

Ascaris lumbricoides IN NEONATE: EVIDENCE OF CONGENITAL TRANSMISSION OF INTESTINAL NEMATODES

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SUMMARY

Clinical and epidemiological study of a forty-days-old infant with a diarrheic condition and insufficient development led to the coprological diagnosis of ascariasis and possible congenital infection. Specific treatment with levamisole, resulted in clinical and parasitological cure, in addition to gain of weight up to normal levels. Maternal parasitism had been diagnosed two months before labor and proved beyond doubt during the ensuing epidemiological inquiry.

KEY WORDS: *Ascaris lumbricoides*; Congenital transmission; nematodes; Neonate; Case description; Epidemiological study.

INTRODUCTION

In developing countries, many studies focus on parasitic pathologies as a consequence of the social, economical and cultural level of their inhabitants. These infectious diseases stand out as important problems^{4, 11, 15, 20}. In Brazil, geohelminthes lead overall statistics, and the intestinal parasitism by *Ascaris lumbricoides* is present in about fifty per cent of the population^{5, 6}.

So far, the acknowledged form of transmission is the oral ingestion of eggs coming from food and soil, and therefore in close relation to the habits and the economical and social levels of the population under exposure^{3, 15, 16}.

Although the percentage of humans harbouring intestinal nematodes is high, very little is known about the evolution of these infections in pregnant women, as well as on its possible effects on the fetuses. The possibility of transpla-

cental transmission has been admitted for parasites with a tissue migratory phase of their larval stages.

In animals, nematode congenital transmission has been ascertained^{1, 18} and, for *Toxocara canis*, it represents one of the usual ways of propagation of parasitism⁸.

In men, MacLEOD (1988)¹² admits that this form of transmission may be underdiagnosed, though some findings are highly suggestive of its occurrence. HOWARD¹⁰, recorded the presence of hookworm eggs in feces of a fourteen-days-old child. FURQUIM⁷, in 1943, reports the existence of several studies carried out by other authors confirming the presence of hookworm eggs in children one-to-two-months-old. He himself⁷ diagnosed the presence of the parasite in fecal matter of a twelve-weeks-old patient, regarding

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the transplacental route as the only possibility in these cases.

Among the studies that strongly suggest congenital transmission, Mandarinó's work¹³, published in 1961, stands out. In it the identification of ancylostomiasis in a sixty-days-old child is recorded, although symptoms had been detected as soon as at the thirtieth day of age. NOWOSU (1981)¹⁴ found *Ancylostoma* eggs in 10% of fecal samples collected from African newborns up to five weeks of age. The case reported by GRANOT et al⁹, in 1983, on strongyloidiasis diagnosed fifteen months after the birth of the patient is important, if we consider that insufficient development and diarrhea were present in such case as soon as at the twentieth day of age, according to the register in the past medical history.

CHU et al² reported on a neonate with ascariasis born by a mother who was a carrier of intestinal and placental ascariasis. The possible paths pursued by the parasite in the body were discussed, with particular emphasis on the transplacental route.

The description of the following case is also strongly suggestive of congenital transmission of *Ascaris lumbricoides*.

CASE DESCRIPTION

F. A. S. is a white male child, born in Rio de Janeiro, the 13th November 1987, after a timely and normal labor, and weighing 3,570 grams. His nutritional history begins with breast feeding during the first seven days, followed by feeding with re-constituted milk, as decided by mother's initiative.

Simultaneously to the introduction of the new diet, the suckling began to present gastrointestinal alterations with a rise in frequency and reduction in the consistency of evacuations. The physician consulted attributed these disturbances to inadequate feeding.

After the third week of age, symptoms worsened and a diarrheic condition with blood in the yellowish liquid feces was noticed. The mother decided to resort to medical help once again,

and several anti-diarrheic drugs were prescribed without success.

Finally she brought the son to a pediatric care service of a Social Security Clinic, where the medical examination ascertained: "underactive child with skin and mucosa paleness, weighing 3,650 grams at thirty days of age". The laboratory tests (search for abnormal elements in urine and feces) were satisfactory, but fertile eggs of *Ascaris lumbricoides* were found at microscopy, when the child was forty days old.

Levamisol was prescribed, on December 28: two doses of 40 mg each, with an interval of one week.

This was followed by reversal of the clinical picture and significant gain of weight which reached 5,630 grams by January 28, 1988. Parasitological tests were negative thirty days after treatment.

The study of the case led to a coproscopic examination of the mother, which revealed eggs of *Ascaris lumbricoides* and *Trichuris trichiura*, with infestation rates of, respectively, 16,284 and 414 eggs per gram of feces (by the Kato-Katz method). A review of prenatal tests confirmed the existence of intestinal parasitism by *Ascaris* during pregnancy, two months before labor.

DISCUSSION

Ascaris lumbricoides is a monoxenous geohelminth normally transmitted through the ingestion of mature (embryonated) eggs from polluted soil or food. Eggs mixed with dust may also be inhaled, retained by respiratory secretions and swallowed with mucus.

During oral transmission, the minimum prepatent period is estimated in sixty days, according to the literature^{4, 5}.

This is the interval needed for the complete migration and maturation cycle in human hosts through the intestinal mucosa, the lungs, the bronchial secretions, the pharynx and the small intestine again, where, after a last ecdysis, about the 20th or 30th days of infection, the parasites need some more time for the young adults to become sexually mature. Thus, egg-laying is

usually detected only after a minimum of two months.

In the reported case, the child presented *Ascaris* eggs in the feces when he was only forty days old. This fact is very suggestive of congenital transmission. However, other possibilities must be considered and discussed.

The hypothesis of contamination of the newborn with parasitic eggs, during a septic labor, through maternal feces must be excluded because freshly eliminated eggs are not infective and require at least one week in the external environment, where the larval development needs oxygen for their aerobic metabolism.

It would be possible that infective eggs, from the soil, contaminated the child by oral route through the dirty hands or breasts of the mother. However, our patient's prepatent period is not consistent with the classically admitted interval, based on experimental observations.

Another hypothesis is that prepatent period could be shortened by a direct cycle, without a passage through the lungs, as in *Ancylostoma duodenale*, but there is no reference in the literature to any such occurrence concerning *Ascaris lumbricoides*.

On the other hand, in our case, the intestinal symptomatology since the seventh day of age suggests the presence of adult worms in the intestine that soon.

The initial history of the child, with gastrointestinal disturbances and the weight gain of only 80 grams in the first forty days, could mean a simple case of feeding inadequacy or a gastroenteritis of bacterial origin, as one of the pediatricians thought. However, the association of these alterations with the parasitism by *Ascaris* cannot be discarded because it is well known that ascariasis leads to a certain degree of nutritional malfunction, such as the reduced ability to digest lactose¹⁹. This fact is worth pointing out, as milk is virtually the only source of feeding in the early stages of life.

An important observation regarding the clinical manifestations that appeared at seven days of age, was their complete disappearance after

specific treatment with levamisole, which was followed by a weight gain of 1,980 grams. Recuperation was coincident with the fact that parasitological tests became negative, as ascertained during the control period of the cure, thirty days later.

Although adult worms have not been retrieved from feces, *A. lumbricoides* is virtually the only agent of human intestinal ascariasis¹⁶. *Toxocara canis* is a parasite that belongs to the same family (*Ascaridae*) and its life cycle is characterized by the existence of a systemic migration period of the second-stage larvae in animals, with invasion of the placenta of pregnant females. The transplacental transmission is the usual form of dissemination of this parasite among dogs. Human toxocariasis leads to a symptomatic condition, named *Larva migrans*, that results from lesions caused by the localized or systemic larval migrations. In these cases, the parasite does not complete its cycle up to the adult stage, and eggs are not produced, so that there is no possibility of diagnosing the infection through fecal examination.

In the case under study, the *Ascaris* infected mother, that had not received anti-helminthic treatment during the pregnant period, gave birth to an infected child.

The fact opens the possibility for studies towards the confirmation of the occurrence and frequency of congenital transmission of intestinal nematodes, as well as on the migratory routes followed by larval stages inside hosts' organisms in these circumstances.

If confirmed, these facts will reinforce the recommendations for antiparasitic treatment of pregnant women, with adequate drugs, to prevent neonatal infection.

RESUMO

***Ascaris lumbricoides* em neonato: evidências da transmissão congênita de nematóides intestinais.**

O estudo clínico e epidemiológico do caso de uma criança, com quarenta dias de idade, que apresentava quadro diarréico e desenvolvimento insuficiente desde o nascimento, condu-

ziu ao diagnóstico coprológico de ascariase e à hipótese de tratar-se de uma infecção congênita. O tratamento específico, com levamisol, produziu cura clínica e parasitológica, e um ganho de peso pelo qual a criança logo alcançou os níveis normais para a idade. O parasitismo materno havia sido diagnosticado dois meses antes do parto e foi confirmado, plenamente, por ocasião do inquérito epidemiológico que realizamos. As razões para se admitir a hipótese de transmissão congênita são apresentadas no trabalho.

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REFERENCES

1. BURKE, T. M. & ROBERSON, E. L. — Prenatal and lactational transmission of *Toxocara canis* and *Ancylostoma caninum*: experimental infection of the bitch at midpregnancy and at parturition. *Intern. J. Parasit.*, 15: 485-490, 1985.
2. CHU, W. G.; CHEN, P. M.; HUANG, C. C. & HSU, C. T. — Neonatal ascariasis. *J. Pediat.*, 81: 783-785, 1972.
3. CROMPTON, D. W. T. — Nutritional aspects of infection. *Trans. roy. Soc. trop. Med. Hyg.*, 80: 697-705, 1986.
4. CROMPTON, D. W. T.; NESHEIM, M. C. & PAWLOWSKI, Z. S., ed. *Ascaris and its prevention and control*. London, Taylor and Francis, 1989.
5. CROMPTON, D. W. T. & PAWLOWSKI, Z. S. — Life history and development of *Ascaris lumbricoides* and persistence of human ascariasis. In: CROMPTON, D. W. T.; NESHEIM, M. C. & PAWLOWSKI, Z. S. *Ascaris and its public health significance*. London, Taylor and Francis, 1985. p. 9-23.
6. DIAS, L. C. S. — Geohelminthiasis in Brazil. *Bol. chil. Parasit.*, 36: 27-28, 1981.
7. FURQUIM, M. V. — Ancilostomose em lactentes: infestação placentária. *Arq. Pediat. (Rio de J.)*, 15: 489-498, 1943.
8. GLICKMAN, L. T.; SCHANTZ, P. M. & CYPRESS, R. H. — Canine and human toxocaríasis: review of transmission, pathogenesis and clinical disease. *J. Amer. vet. med. Ass.*, 175: 1265-1269, 1979.
9. GRANOT, E.; DECKELBAUM, R. J.; HELDENBERG, D.; WAGNER, Y.; OKON, E. & TAMIR, I. — *Strongyloides* in infancy: case report and review. *Israel J. med. Sci.*, 19: 1089-1093, 1983.
10. HOWARD, H. H. — Prenatal hookworm infection. *Sth. med. J. (Bgham, Ala.)*, 10: 793-795, 1917.
11. MCGREGOR, I. A. — The significance of parasitic infections in terms of clinical disease: a personal view. *Parasitology*, 94: S159-S178, 1987.
12. MacLEOD, C. L. — Intestinal nematodes. In: MacLEOD, C. L. — *Parasitic infections in pregnancy and the newborn*. New York, Oxford Univ. Press, 1988. p. 192-215.
13. MANDARINO, E. — Um caso de parasitose intestinal em lactente. *Rev. bras. Med.*, 18: 599, 1961.
14. NOWOSU, A. B. C. — Human neonatal infections with hookworms in an endemic area of Southern Nigeria. *Trop. geogr. Med.*, 33: 105-111, 1981.
15. ORGANISATION MONDIALE DE LA SANTÉ — Lutte contre les parasitoses intestinales. *Org. mond. Santé Sér. Rapp. techn.*, (749), 1987.
16. ORGANIZACION MUNDIAL DE LA SALUD — Infecciones intestinales por protozoos y helmintos. *Org. mund. Salud Sér. Inf. técn.*, (666), 1981.
17. PAWLOWSKI, Z. S. — Ascariasis: host-pathogen biology. *Rev. infect. Dis.*, 4: 806-814, 1982.
18. SCOTHORN, M. W.; KOUTX, F. R. & GROVES, H. F. — Prenatal *Toxocara canis* in pups. *J. Amer. vet. med. Ass.*, 146: 45-48, 1965.
19. TAREN, D. L.; NESHEIM, M. C.; CROMPTON, D. W. T.; HOLLAND, C. V.; BARBEAU, I.; RIVERA, G.; SANJUR, D.; TIFFANY, J. & TUCKER, K. — Contributions of ascariasis to poor nutritional status in children from Chiriqui Province, Republic of Panama. *Parasitology*, 95: 603-613, 1987.
20. WORLD HEALTH ORGANIZATION — *General strategies for prevention and control of intestinal parasitic infections within Primary Health Care (PHC)*. Informal PDP document, PDP/85.1, Geneva, 1985.

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