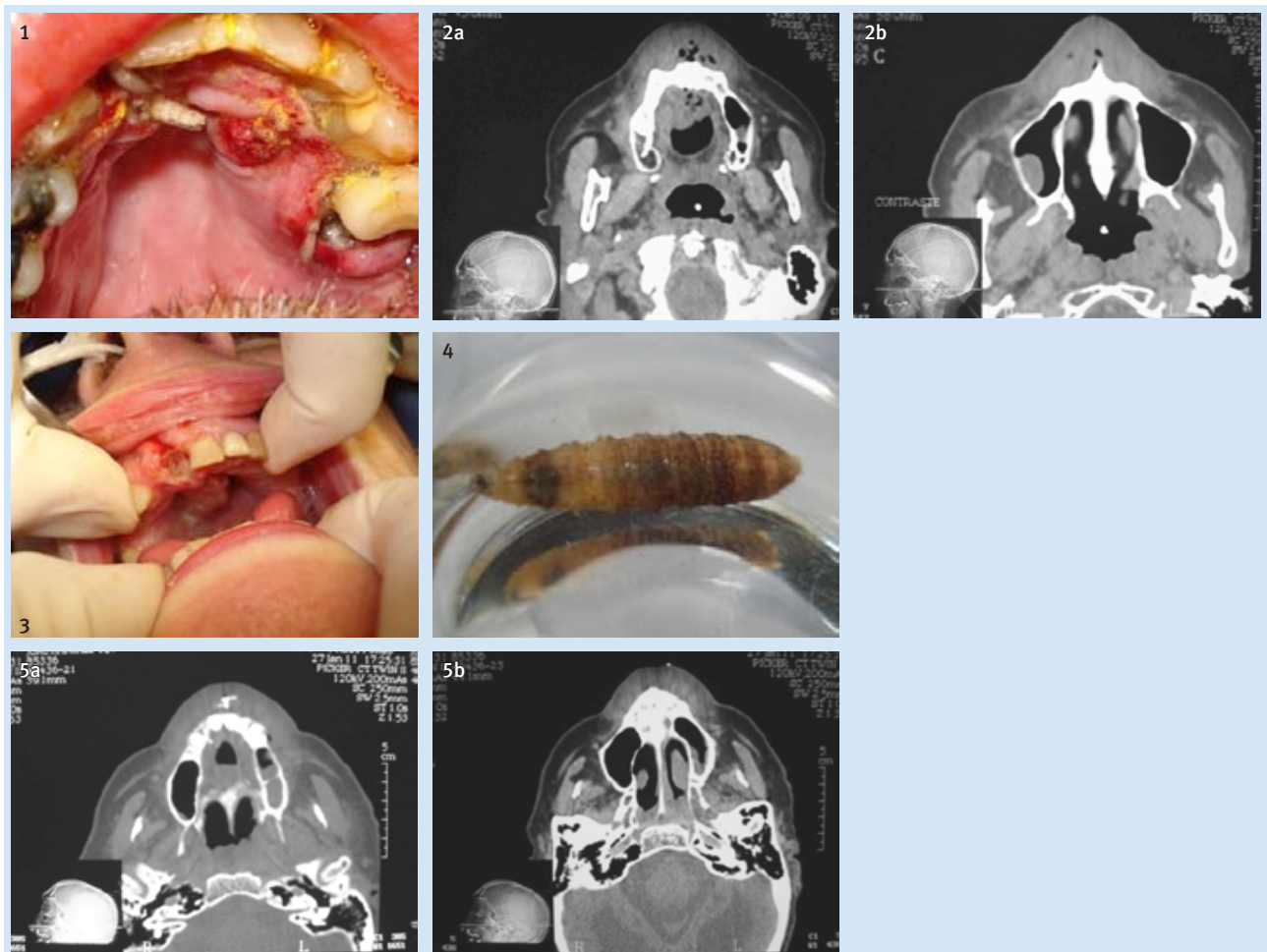
juća, a ostale facijalne strukture netaknute. Prema riječima skrbnika, lezija se pojavila prije dva dana (slika 1.).

CT-snimka maksile i paranasalnih sinusa pokazala je amorfne strukture u gustoći mekog tkiva te prozračnosti u alveolarnom grebenu, na dnu sulkusa i u gornjem dijelu tvrdog nepca. Uočena je i sonda u faringealnoj regiji. Vidljivi dijelovi mastoidea nisu pokazivali znakove abnormalnosti. Bio je vidljiv i desni maksilarni sinus (slike 2 a i b). Pretrage krvi (KKS) pokazale su hemodinamsku stabilnost.

Ličinke u usnoj šupljini tretirane su oksigeniranom vodom (10 vol.), CHX-om i ručnim uklanjanjem. Izvađeno ih je četrdesetak. Ispiranje CHX-om obavljalo se svaki dan. Tre-

movement was observed. The palate lump with approximately 2 cm in diameter contained larvae in its interior. The state of dental hygiene of the patient was acceptable and remaining facial structures were intact. According to reports from the patient's caretakers, the lesion had appeared about 2 days prior (Figure 1).

A CT scan of the maxilla and paranasal sinuses was performed showing the presence of a dysmorphic image with soft tissue density, permeating gas pockets located in the alveolar ridge area, bottom-of-sulcus, and superior hard palate area. The presence of probe was noted throughout the pharyngeal region. Visible portions of mastoids did not



Slika 1. Inicijalni izgled prvog slučaja – vidi se fistula i pomicanje ličinki u projekciji apeksa radikusa zuba 11; izraslina na nepcu promjera 2 cm sadržava ličinke

Figure 1 Initial aspect of case 1 showing fistula in the apex of radicular remains of the dental element 11, where larvae movement was observed. The palate lump with approximately 2 cm in diameter contained larvae in its interior.

Slika 2 a i b Slučaj 1. – CT-snimka lica: amorfni predmet gustoće mekog tkiva; džepovi zraka u predjelu alveolarne kosti, dna sulkusa i mekog nepca; vidljiva je i slika nazogastrične sonde kroz farinks; naznake desnoga maksilarnog sinusa

Figure 2a and b Case 1 – Facial CT scan: dysmorphic image with soft tissue density, permeating gas pockets in the alveolar ridge area, bottom-of-sulcus, and hard palate. It was noted the presence of nasogastric probe through the pharyngeal region. Signs of right maxillary sinus.

Slika 3. 23 dana nakon operacije vidljivi su šavovi nakon zahvata

Figure 3 23 days postoperative with suture after surgical debridement;

Slika 4. Fotografija ličinke *Cochliomyia homivorax* (ima metalnocrne uzdužne crte po tijelu)

Figure 4 Photo showing a solo larva of *Cochliomyia homivorax* with metallic colored and black longitudinal striped thorax.

Slika 5 a i b CT-snimka maksilarnih i frontalnih sinusa pokazuje inicijalnu leziju bez znatnijeg gubitka maksilarne kosti te diskretna oslabljena područja s džepovima zraka u prednjem dijelu gornjega zubnog luka

Figure 5a and b CT scan of maxillary and facial sinuses: showing an initial lesion without significant bone commitment of maxillary bone and discrete hyperattenuation area, with low gas pocket in the anterior ridge of the superior dental arch.

tiranje ivermectinom sastojalo se od trodnevne oralne primjene – jedna doza od 200 mg/kg na dan.

Desetog dana hospitalizacije izvađen je zub 11 te očišćeni zahvaćena kost i sluznica, pa je fistula zatvorena (slika 3.) Kirurški zahvat obavljen je u lokalnoj anesteziji, no uz asistiranje specijalista zbog općeg stanja bolesnice.

Pacijentica je otpuštena nakon 23 dana. U laboratoriju Sveučilišta Passo Fundo ustanovljeno je da ličinke pripadaju vrsti muhe *Cochliomyia hominivorax* (slika 4.).

Slučaj 2

Pacijent u dobi od 68 godina hitno je primljen u bolnicu jer je bio u postinzultnom stanju, imao je apsces u ustima i sumnjalo se na oralnu mijazu.

Kliničkim pregledom ustanovljena je upala pluća i neurološki ispadi nakon inzulta, pa je učinjena traheotomija plastičnom kanilom. Zbog upale pluća pacijentu je određena intravenska antibiotska terapiju (Levofloxacin 500 mg) te fiziološka otopina i oralna terapija CHX-om.

Oralnim pregledom ustanovljeno je isušivanje sluznice usana i šupljina ispunjena ličinkama. Usta su mu stalno bila otvorena. Pregledom su pronađeni i apscesi na ostalim zubima te je indicirana njihova ekstrakcija. Oralna higijena bila je iznimno loša. Prema riječima skrbnika lezija se pacijentu pojavila prije četiri dana.

Napravljena je CT-snimka gornje čeljusti i paranazalnih sinusa te je uočena inicijalna lezija. Nije postojala komunikacija između bukalnog sinusa i oralne šupljine. Okolne koštane strukture bile su intaktne. Mastoidi su bili normalno prozračni. Uočeni su džepovi zraka u lateralnom dijelu gornjega zubnog niza, što upućuje na mijazu. KKS je pokazao hemodinamsku stabilnost (slika 5 a i b).

Nakon što ga je obradio torakalni kirurg, pacijentu su izvađeni problematični zubi, kost i sluznica su očišćeni i fistula zatvorena. Kao i u prvom slučaju, određena je trodnevna potporna terapija ivermectinom (6 mg) te ispiranje oksigeniranim vodom i CHX-om.

Kirurški zahvat obavljen je u lokalnoj anesteziji, no uz asistiranje specijalista zbog lošega zdravstvenog stanja pacijenta.

Šest dana nakon prijma pacijent je otpušten iz bolnice, a pregledom ličinki u laboratoriju Sveučilišta Passo Fundo ustanovljeno je da je riječ o običnoj muhi.

show any abnormality. The patient presented right maxillary sinus (Figures 2a and b). After a complete blood count, albumin, urea, and creatinine, hemodynamic stability was observed.

For the treatment of larvae present in the oral cavity, two washing procedures were performed with 10 vol. oxygenated water and CHX added to manual removal of larvae. Around 40 larvae were removed. Rinses of CHX were performed daily. Among the procedures, Ivermectin 6 mg was administered. The treatment consisted of oral Ivermectin therapy (a single dose of 200 mg/kg per day), for 3 days.

On the tenth day of hospital admission, an extraction of septic tooth 11 was performed, along with local bone curettage, mucosa debridement, and fistula closure (Figure 3). The surgical treatment was performed under local anesthesia assisted by a specialist due to the overall severe clinical state of the patient.

After 23 days of admission, the patient was released. The entomology service of the University of Passo Fundo that examined the larvae, determined that the type of the fly was *Cochliomyia hominivorax*, popularly known as blowfly (Figure 4).

Case 2

Patient, male, 68 years old, with aftermaths of a stroke, arrived at the Emergency unit of the HSVP with septic teeth and suspicion of oral myiasis.

At the medical clinical assessment, the patient was tracheostomized with a plastic cannula, had a lung infection, and neurological aftermaths from the stroke. At the moment of admission, intravenous antibiotic therapy (Levofloxacin 500 mg due to the patient's pulmonary conditions) was prescribed along with medications which the patient was already taking, parenteral hydration, and oral hygiene with CHX.

The physical examination showed drying of labial mucosa and a hole in the superior cavity with larva presence. The oral cavity remained constantly open. Apart from this lesion, the patient presented some septic teeth indicated for extraction. The state of dental hygiene of the patient was poor. According to reports from the patient's caretakers, the lesion had appeared about 4 days prior.

A CT scan of the maxilla and paranasal sinuses was performed, where observing the initial lesion showed no evidence of buccal sinus communication or significant bone commitment placed along the maxillary bone, in a medial condition, regional bone structures were intact, normal aerated mastoids. Discrete hyperattenuation with low gas pockets along the anterior ridge of the lateral portion of superior dental arch, correlating with clinical data was related to myiasis. A complete blood count presented hemodynamic stability (Figures 5a and b).

After the medical release from thoracic surgeon and medical clinic, an extraction of septic teeth was performed, along with local bone curettage, mucosa debridement, and fistula closure. And, as in case 1, an adjunct treatment of larvae was applied with Ivermectin 6 mg, with the same protocol for 3 days, along with washing with 10 vol. oxygenated water. Oral hygiene was carried out with CHX.

Rasprava

Iz literature se zna da je mijaza moguća i kod ljudi i životinja. Najčešće se pojavljuje kod starijih, te onih s posebnim potrebama i sklonijima obolijevanju. Oralna mijaza nastaje zbog loše oralne higijene, alkoholizma, senilnosti, gnojnih lezija, uznapredovale halitose i novotvorina, kod ljudi s posebnim potrebama i pacijenata zaboravljenih u gerijatrijskim domovima i psihijatrijskim ustanovama. Mogu oboljeti i zdravi, dobro zbrinuti pacijenti. Oralna mijaza češća je u nerazvijenim zemljama i tropskim ruralnim predjelima (9,10,11,13).

Kao i ovi slučajevi, slučajevi opisani u literaturi upućuju na to da najčešće obolijevaju pacijenti s rizičnim čimbenicima kao što su otvoreni zagriz, disanje na usta i oslabljene usne. Lezije su najčešće na prednjem dijelu tvrdog nepca, desnima, usnici i njezinim kutovima (komisuri) (14).

Češće infekcije povezuje se s tropskim područjima i ljudima niskoga socijalno-ekonomskog statusa koji žive u nehigijenskim uvjetima. U prvom slučaju pacijentica je potjecala iz urbanog okruženja, ali je imala dijagnozu Alzheimerove bolesti, bila je dehidrirana i s izrazitom kaheksijom, a usta su joj bila konstantno otvorena zbog opuštenosti mišića zatvarača. U drugom slučaju pacijent je također živio u gradu, ali je imao simptome moždanog udara te stalno otvorena usta, a obavljena mu je i traheotomija (15).

Kliničkim pregledom usne šupljine ustanovljeni su eritematozna oteklina i pulsirajuća bol zbog pomicanja ličinki te lezija kroz koje su bile vidljive. U literaturi su opisane metode kliničkog zbrinjavanja mijaze koje uključuju čišćenje lezije i uklanjanje nekrotičnog tkiva (9). Unatoč svemu, ni jedna metoda nije potpuno učinkovita.

Kirurzi različito rješavaju mijazu, uglavnom na temelju osobnog iskustva i prikaza slučajeva (jodoform, etilni klorid, živin klorid, krezot, fiziološka otopina, terpentinsko ulje, sistemska uporaba thiabendazola te antibiotika širokog spektra radi prevencije sekundarne infekcije), (16), a pritom se koriste i ljudima prilagođenim veterinarskim lijekovima. Neki autori ističu ivermectin kao lijek izbora u tretiranju mijaze (8,12).

Ivermectin je antiparazitik širokog spektra koji se primjenjuje u veterini, ali je dokazano učinkovit i u liječenju parazitskih infekcija kod ljudi. Najčešće se daje u pojedinačnoj dozi od 150 do 200 mg/kg tjelesne mase. Brzo se apsorbira i u krvi vrlo brzo dostiže visoke koncentracije. Daje se oralno i mora krvlju stići do inficiranog područja (9,12).

Mehaničko uklanjanje ličinki standardni je postupak u liječenju mijaze. Sistemsom primjenom ivermectina mogu se postići dobri rezultati. Topiklani antibiotici mogu biti dodatno terapijsko sredstvo. Ivermectin je polusintetski makro-

Surgical treatment was performed under local anesthesia assisted by a specialist due to the overall poor clinical state of the patient.

After 6 days of admission, the patient was released from the hospital and the entomology service of the University of Passo Fundo that examined the type of larva, determined it was a common fly (housefly).

Discussion

Literature shows that myiasis may affect humans and animals. As reported in the cases, it mainly occurs in elderly people and/or patients with mental disorders, who are more subjected to the disease. Oral myiasis is usually assigned to poor oral hygiene, alcoholism, senility, suppurative lesion, severe halitosis, neoplasia, and has also been reported in patients with special needs, forgotten in geriatric homes or mental hospitals, however, it may occur in well-nourished and healthy patients. Oral myiasis is more common in underdeveloped countries and tropics, prevailing in the rural area (9,10,11,13).

Similar to the cases mentioned here, the ones described in literature, located in the anterior palate, gums, lips, or labial commissure, had mainly affected patients with additional predisposing factors identified as labial incompetence, open bite, and mouth breathing (14).

There is more prevalence of this disease in regions of hot weather, in people that come from insanitary sites, and from low social-economic level. In case 1, the patient lived in an urban environment, but presented Alzheimer's disease, dehydration, and severe cachectic stage, besides having a constantly open oral cavity due to jaw relaxation. In case 2, the patient also lived in urban environment, however, he presented stroke aftermaths, tracheostomy, and constantly open oral cavity (15).

Oral features of the infection include erythematous swelling and pulsatile pain due to the movement of larvae or to openings made at the margin of gingival surfaces, where larvae may be noted. Some methods have already been described for the clinical treatment of human myiasis, however, none of them were completely effective, with the usual proposal of lesion debridement with the removal of necrotic tissues (9).

Surgeons in different regions have dealt with this disease in various manners, basing their decisions on personal experience, on case reports (Iodoform, ethyl chloride, mercury chloride, creosote, Saline, and Turpentine Oil, and for the systemic use of Thiabendazole always associated with a wide spectrum antibiotic therapy to control secondary infections)¹⁶, and on the treatment with drugs used in veterinary studies and extrapolated to humans. Some of these have used Ivermectin as a therapeutic agent for myiasis (8,12).

Ivermectin is a broad-spectrum antiparasitic drug for veterinary use, but with proven efficacy for some parasites that attack the human organism. It is generally administered in a single dose of 150-200 g/kg of body weight. Ivermectin is absorbed quickly and reaches a high concentration in the blood within a relatively short period of time. It is administered

lidni antibiotik izoliran iz *Streptomyces avermitilis*. Godine 1993. proglašen je sigurnim za ljudsku uporabu. Lijek blokira živčane impulse na sinapsama otpuštajući g-aminobutiričnu kiselinu, što uzrokuje paralizu i smrt (5,23).

Istim protokolom kao u ovom slučaju koristili su se Shinohara i suradnici u tretiranju mijaze. Abdo i njegovi kolege opisali su mijazu gornje usnice s nekrozom tkiva, a tretirali su je dozom od 6 mg oralno i kirurški (5,6,12).

Različiti rezultati, no sličan protokol liječenja, upućuju na isprepletanje još uvijek nepoznatih čimbenika koji utječu na ishod liječenja te tako onemogućuju određivanje točnog protokola u liječenju mijaze. U literaturi se navodi da bi reducirana doza mogla biti uzrok neuspješne terapije (1).

Nekrotično tkivo može biti važan čimbenik u liječenju jer onemogućuje djelovanje lijeka na inficiranom području. To se događa zbog loše prokrvljenosti nekrotičnog tkiva, što na kraju negativno utječe na ishod terapije. Ovo ide u prilog različitim rezultatima terapija u kojima su se rabile iste doze lijeka (1).

Kod korištenja ivermectina postoji rizik od štetnih popratnih pojava na središnji živčani sustav, posebice kad pacijentata s neurološkim problemima. Neurotoksičnost toga lijeka može biti pojačana pretjeranom sintezom P-glikoproteina jer ivermectin prelazi krvožilnu barijeru mozga te se taloži u njegovu tkivu, a to izaziva neurotoksičnost (5,12).

Nužna je pozorna procjena pacijentova zdravstvenog stanja, osobito ako se propisuju lijekovi čije interakcije još nisu potpuno razjašnjene te ako pati od neuroloških tegoba (1).

Prognoza terapije izravno je povezana s početkom nastanka lezije, mjestom gdje se nalazi i zdravstvenim stanjem pacijenta. Lokalna anestezija primjenjuje se nakon procjene situacije, a slijedi incizija kože ili sluznice. Kod liječenja pacijentata s paralizom mozga može se zaključiti da je mijaza povezana s infekcijama kože, mjehura, nosnih šupljina, ušiju, očiju i povremeno usne šupljine (2,14).

U ovom prikazu slučaja zaključili smo da postoje neki rizični čimbenici kod pojave i napredovanja oralne mijaze, a to su: pothranjenost, loša higijena usta, postojeće oralne lezije i uznapredovala halitoza. Ivermectin se pokazao kao jednostavna potporna terapija u liječenju ove specifične patologije.

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orally and must be distributed through the bloodstream to the infested area (9,12).

Mechanical removal of larvae is the traditional treatment for myiasis. The use of systemic Ivermectin can produce favorable results. Topical antibiotics can be used as coadjuvants in treatment. Ivermectin is a semisynthetic macrolide antibiotic isolated from *Streptomyces avermitilis*. In 1993, Ivermectin was reported safe for human use. It blocks nerve impulses on the nerve ending through the release of g-aminobutyric acid linking the receptors and causing palsy and death (5,13).

The same protocol applied to these cases was used by Shinohara et al. for the successful treatment of an adult patient. Abdo et al. reported a case of myiasis in the upper lip with large tissue necrosis, in which they used a dose of 6 mg orally, associated with surgical treatment (5,6,12).

These different results, even in a similar manner of treatment, suggest the interference of factors not yet known that may compromise treatment and hinder the establishment of an appropriate protocol. The use of reduced doses of Ivermectin supposedly led to treatment failure (1).

The presence of tissue necrosis may be an important factor limiting the scope of the drug in therapeutic doses to the infected area. This difficulty may be because of the poor vascularization present in necrotic areas, which may contribute negatively to the outcome of treatment. This justifies the reporting of different results using similar doses of Ivermectin, which can be attributed to local tissue condition (1).

There is a risk of adverse effects on the central nervous system with use of Ivermectin, especially in patients with neurological disorders. Ivermectin has neurotoxicity that may be influenced by the overexpression of P-glycoprotein, thus favoring the entry of Ivermectin across the blood-brain barrier and an increase in its concentration in brain tissue, bringing about severe neurotoxicity (5,12).

A careful assessment of the patient's health is essential when using drugs, such as Ivermectin, the adverse effects and drug interactions of which are not yet fully understood, especially in patients with neurological disorders (1).

The prognosis is directly related to time, site of occurrence, and systemic conditions of the patient. Depending on the situation, local anesthesia may be required, followed by skin or mucosa incision. When treating patients with brain paralysis, it can be affirmed that myiasis may be related to infections of the skin, bladder, nasal cavities, ear cavities, eyes, and occasionally, oral cavities (2,4).

In this paper, we concluded that some predisposing factors such as malnutrition, poor oral hygiene, preexistent oral lesions, and severe halitosis have a crucial influence for the appearance and progression of oral myiasis, and Ivermectin proved to be quite a viable and easy implementation, serving as a good option in the adjunct treatment of this pathology.

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Abstract

Oral myiasis is generally associated to poor oral hygiene, alcoholism, senility, suppurative lesions, and neoplasia and has been constantly reported in elderly patients and/or patients with mental disorders and special needs. Different methods have been described for the clinical treatment of human myiasis, however, none of them were completely effective. This paper suggests that oral Ivermectin is considered an alternative therapy for myiasis. This medication is practical to administer and presents quick absorption with high blood concentration in relatively little time. The present article reports two cases of elderly patients who were residents of geriatric homes and were referred to the emergency unit of the Hospital São Vicente de Paulo of Passo Fundo – RS, Brazil, with a critical condition of oral myiasis and septic teeth. For treating the larvae present in the oral cavity, washing procedures with 10 vol. oxygenated water and 0.12% Chlorhexidine gluconate (CHX) were performed, plus manual removal of the larvae. As adjunct systemic treatment, Ivermectin 6 mg was administered for 3 days, which proved to be quite a viable and easy implementation, serving as a good option in the adjunct treatment of this kind of pathology.

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Key words

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