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PECULIARITIES OF THE CLINICAL PICTURE AND DIAGNOSIS OF DIROFILARIASIS IN THE MAXILLOFACIAL AREA: A SERIES OF CASES FROM PRACTICE

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Key words: *dirofilariasis, maxillofacial, helminthiasis, nematode*
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Abstract. Peculiarities of the clinical picture and diagnosis of dirofilariasis in the maxillofacial area: a series of cases from practice. Buniatian Kh.A., Khotimska Yu.V., Kovach I.V., Yaroslavska Yu.Yu., Bondarenko O.V., Nazaryan R.S. *Dirofilariasis is a helminthiasis that occurs in carnivorous animals (dogs, cats, foxes, wolves, etc.) and less often in humans, although according to some authors it is believed that the number of infected animals approximately corresponds to the number of infected people. Dirofilariasis of the maxillofacial area is not a widespread condition, its cases are described in short series, therefore, the aim of this work is to share our own experience of managing patients with this rare condition.The work presents our own experience in the management of 14 dirofilariasis patients with lesions of the maxillofacial area, of them there are 3 men and 11 women aged 29 to 54. Most patients sought help in the late autumn, winter and spring periods and only 2 people in the summer period. All patients were examined by a dentist, and an ultrasound examination of the area with a formation was performed. According to the clinical manifestations, the disease began acutely in nine patients and had a picture of inflamed atheroma (2 – in the zygomatic area, 1 – in the parotid, 2 – in the infraorbital area, 2 – in the temporal area, and 2 – in the area of the nasal bridge). All patients were operated on and tumor-like formations in dense membranes were removed, inside which one live nematode 11-18 cm long was found. In 3 observations, fragments of dead, partially lysed nematodes were removed from the oral cavity, the capsules of which imitated a migrating granuloma. According to the location – 5 capsules with dirofilaria were located in the subcutaneous fatty tissue, 3 – in the submucosal layer of the gums fused to the periosteum of the upper jaw, 1 – in the submucous layer of the lower jaw, 2 – in the fibers of the temporalis muscle and 1 – in the fibers of the buccal muscle. In each case, the localization of the nematode was close to the places of accumulation of adipose tissue or large blood vessels. In the postoperative period complex therapy was prescribed, including symptomatic anti-inflammatory and desensitizing agents, and consultation with infectionist was recommended. Thus, according to our observations, dirofilariasis most often affects areas of the face in which there are large vessels and accumulation of fatty tissue. In connection with the prevalence of dirofilariosis in humans and the predominant localization of parasitic infection in the face area, dentists, ophthalmologists and otolaryngologists need to be familiar with this pathology and show definite vigilance. Treatment dirofilariosis patients should be carried out comprehensively, together with parasitologists, with surgical excision of the lesion and appropriate drug therapy.*

Реферат. Особливості клініки та діагностики дирофіляріозу щелепно-лицьової ділянки: серія випадків з практики. Бунятян Х.А., Хотімська Ю.В., Ковач І.В., Ярославська Ю.Ю., Бондаренко О.В., Назарян Р.С. *Дирофіляріоз – гельмінтоз, який зустрічається в м'ясоїдних тварин (собак, кішок, лисиць, вовків та ін.) і рідше в людини, хоча за даними деяких авторів вважається, що кількість заражених тварин приблизно відповідає кількості заражених людей. Дирофіляріоз щелепно-лицьової ділянки не є поширеним станом, його випадки*

описуються короткими серіями, тому ми поставили за мету цієї роботи поширення власного досвіду ведення хворих з цим рідкісним станом. У роботі наведено власний досвід ведення 14 хворих на дирофіляріоз з ураженням щелепно-лицьової ділянки. З них 3 чоловіки та 11 жінок віком від 29 до 54 років. Більшість пацієнтів звернулися за допомогою в пізній осінній, зимовий та весняний періоди, лише 2 особи в літній період. Усіх пацієнтів було оглянуто стоматологом, проведено ультразвукове дослідження ділянки з новоутворенням. За клінічними проявами в дев'яти пацієнтів захворювання почалося гостро й мало картину запаленої атероми (2 – у виличній ділянці, 1 – у привушній, 2 – у підочній, 2 – у скроневій та 2 – у ділянці перенісся). Усі пацієнти прооперовані та у всіх вилучено пухлиноподібні утворення в щільних оболонках, усередині яких знайдено по одній живій нематоді довжиною 11-18 см. У 3 спостереженнях у підслизовому шарі по перехідній складці верхньої щелепи вилучено фрагменти мертвих, частково лізованих нематод, капсули яких імітували мігруючу гранульому. За місцем залягання – 5 капсул з дирофілярією знаходилися в підшкірній жировій клітковині, 3 – у підслизовому шарі ясен, спаяні з окістям верхньої щелепи, 1 – у підслизовому шарі нижньої щелепи, 2 – у волокнах скроневого м'яза й 1 – у волокнах щічного м'яза. У кожному випадку локалізація нематоди була наближена до місць скупчення жирової тканини або великих кровоносних судин. У післяопераційному періоді хворим призначали комплексну протизапальну та десенсибілізуючу терапію і рекомендували консультацію лікаря-інфекціоніста. Таким чином, за нашими спостереженнями дирофіляріоз найбільш часто вражає ділянки обличчя, в яких є великі судини і скупчення жирової клітковини. У зв'язку з поширеністю дирофіляріозу в людей та переважною локалізацією паразитарної інфекції в ділянці обличчя, лікарям-стоматологам, офтальмологам та отоларингологам необхідно бути ознайомленими із вказаною патологією та виявляти певну настороженість. Лікування пацієнтів з дирофіляріозом повинно проводитися комплексно, спільно з паразитологами, з хірургічним висіченням вогнища ураження та відповідною медикаментозною терапією.

Over the last 15-20 years, the attention of clinicians has been attracted by previously uncommon infectious [1, 2] and parasitic diseases which are due to contamination with larvae of animals' helminths. It has been established that a person is infected with these types of helminths in the same ways as with species specific to it [3]. Larvae of certain ones actively penetrate through the skin, others are introduced by insects (intermediate hosts), eggs or larvae of the third group are swallowed with contaminated food and water, and carried into the mouth by hands.

It is only in exceptional cases that helminths of animal characteristic of humans develop in the body to a sexually mature state. As a rule, they pass only the early stages of development and, while retaining the ability to migrate, often remain in the tissues for a long time period. Observations of the researchers, conducted on experimental animals, showed that helminths' larvae, having got into an unusual host, show a tendency to migrate in atypical ways [4]. This tendency leads to an increase in the pathogenic effect, since in this case the larvae can often get into more vulnerable tissues than in case of customary way of migration.

Dirofilariasis is a helminthiasis that occurs in carnivorous animals (dogs, cats, foxes, wolves, etc.) and less often in humans, although according to some authors it is believed that the number of infected animals approximately corresponds to the number of infected people. According to the latest data, human dirofilariasis is found in various parts worldwide, most often in countries with a warm, humid climate [5, 6]. Recently, this helminthic invasion has been registered in all regions of Ukraine.

Animals are the main host of Dirofilaria (*Dirofilaria)*. A person is called the host of a "dead end" or "false address" for the parasite, because the nematode in the human body does not reach sexual maturity and is not reproduced [7, 8]. Human infection occurs as a result of bites of insects, more often mosquitoes of *Culex, Aedes, Anopheles* species, which are carriers of parasite larvae.

According to the researchers, the manifestations of dirofilariasis on the face are the appearance of a tumor-like formation in the subcutaneous fatty tissue, most often in the periorbital areas, with itching, a feeling of "crawling" under the skin, and pulsation. Based on the literature data, the diagnosis is established on the basis of clinical signs, anamnesis of the disease, eosinophilia in the clinical blood test, as well as the characteristic picture of the formation revealed in ultrasound diagnostics (USD) [6, 9]. Dirofilariasis of the maxillofacial region is not a widespread condition, its cases are described in short series, for that reason we aimed this work to share our own experience of managing patients with this rare condition.

MATERIALS AND METHODS OF RESEARCH

The study encompasses 5 years period and involved 14 patients with dirofilariasis who sought medical advice of a dentist. Of the total number of patients, 3 were men and 11 – women aged 29-54 years. Among the patients, 10 are residents of the city who do not have pets in the home, 3 – are residents of the suburbs, and one female is a resident of the village, living in the private sector. All patients did not travel outside the city and region during the last 6 months.

After the examination carried out by the maxillofacial surgeon all patients underwent ultrasound investigation (USI). On the basis of USI data dental curing treatment was developed. The ultrasound examination was carried out in real time with the help

of a linear sensor with a frequency of 7 MHz on the ultrasonic device of the company "Sonoline SI 450" (Germany) [10]. In Ukraine, until 2020, the Protocol for the provision of medical assistance to patients with dirofilariosis (Addendum to the order of the Ministry of Health No. 434 of 03-07-2006) was in force, which has lost its validity, but the key link in the diagnosis of this disease is the examination of the isolated parasite, which was carried out in all cases.

The research was conducted in accordance with the principles of bioethics set forth in the Declaration of Helsinki "Ethical Principles of Medical Research Involving Humans" and the "Universal Declaration on Bioethics and Human Rights (UNESCO)". The patients gave their written consent to the necessary diagnostic and treatment methods. The conducted research was adopted and approved by the ethics commission of the Kharkiv National Medical University (protocol 3, October 13, 2022)

RESULTS AND DISCUSSION

Most patients sought medical advice in the late autumn, winter and spring periods, only 2 people – in the summer period. According to the clinical manifestations, the disease began acutely in eight patients with characteristic clinical signs of an inflamed atheroma (2 – in the zygomatic area, 1 – in the parotid, 2 – in the infraorbital area, 2 – in the temporal area, and 2 – in the area of the nasal bridge). Dirofilariasis was not suspected in 6 patients, because they had a classic odontogenic migrating granuloma that spread from the bone to the periosteum and mucous membrane of the cheek, in 4 patients – in the transitional fold of the upper jaw, in 2 – in the transitional fold of the lower jaw. A characteristic feature was the presence of patients' complaints of a moderate burning sensation, pulsation in the area of a new growth. Attention was drawn to two female patients who complained of the presence of new growth in the area of the nasal bridge and in the infraorbital area. Both patients noted the migration of swelling near to the eye (the first – from the back of the nose to the inner corner of the eye, the second – to the lower eyelid) during the last 3-4 weeks. These patients were referred to the ophthalmology department, where a preliminary diagnosis of dirofilariasis of the periorbital area was established and parasites were removed from the inner corner of the eye and the lower eyelid.

In other cases, the correct preliminary diagnosis was established in 6 (43%) observations in dirofilariasis of the parotid, zygomatic, infraorbital and temporal areas according to USI data.

In carrying out USI of the soft tissues of the abovementioned areas at a depth of 8-10 mm from the skin surface, there were determined cavitary spatial formations of a rounded shape with a diameter of up to 15 mm, with clear, even contours. Their content is liquid, not homogeneous due to many regular geometric diploid figures of a linear shape, with a lumen in the center, of different length, up to 0.7 mm thick, intensively floating in the cavity of the formation, especially when lightly pressing on the formation with the sensor. The capsule of the formation is with a distinct separation, up to 0.8 mm thick, this was the basis to conclude about the presence of incapsulated foreign body. Ultrasound conclusion: encapsulated (moving or immobile) foreign body (Fig. 1).

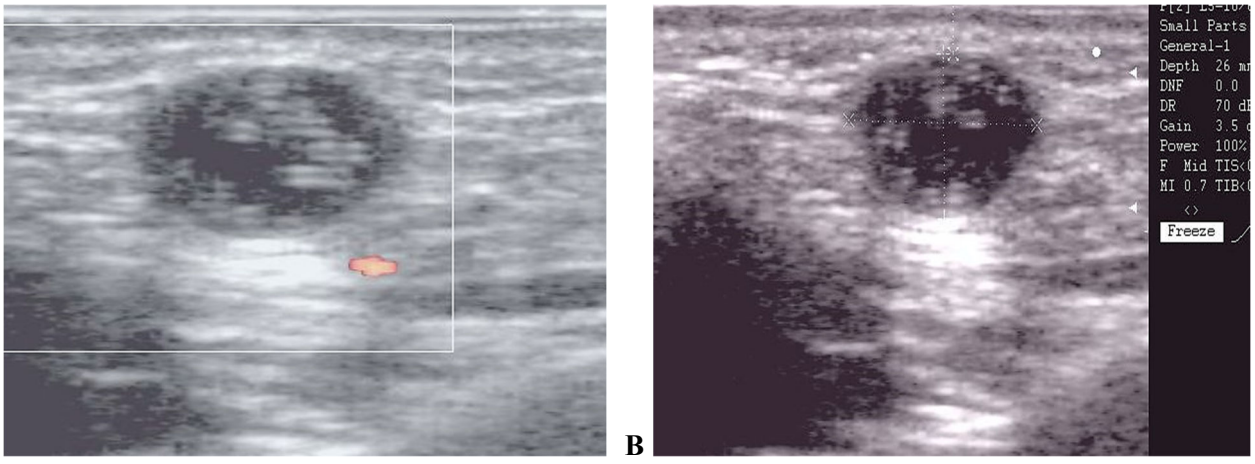

Fig. 1. Ultrasound picture of the formation containing an intratissular parasite.
A - temporal area; B – infraorbital area

A characteristic feature of dirofilariasis of the maxillofacial area was the fact that eosinophilia in the clinical blood analysis was not noted in any observation.

All patients were operated on according to previously established diagnoses. Intraoperatively there were removed tumor-like formations in dense

membranes, inside which one live nematode 11-18 cm long was found (Fig. 2, 3). In 3 observations, fragments of dead, partially lysed nematodes were removed from the submucosal layer along the transitional fold of the upper jaw, the capsules of which simulated a migrating granuloma. According to the location – 5 capsules with dirofilaria were located in the subcutaneous fatty tissue, 3 – in the submucosal layer of the gums fused to the periosteum of the upper jaw, 1 – in the submucosal layer of the lower jaw, 2 – in the fibers of the temporal muscle, and 1 – in the fibers of the buccal muscle. In each case, the localization of the nematode was close to the places of accumulation of adipose tissue or large blood vessels.

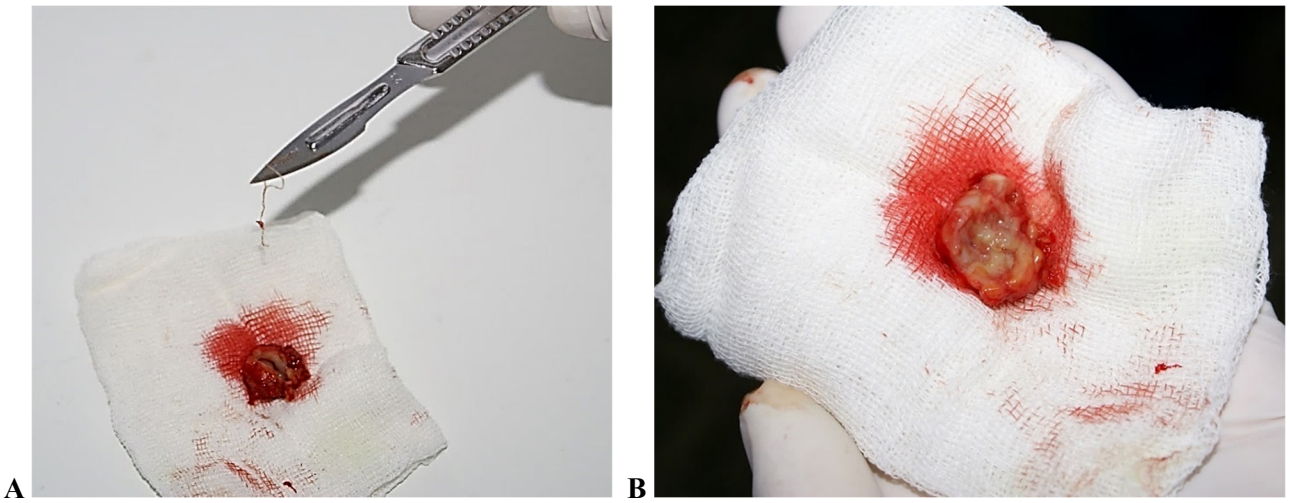

Fig. 2. External view of dirofilaria capsule. A – external view with elongated nematode; B - internal structure

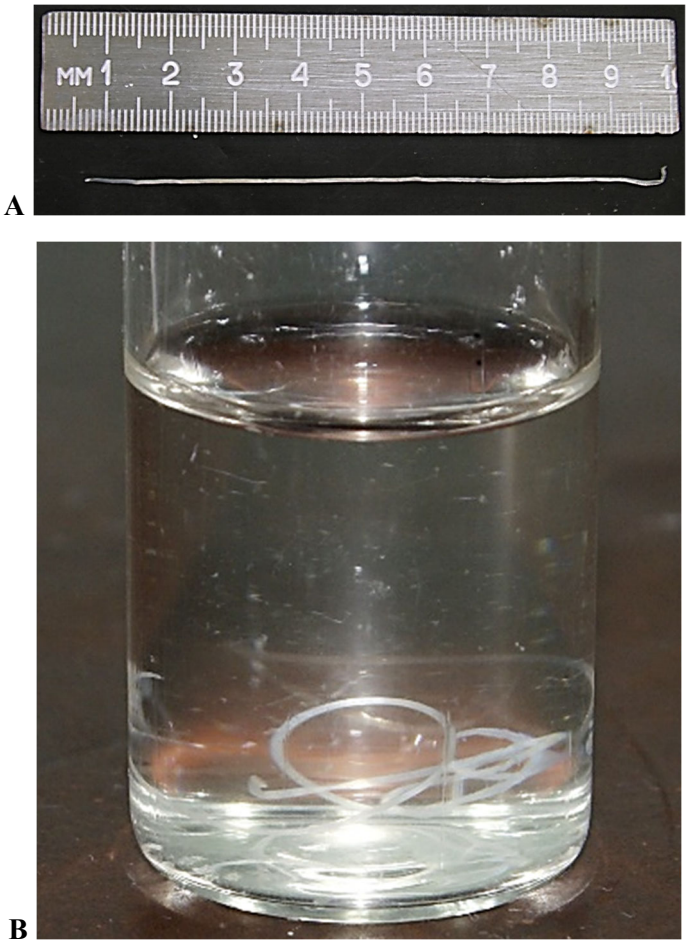

Fig. 3. External view of the removed dirofilaria

According to the recommendations of parasitologists, in the postoperative period complex therapy was prescribed, which included symptomatic anti-inflammatory and desensitizing agents, as well as special drugs containing albendazole. Healing of postoperative wounds proceeded without complications. The removed live helminths were embeded with 96° alcohol and sent for investigation. After removal of sutures from postoperative wounds, all patients were sent to a parasitologist for further treatment and follow-up.

Almost any lesion of the face, maxillofacial area, nasal sinuses is characterized by a wide range of clinical manifestations [11, 12], taking into account the peculiarities of the structure of this part of the body [13, 14], a large list of factors that can influence [15, 16] and, usually, it requires the involvement of specialists of various medical specialties [17, 18] to make diagnosis and prescribe adequate therapy [19, 20]. However, vigilance and knowledge of the features of the course makes it possible to successfully manage patients even with such infrequent conditions as dirofilariasis.

Over the past four decades the number of registered cases of dirofilariasis in people in Europe has increased significantly [3]. However, despite careful collection of available data, the disease incidence is likely to be underestimated due to the lack of a mandatory and centrally coordinated reporting system and misdiagnosed and unrecognized cases. This raises concerns that dirofilariasis will become an endemic zoonotic parasite throughout Europe in the near future [3].

In this connection, the question of readiness of doctors to meet dirofilariasis cases and readiness for adequate pharmacotherapy, surgical treatment or their combination arises. Chemoprophylaxis with macrocyclic lactones also, unfortunately, has adverse consequences [21]. In recent years, works devoted to the use of pharmaceuticals based on experimental research have made a real breakthrough in industries where it was long expected to eliminate the toxic effects of treatment [22, 23]. However, regarding the treatment of helminthiasis, more precisely, treatment without health consequences remains open, since traditional methods are still used. Even only surgical elimination of the parasite contributes to the toxic load due to the use of anesthetics [24, 25].

In our study, the gender distribution is equal to 3:11 (men:women) and the age range is from 29 to 54 years. In this regard, the literature sources are contradictory, with some our data differ [3] or similar [26]. The reasons for such differences may be related to population or national differences in daily activities and habits, including outdoor activities, clothing preferences. In particular, the Austrian researchers focus on the head lesions [3].

It is only adult helminths were isolated in most of our cases, possibly due to low awareness of dirofilariasis and absence of symptoms after infection, which gave the nematodes time to mature. The lack of reliable, specific and sensitive serological tests impairs diagnosis in humans. Therefore, it is necessary to increase the awareness of doctors, veterinarians, as well as pet owners about diseases related to humans and about dirofilariasis in dogs, which are a frequent source of spread of nematodes. Infectious and invasive conditions remain a significant cause of death and disability in Europe [27], so it is important to disseminate information on prevention and treatment measures recommended by the European Society of Dirofilariasis and Angiostrongylosis (ESDA) [28] to reduce the risk of transmission of infection to a human.

CONCLUSIONS

1. Based on the analysis of the presented data on clinical course of dirofilariasis in the maxillofacial area, it should be noted that doctors of Ukraine should be prepared for cases of manifestation of this helminthiasis in local residents, even if they have not traveled abroad for the past 6 months.
2. According to our observations, dirofilariasis most often affects areas of the face in which there are large vessels and accumulation of fatty tissue. Thus, due to the prevalence of dirofilariasis in humans and the predominant localization of parasitic infection in the area of the face, dentists, ophthalmologists, and otolaryngologists must be familiar with this pathology and show some vigilance.
3. Despite the absence of an active national Protocol, the treatment of patients with dirofilariosis should be carried out comprehensively, together with parasitologists, with surgical excision of the lesion and appropriate drug therapy.

Contributors:

Buniatian Kh.A., Khotimska Yu.V. – resources, validation, formal analysis;

Kovach I.V. – conceptualization, validation, supervision;

Yaroslavska Yu.Yu. – data curation, writing – original draft, writing – review & editing;

Bondarenko O.V. – data curation, formal analysis, visualization;

Nazaryan R.S. – conceptualization, methodology.

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