Case Report: A Case of Lagochilascariasis in Suriname with the Involvement of the ENT System and the Skull Base

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Abstract. We describe a case of human lagochilascariasis, with skull-base involvement and a chronic and relapsing course after treatment. This rare parasitic infection is usually manifested in the head and neck area, characterized by progressive granulomatous inflammation and the formation of abscesses. Transmission to humans most likely occurs by the consumption of undercooked meat of wild rodents. On the basis of literature studies, we propose the most likely life cycle of the parasite that involves wild feline and rodent species, with humans as accidental hosts. Even in endemic areas, it is very difficult to recognize the disease at an early stage. Progression will eventually lead to involvement of the (central) nervous system, as described in our case. Treatment is often difficult and involves resection and prolonged treatment with anthelmintic drugs. Recurrences are not uncommon and at present, long-term oral administration of ivermectin seems to be the most effective treatment.

INTRODUCTION

Lagochilascariasis is a very rare parasitic disease in humans and was first described by Leiper in 1909 in patients in Trinidad.¹ The disease is endemic in the neotropical area, ranging from Mexico to South America, with Brazil counting for most of the cases described.² In Suriname, a series of six cases have been reported until 1992.³ Not recognizing or wrong treatment of the disease could have devastating consequences, but diagnosis and treatment are both difficult because of the rarity of the disease.

CASE REPORT

A 33-year-old male, who worked in the hinterlands of Suriname as an entertainer in artisanal gold mining areas, visited an ear, nose, and throat (ENT) outpatient clinic in April 2013 with aural discharge and excretion of worms from the right external ear canal. He had a discharge of small white worms from his nose and right ear for the first time about 9 months before. He was treated by a physician with an anthelmintic drug, most likely mebendazole, with no effect on the intermittent discharge of worms. He also complained of a painless cervical mass, pain in the ipsilateral ear, malaise, and weight loss. The cervical mass had evolved 6 months earlier and was progressive in size. Since there was a progressive swelling from the ipsilateral side of the neck that was suspicious for a malignancy, a fine needle aspiration was performed. This yielded a chronic inflammation without malignant cells. A biopsy from an ipsilateral swelling in the naso- and oropharynx was also without signs of malignancy. A subsequent computed tomography scan from the head and neck revealed a defect in the middle cranial fossa and swelling of the parapharyngeal and retropharyngeal space (Figure 1). In the meantime, the patient developed unilateral periorbital pain, diplopia, and discharge of white worms from the cervical mass (Figure 2A). Physical examination showed intact facial nerve function, with paralysis of the sixth cranial nerve on the right side. The triad of the periorbital pain,

abducens nerve palsy, and petrous apicitis is better known as Gradenigo's syndrome also called Gradenigo–Lannois syndrome, and is a complication of otitis media and mastoiditis involving the apex of the petrous temporal bone. Laboratory investigations showed no abnormalities, especially no eosinophilia or leukocytosis. A right-sided tonsillectomy and drainage of the parapharyngeal mass was carried out, followed by a craniotomy, in the same operative session, which revealed living worms within the extradural space of the middle cranial fossa and a partially destroyed skull base. The worms were removed as much as possible and the cavity was rinsed with povidone-iodine diluted with saline. This was done since povidone-iodine proved to stop the movement of the worms in vitro *durante operationem*, which could not be achieved by submersion in saline. Drainage of the cervical mass did not show the presence of worms. The worms removed from the skull base were examined and identified as *Lagochilascaris minor* (Figure 3A). Histologic examination of the removed tonsil showed a granulomatous inflammation, as a consequence of multiple larvae in different maturation stages (Figure 3B). After surgery, the patient was treated with three oral doses of 10 mg ivermectin, with an interval of 2 days, followed by albendazole 400 mg two times a day for the first 2 weeks, and 400 mg once a day for another 2 weeks.

In the first 3 days, there was excretion of worms from the craniotomy wound, but that gradually decreased to zero. Analysis of stool samples, collected during admission, but after surgery, did not reveal any larvae or eggs. The patient was discharged from the hospital with a facial nerve paralysis as a consequence of the neurosurgical evacuation of the intracranial mass. The perforation of the right tympanic membrane was resolved without surgical intervention; however, a right-sided hearing loss was detected by audiometry. A preoperative screening of the hearing function had not been performed; therefore, it remains unclear if the hearing loss was due to the infection or to the surgical procedure. The patient slowly recovered and had already stopped shedding worms when he was discharged from the hospital, 3 weeks after surgery and commencement of anthelmintic therapy. The preoperative abducens palsy disappeared (Figure 2B).

In April 2014, the patient returned to the hospital with a swelling of the right side of the neck. Cervical excision and examination of lymph nodes did not reveal the presence of

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FIGURE 1. Computed tomography scan of head and neck showed a defect in the middle cranial fossa and swelling of the parapharyngeal and retropharyngeal space.

parasites, but only reactive lymphoid tissue. In October 2014, he was seen again, this time with a swelling of the right preauricular area. He also observed the evacuation of a living worm from the neck. We started treatment with ivermectin, a weekly oral dose of 10 mg that resulted in a decrease of the preauricular mass. A magnetic resonance imaging scan of the head was performed 4 months after initiation of retreatment with ivermectin and showed no acute abnormalities, but only residual deviations after an earlier abscess at the right side of the neck. After 6 months of treatment, the ivermectin was discontinued and the patient is being frequently checked in our hospital. So far, through August 2015, there has not been any recurrence of symptoms.

DISCUSSION

Inflammation of the different regions of the ENT system due to a parasitic infestation is a rare entity.⁴ We present a case of lagochilascariasis wherein besides the ear and pharynx, the neck, skull base, and cranial nerves are also involved. The

FIGURE 2. (A) Preoperative abducens nerve palsy, (B) complete disappearance of the preoperative abducens palsy.

FIGURE 3. (A) Macroscopic examination of the worms found in the intracranial extradural space, which were identified as *Lagochilascaris minor*, (B) granulomatous inflammation, as a consequence of multiple larvae in different maturation stages.

differential diagnosis of a neck mass is broad, but can be divided in three broad categories: congenital (like teratoma, laryngocele, and various cysts), inflammatory (infectious and noninfectious), and neoplastic (like lymphoma, thyroid cancer, and metastatic head and neck carcinoma). If an inflammatory cause is not suspected, a fine needle aspiration has to be performed to exclude malignancy. In our case, we found no positive signs of inflammation by physical and laboratory examination at the first presentation or at the relapse. Therefore, a fine needle aspiration was done. Laboratory findings are not a routine to monitor the effectiveness of therapy or to predict a relapse.

The genus *Lagochilascaris* includes five species. *Lagochilascaris minor* is the most important, since it is the only species causing human lagochilascariasis.⁵ Animal experiments have provided insight into the life cycle of this helminth. Probably mice and other rodents are intermediate hosts for the parasite and can be infected by ingestion of eggs. A couple of hours after ingestion, the larvae hatch from the eggs in the gastrointestinal tract of the mice. The larvae move from the central veins of the liver to the bronchioles and alveoli of the lungs. Then, the larvae begin to hatch in muscle and fat tissue, forming small larval nodules, and develop into an advanced third stadium, but these seem not to be able to develop into adult worms, even after an observation period of up to 220 days.⁶ Similar animal experiments showed that cats could only be infected after consuming infected mice. No cat was infected after ingestion of eggs or mice that were less than 3 days infected.⁶ After consuming infected mice, larvae in the third stadium can be observed migrating from the stomach to the upper portions of the digestive tract, where they

develop into the fourth stadium larvae and adult worms. The adult worms can expel eggs, that will be found in feces of infected cats.⁷ Infected cats develop similar symptoms as humans, with lesions in the larynx and pharynx and cervical lymphadenopathy.⁶ Wild rodents like guinea pigs, agouti, and capybara become infected by consuming eggs of *Lagochilascaris* that are expelled with feces by infected wild felines; the rodents then become intermediate hosts.⁸ Lagochilascariasis is mostly seen in humans living in or close to forested areas and who maintain a diet of hunted meat, including the species previously mentioned.⁴ Humans can be considered as accidental hosts who become infected by ingesting raw or undercooked meat of the intermediate host that contains encysted larvae. The pathophysiology of infection is probably the same as in cats, although alternative routes are proposed, like migration from the lungs to the upper gastrointestinal tract or direct infection of the pharynx or larynx.^{1,9,10}

It is generally recognized that proteases play an important role in basic physiology and pathogenesis of parasitic diseases. Proteases can process proteins and peptides to provide required amino acids, facilitate infection, and dissemination through host tissue by hydrolyzing extracellular proteins and by evading host immune response.¹¹ Excretory or secretory products of *L. minor* also hydrolyzed fibrinogen completely, probably as a strategy to escape from the hemostatic process during migration through blood vessels. Collagen found in the extracellular matrix of, for example, cartilage and bone, is susceptible to hydrolyzing activity of the secretory products of *L. minor*.¹¹ A granulomatous response is likely to be the most important immune response to the secreted irritating substances of the parasite, promoting the formation of abscesses and migration to other tissues.¹²

Almost all infected humans present with lesions and tumors of the larynx, pharynx, and neck area, without signs of fever or pain.⁴ In humans, all stages of the parasite can be found in the tissues: eggs, larvae, and adult worms. Local reproduction and autoinfection are likely to occur, and can probably maintain the infection for a very long period.⁹ Diagnosis can be made by finding eggs, larvae, or adult worms.

As in our case, treatment can be challenging and as a consequence of the rareness of the disease, the best treatment protocol has not yet been established. Especially after treatment with anthelmintic drugs like albendazole, recurrences are frequent, maybe as a result of ineffectiveness against the eggs of the parasite.^{9,13–15} Resection of the mass is often performed, although the benefit is unknown.

In our case, there was an increment in lymph node size probably due to recurrence of the disease; however, there was no histological proof for this, besides the patient's observation of worm excretion. Abscesses containing eggs, larvae, or adult worms were not found. The size of the lymph nodes decreased after ivermectin was started.

Ivermectin has been used successfully in the treatment of recurrences of lagochilascariasis.^{9,13} In an animal experiment with experimentally infected cats, a 100% drug efficacy was observed with ivermectin treatment.¹⁶ A regimen of repeated doses is often prescribed based on the possibility of autoinfection and possible ineffectiveness against larval stages.^{9,16}

Three other cases have been described in Suriname where all three patients had a growing neck mass and were treated with thiabendazole. One patient showed slow regression of the neck mass after a second cycle of thiabendazole,

but was lost to follow up. The second patient did not respond to treatment with thiabendazole and died a year later. The last patient received thiabendazole and levamisole without success and was cured after prolonged treatment with albendazole.^{3,17,18}

As written above, lagochilascariasis is a very rare parasitic disease. This is the reason there has been no specific public health response after this case in Suriname, except for the existing national advice to avoid undercooked bushmeat.

CONCLUSION

We described a case of human lagochilascariasis, with skull-base involvement and a chronic and relapsing course after treatment. The disease is usually manifested in the head and neck area, characterized by progressive granulomatous inflammation and the formation of abscesses. Even in endemic areas, it is very difficult to recognize the disease in an early stage. Progression will eventually lead to involvement of the (central) nervous system, as described in our case. Treatment is often difficult and involves resection and prolonged treatment with anthelmintic drugs. Long-term administration of ivermectin seems to be effective in the treatment of lagochilascariasis.

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