

Prevalence of chorioretinal scars in angiographics exams

Prevalência de cicatrizes coriorretinianas em exames angiográficos

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ABSTRACT

*Toxoplasmosis is a zoonosis whose etiologic agent is *Toxoplasma gondii*, which is characterized as an infectious disease of worldwide distribution. There are thought to be more than 2 billion people globally infected with toxoplasmosis. It is well known that toxoplasmosis is a frequent cause of chorioretinal scarring. In this group of diseases, the angiographic examination (or retinal fluorescein angiography) is very important for diagnosis. **Objective:** To perform a survey on the prevalence of chorioretinal scars in angiography at a private clinic in the area of Cascavel, Paraná State, Brazil. **Methods:** This was a retrospective, cross-sectional study with collection of data from source documents, involving the analysis of 8,719 reports of retinal angiograms performed at the Instituto da Visão of Cascavel, Brazil, between the years 2000-2011. The first diagnosis of each patient was selected, completing a total of 4,928 valid exams. The changes were classified according to the type of visualized scarring, and divided as percentage frequency. **Results:** We observed a prevalence of 6.38% scars, and the percentage of chorioretinal scars was found to be 6.14%. **Conclusion:** The low prevalence of chorioretinal scars found in the region of Cascavel, Brazil, when compared with the region of Erechim (Rio Grande do Sul State), Brazil, is due to climatic, sociocultural and institutional factors. Besides the chorioretinal scars, which represent the largest group of scars, other subtypes of scars with lower prevalence were found.*

Keywords: Scars; Retina; Toxoplasmosis; Chorioretinitis; Prevalence

RESUMO

A toxoplasmose é uma zoonose que tem como agente etiológico o *Toxoplasma gondii*, que se caracteriza por ser uma doença infecciosa de distribuição mundial. Considera-se que no mundo existam mais de 2 bilhões de pessoas infectadas pela toxoplasmose. É bem conhecido que a toxoplasmose é uma causa frequente de cicatriz coriorretiniana. Nesse grupo de doenças, o exame angiográfico (ou angiofluoresceinografia de retina) é de fundamental importância para o diagnóstico. **Objetivo:** Realizar um levantamento da prevalência de cicatrizes coriorretinianas em angiografias em serviço privado na região de Cascavel (PR), Brasil. **Métodos:** Realização um estudo retrospectivo, transversal, com levantamento de documentos fonte, onde foram analisados 8719 laudos de angiografias de retina realizadas no Instituto da Visão na cidade de Cascavel (PR), Brasil, entre os anos de 2000 a 2011, sendo selecionados como primeiro diagnóstico de cada paciente, completando um total de 4928 exames válidos. As alterações encontradas foram classificadas de acordo com o tipo de cicatriz visualizada, e divididas conforme frequência percentual. **Resultados:** Observou-se uma prevalência de cicatrizes de 6,38%, sendo que o percentual de cicatriz coriorretiniana encontrado foi de 6,14%. **Conclusão:** A baixa prevalência de cicatrizes coriorretinianas encontrada na região de Cascavel (PR), Brasil, quando comparada à de Erechim (RS), Brasil, se deve a diversos fatores, tanto climáticos, socioculturais e institucionais. Além das cicatrizes coriorretinianas, que representaram o maior número entre as cicatrizes, foram encontrados outros subtipos cicatriciais com prevalências menores.

Descritores: Cicatrizes; Retina; Toxoplasmose; Coriorretinite; Prevalência

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INTRODUCTION

Toxoplasmosis is a disease whose etiologic agent is the *Toxoplasma gondii*, which is an infectious disease spread worldwide. It is considered that there are more than 2 billion people infected by toxoplasmosis in the world. Its prevalence varies according to socioeconomic factors, age and geographic aspects specific to each region. It is estimated that the largest numbers of infection by the disease are located in tropical areas⁽¹⁾.

Currently it is known that the definitive host of *T. gondii* is the cat. Cats release and disseminate oocysts to places such as land, water and food. The transmission can be by eating unwashed fruits and vegetables, as well as through ingestion of cysts present in raw and/or undercooked meats. In addition, with the transplant of organs from donors with positive titles for *T. gondii* it is possible to transmit the disease to a seronegative receiver⁽²⁾. Transplacental transmission is another important route of infection, being more severe in the third quarter, in which the transmission indexes reach 60%⁽³⁾.

Among the parasitic infections causing retinitis, the most common one is toxoplasmosis, which may manifest as an active injury or scar⁽⁴⁾. In this group of diseases, the angiographic examination is of key importance for the diagnosis. It is known that ocular toxoplasmosis is the leading cause of posterior uveitis in immunocompetent individuals⁽⁵⁾, and in immunocompromised patients, particularly those with AIDS, toxoplasmosis is one of the most common causes of secondary ocular infection.

The ocular manifestations of infection vary according to the kind of transmission of the disease, transplacental (congenital) or acquired. Approximately 70% of patients who acquire the infection by transplacental route develop chorioretinal scars⁽⁶⁾. Although they are best known, the ocular manifestations acquired after birth are less frequent than those purchased by congenital infections⁽⁷⁾.

On congenital toxoplasmosis, the main manifestations occur through ocular symptoms in the form of retinochoroiditis, and of the central nervous system as microcephaly or hydrocephalus, intracranial calcifications and mental retardation. In addition to the focal necrotic retinochoroiditis, toxoplasmic ocular injuries can manifest as secondary iridocyclitis, vasculitis, neuroretinitis, optic neuritis, papillitis, heterochromia iridis, pseudo-retinitis pigmentosa and also involve the vitreous⁽⁸⁾.

Traditionally the acquired toxoplasmosis is considered a benign and self-limiting disease, showing no obvious symptoms and thus being asymptomatic. Only about 10% of patients infected with acquired toxoplasmosis manifest clinical symptoms⁽³⁾. The signal usually recognized as manifestation of acquired toxoplasmosis is cervical lymphadenopathy associated to fatigue, myalgia and absence of fever. Ocular involvement in the form of retinochoroiditis is rare in acute acquired infection⁽⁸⁾. Patients with acquired toxoplasmosis can develop ocular changes as focal retinochoroiditis, conjunctivitis, papillitis, optic atrophy and panuveitis⁽⁹⁾. Other parts of the eye may be affected, creating atypical forms of the disease as represented by the development of vasculitis, vitritis or iridocyclitis⁽⁶⁾.

Patients with acquired toxoplasmosis have risk of developing late ocular injuries that could compromise vision irreversibly. Some eye complications related to toxoplasmic retinochoroiditis are: cataract, macular edema, macular pucker, retinal detachment, retinal tear, branch retinal artery occlusion and retinal vein⁽⁵⁾.

The diagnosis of toxoplasmosis is made from the clinical analysis of the injuries and the positive serology for toxoplasmosis. The aspect of the toxoplasmic ocular injury is a necrotizing focal retinitis, generally oval or circular. The toxoplasmic retinochoroiditis is classically presented as a focus of retinitis adjacent to an old chorioretinal scar⁽¹⁰⁾. The serological diagnosis is made from the dosage of antibodies of IgG, IgM and IgA classes by means of indirect immunofluorescence and enzyme-linked immunosorbent assay (ELISA).⁽¹¹⁾

The ocular toxoplasmosis has high prevalence in the city of Erechim, Rio Grande do Sul. In addition, southwestern cities of Paraná like Cascavel and Pato Branco are considered regions of high frequency chorioretinal scars of toxoplasmosis⁽¹⁾. In view of this, the study aimed to estimate the prevalence of possibly-toxoplasmic chorioretinal scars in the region of Cascavel.

METHODS

Retrospective, cross-sectional study with data collection from source documents (medical records and electronic database of the service), with documentary character and quantitative nature.

The present study was conducted in the city of Cascavel/PR, on the premises of a private company, Instituto da Visão, specialized in Ophthalmology, and the survey only started after formal authorization. The population of study included the analysis of 8719 retinal angiography reports performed at Instituto da Visão in the period from 2000 to 2011 and stored in digital format. The study included only the first angiography exam of each patient, therefore being excluded all subsequent exams carried out by the same patient, and reached a total of 4928 valid exams. The sample was then represented by angiography reports classified according to the presence of chorioretinal scars.

Each angiographic exam was analyzed and reviewed by two specialist from the hospital, and in case of disagreement, a meeting was held in order to come into agreement in order to issue the report and reduce the bias of the examiner.

The study was submitted to the Research Ethics Committee of FAG – Faculdade Assis Gurgacz, and is in compliance with Resolution 196/96 of the National Health Committee, as Opinion number 742.632.

RESULTS

Of the 8719 reports, 4928 retinal angiographies were analyzed as valid, and the results obtained were classified into 9 groups according to the following diseases: vascular, degenerations and dystrophies, inflammatory, scars, interface changes, tumors, trauma, congenital and others. Among them, the groups presenting a higher percentage of significant findings were those related to vascular diseases and degenerations and dystrophies.

Among the 4928 exams, 322 (6.53%) were considered normal, with no pathological findings. The number of scars found in the study involved a total of 315 (6.38%) in the general population. The scar of higher prevalence in the study was the chorioretinal scar, with a total of 303 (6.14%) findings. In addition to the chorioretinal scars, other scar patterns were found in the study, and are described in table 1 as the absolute number found

and the respective percentage. The scars found in the exams were not classified into five grades according to the aspect and probability to be toxoplasmosis because this not be the main purpose of the exam.

Table 1
Scar findings

Type of the scar	N°	%
Chorioretinal scar	303	6.14
Disciform scar	9	0.18
Atrophic scar	3	0.06
Total	315	6.38

DISCUSSION

In the literature, there are few studies describing the prevalence of chorioretinal scars suggestive of ocular toxoplasmosis in the general population. The prevalence of toxoplasmosis depends on climatic, geographic, cultural and socioeconomic factors. In Brazil, uveitis due to toxoplasmosis is currently considered to be the most frequent cause of uveitis⁽¹²⁾. Anterior uveitis caused by *Toxoplasma gondii* can be explained by the presence of parasites within the anterior segment of the eye or by hypersensitivity reaction⁽¹³⁾. However, among the most suggestive manifestations of ocular toxoplasmosis, retinocoroidite is the most common, being often mentioned as a sign of congenital toxoplasmosis⁽¹⁴⁾.

The ocular scars resulting from toxoplasmosis exhibit defined margins, with retinobulbar atrophy and varying degrees of hyperplasia of the pigment epithelium, and in some cases may also be observed vessels of the choroid and sclera in the central and atrophic areas. Retinal scar with *wagon wheel* aspect or injuries in macular rosacea is considered by some authors a pathognomonic injury of congenital ocular toxoplasmosis. In addition to the injury in macular rosacea, the scars can be biter-like, with plans of necrosis in the retinal thickness⁽¹³⁾.

In a study that examined the prevalence of positive seropositivity for toxoplasmosis in 100 blood donors from the blood bank of Cascavel/PR, being 67 men and 33 women, there was a prevalence of 62% of positive IgG for *Toxoplasma gondii* and 100% negative IgM. Among men the seropositivity was 59.7%, and among women of 66.67%⁽¹⁵⁾. From 1990 to 2001, in an epidemiological study on ocular toxoplasmosis in the region of Erechim in Rio Grande do Sul, 74.8% of the sample (765 people) presented positive IgG to toxoplasmosis⁽⁶⁾. In this same study, we can see that of the 184 cases of possibly toxoplasmatoc uveitis, 183 had IgG reagent for the *T. gondii*.

For a long time ocular toxoplasmosis was considered to be a sequel of congenital infection by *Toxoplasma gondii*, and only in few and infrequent cases assigned to the postnatal infection in an immunocompetent patient⁽¹⁶⁾. However, recent studies have shown that ocular manifestations of toxoplasmosis can also be derived from the acquired form after birth. Many of these studies were developed in southern Brazil, in the region of Erechim/RS, where most patients examined acquired the infection after birth.

Other Brazilian regions also feature high prevalences of toxoplasmosis, and as a result a high prevalence of retinobulbar atrophy. In addition to Erechim/RS, cities of southern Brazil as Cascavel/PR are cited in the book by Silveira (2002) as locations of high prevalence of ocular injuries by toxoplasmosis. It is believed that due to the similarity of geographical conditions, as well as the

cultural background, Cascavel and Erechim can present similar prevalence of toxoplasmatoc injuries.

In this study conducted in the city of Cascavel/PR in a private company specialized in ophthalmology, we found that the prevalence of scar findings was of 6.38%. The prevalence of chorioretinal scars suggestive of toxoplasmosis found was of 6.14% in the general population. In the study carried out in 1990 in the city of Erechim/RS with 1042 patients, retinal lesions were observed in 215 patients (20.6%).⁽²⁾ In another study of the population of this southern region of Brazil, 21.3% of patients examined aged 13 years old or more had posterior uveitis due to contamination by *Toxoplasma gondii*. The prevalence found in Erechim/RS is more than 30 times greater than the estimates previously made for ocular toxoplasmosis in other parts of the world⁽¹⁶⁾.

Various hypotheses were created to explain the high prevalence of ocular toxoplasmosis in the region of Erechim/RS. The early stage of infection, as well as a long-term exposure of the individual, can increase the chance of developing ocular complications. Still, it is possible to say that genetic differences of the host and other external agents can interact and alter the course of the disease, in order to provide the development of posterior uveitis⁽¹⁶⁾.

The 1042 patients who took part in the study conducted in Erechim/RS in the year of 1990 were reevaluated in 1997. After seven years, it can be said that the appearance of eye injuries after seroconversion is a frequent finding in the population studied in southern Brazil. In 1990, 130 patients were seronegative for *T. gondii*. In 1997, 21 of the 109 individuals examined were considered seropositive, and two of the 21 individuals (9.5%) developed retinal injuries highly suggestive of ocular toxoplasmosis⁽¹⁷⁾.

In a survey of the rural population in the south of Rio de Janeiro, in the city of Barra Mansa, the prevalence of retinal injuries suggestive of toxoplasmosis was 5.8% in patients with seropositivity to IgG anti *Toxoplasma gondii*, and 3.8% in the general population⁽¹⁸⁾. In Venda Nova do Imigrante/ES, of the 1074 patients examined, 11.27% presented ocular injuries compatible with ocular toxoplasmosis⁽¹²⁾, being the percentage found lower than that of Erechim/RS, and greater than that found in Cascavel/PR. Table 2 compares the prevalence of chorioretinal scars found from studies conducted in different Brazilian geographic regions.

Table 2
Prevalence of chorioretinal scar

City/ Region	Frequency of the scars (%)
Erechim (RS)	20.6
Venda Nova do Imigrante (ES)	11.26
Cascavel (PR)	6.14
Barra Mansa (RJ)	5.8*
	3.8**

*Prevalence in patients with seropositivity to IgG anti *Toxoplasma gondii*.

**Prevalence in the general population.

In this study, conducted in the specialized center of ophthalmology in the city of Cascavel in Paraná, the angiographic exams were carried out based on data from the patient's history and complaint, as well as on their underlying disease. In addition, the tests were carried out to highlight not only toxoplasmosis scars, but also to find vascular diseases, dystrophies and

degenerations, inflammatory diseases, interface changes, tumors, traumas, congenital diseases and others.

CONCLUSION

When comparing the results of several studies in different locations of Brazil, it is possible to see that the prevalence of ocular toxoplasmosis and ocular scars is variable between regions, possibly due to climatic, environmental and socio-cultural factors. Our comparison with the data found in Erechim is justified by Silveira's quote (2002) in the book "Toxoplasmosis: Dúvidas e Controvérsias". In this publication, the author mentions that cities in the southwest of Paraná can be locations with prevalence of ocular injuries similar to those found in Erechim. It is postulated that a similar prevalence between the aforementioned regions is related to the similarity of environmental and sociocultural factors.

However, a low prevalence of ocular injuries in the region of Cascavel when compared to the high prevalence found in the region of Erechim. It is believed that one of the hypotheses for the significant difference between the results is due to the existence of a treatment and research center devoted specifically to ocular toxoplasmosis in the region of Erechim. In addition, our goal in this study was not only finding chorioretinal scars. In the course of the research, we also tried to show vascular diseases, degenerations and dystrophies, inflammatory diseases, interface changes, tumors, traumas and congenital diseases by angiography exams.

New studies on ocular toxoplasmosis are under development, bringing new prospects for diagnosis and treatment of this important eye disease.

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