Iranian J Parasitol: Vol. 6, No.4, 2011, pp.99-104

Tehran University of Medical Sciences Publication
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Iranian J Parasitol

Open access Journal at
http:// ijpa.tums.ac.ir

Iranian Society of Parasitology
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Case Report

A Case of Ciliate Protozoa *Colpoda* Spp. (Ciliata: Colpodidae) Detected In Human Urine

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(Received 15 May 2011; accepted 18 Oct 2011)

ABSTRACT

In the urine of a patient with chronic prostatitis, renal microlithiasis and acute cystitis we found the ciliate protozoa *Colpoda* spp., both in vegetative and cystic form. The entry point was most likely the urinary tract. Keeping in mind that only four more cases of *Colpoda* spp. existent in human urine have already been described, and that in the case of our patient the ciliate was present at repeated examinations of his urine, we presumed that it is not only a spurious infection of the urogenital tract. It still remains to be analyzed whether this ciliate belongs to a species of Colpoda adapted to parasitism in homeothermae and whether it can be pathogenic for humans.

Keywords: *Colpoda* spp., Urinary pathology, Ciliate protozoa

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Introduction

The ciliate protozoa *Colpoda* spp. described by Maupas in 1883 (1) was first observed in human feces (2, 3), the second time in the urine of an Algerian patient (4), and recently in the urine of two immunodeficient patients from Japan (5). It is a widely distributed protozoan, frequently found in wet, sludgy soil, stagnant and residual water and decaying vegetation. The adaptability of the *Colpoda* genus to high osmotic pressures can explain its extensive spread in sweet and salty waters, the ciliate being capable of adaptation during some generations to the osmolarity of marine water. In the ground, it has been discovered as deep as 20 meters down (6). The ciliate is described as a facultative parasite of invertebrate organisms, such as the mollusk *Agrolimax agrestis* (7). *Colpoda* divides and excyst at temperatures between 8 and 35 ºC (5), that is why the growth of the ciliate is inhibited by the temperature of the human body. Therefore, the medical literature states the incapacity of this ciliate to produce human parasitoses.

Case report

We here report the case of a male patient, 36 years old, oligophrene, hospitalized in the Clinic of Psychiatry in Cluj-Napoca for psychomotor agitation, irritability and violence. Family history is irrelevant, and the patient's medical history consists in repeated hospitalizations in the same clinic.

The patient is homeless, oscillating between periods of vagrancy and hospitalizations in different recovery and rehabilitation centers. The patient returns to the clinic shortly after a previous hospitalization for a psycho-pathological frame dominated by psychomotor agitation, verbal and physical aggressiveness. Moreover, a few days before he was complaining of nausea, vomiting, dysuria and haematuria, and he was hospitalized with the diagnosis of slight mental retardation with behavioral disorders; acute hemorrhagic cystitis. Taking in account his digestive manifestation he was given a treatment with omeprazole and amoxicillin.

Urinary sediment examination with the 40x magnifier, demonstrate alongside renal epithelial cells isolated and in placards, 5-8 leucocytes/microscope field, rare squamous epithelial cells and 1-3 erythrocytes and also the presence of a few ciliates, difficult to examine due to their speed. After 3-4 hours the movements of the protozoa became slower and thus it could be examined. The dimension of the trophozoites was established at 40-45 µm in length and 20-25 µm in width; their body was kidney-shaped, covered with short cilia, and presenting a cytostome at the bottom of a ciliated vestibulum showing a bunch of cilia, a contractile vacuole at the posterior extremity, an ovoid or round macronucleus and a multitude of food vacuoles. In accordance with morphological criteria, the ciliate was identified as belonging to the Colpoda genus, showing features specific to the *Colpoda steinii* species (Fig.1). The stool examination was negative. All other possible infectious causes for the acute hemorrhagic cystitis were excluded (negative urine culture, negative tubercle bacilli in urinary sediment). At this point we verify the immune status of the patient and other biological parameters. The laboratory tests are presented in Table 1. We remarked high values of the γ-GT and of the serum triglycerides and also a positive HBs antigen. The rest of the blood tests ranked within normal values.

The abdominal ultrasonography examination demonstrates liver steatosis, right hydronephrosis and an enlarged prostate (40/30/32 mm).

Based on the symptoms, on the clinical exam and on the laboratory investigations, the following diagnosis was established: acute cystitis, chronic prostatitis, right renotubular microlithiasis, and slight mental retardation with behavioral disorders.

Alongside the psychotropic treatment, antiparasitic medication with metronidazole 250 mg, 2 tb/daily and doxycycline 100 mg, 1 tb/daily during a week was also administered.

The first doubt that rose was whether this ciliate got into the patient's urine by accident. A possible contamination of the sample during or after collection was seen as possible; therefore we double-checked the procedure used, because the cystic forms could have adhered to the walls of the bottle and excyst by mere damping (6, 8). The urine was collected according to standards using sterile single use container (first voided urine in the morning). The urine analyzed on the same day for all of the patients in the section and collected in the same manner did not show the presence of *Colpoda* in any other patient. Three days later a second testing of the urine (throughout the above mentioned standard procedures) of our patient showed the same aspect, with rare mobile trophozoites of *Colpoda* spp. Taking into account the fact that the patient is oligophrene, we wanted to exclude the probability of a purposeful contamination of the urine sample. Therefore a biological analysis of the tap water in the ward section, of the water in the toilet and in the toilet basin was performed. The results were negative for the presence of *Colpoda* spp. After 7 days of treatment, we performed a third analysis of the urine. Surprisingly, we noticed the presence of numerous mobile trophozoites and *Colpoda* sp cysts. Besides, we distinguished a great number of uric acid crystals and calcium oxalate crystals, rare hyaline casts, frequent transitional epithelial cells and renal epithelial cells, as well as 5-6 leucocytes/microscope field. The protozoan cysts were grouped in clusters, had thin walls and the content in the most of them was mobile (Fig. 2). Some cysts were ciliated and showed a contractile vacuole; inside other cysts two mobile trophozoites could be clearly observed. We monitored them for several hours by videotaping from microscope, vainly waiting for them to excyst.

We therefore concluded that the ciliate was multiplying in the urogenital tract of the patient. The question is how has *Colpoda* spp. got in there? Although some authors (5) suggest the possibility of intestinal contamination (drinking of contaminated water, dirty hands), this is less probable, the parasite not being able to survive in the gastric acid medium (3). Moreover, the patient's feces did not show cysts or trophozoites of *Colpoda* spp. Therefore the retrograde way (through the urethra) had to be taken into account, sustained both by the precarious hygienic conditions of the patient (bathing in dirty waters may be taking in account as the patient was with oligophrenia and homeless), and by his renal pathology. Both renal urethral microlithiasis and cystitis imply a certain degree of urinary stasis, modifications confirmed by the laboratory and ultrasonography examinations. These could have favored the persistence of the ciliate in the urinary tract.

Trying to decipher the history of the infection, we performed various experiments:

- The wet mount preparation was left in the wet chamber overnight, at room temperature. The following day, the number of cysts was smaller, but, in exchange, we remarked the presence of many mobile trophozoites, very likely resulted through excystation. After 4-5 hours, most trophozoites were immobile.

- Trying to obtain the excystation, we left one urine sample overnight at room temperature, one in the thermostat, and another mixed with distilled water (which, according to Stout, 1955, favors excystment). Excystment did not occur in any of the three samples.
- On the same day the patient was transferred to a rehabilitation facility in another city. After 10 days we obtained another urine sample, which showed rare mobile trophozoites, partially decomposed and resting cysts.

After another 7 days of treatment with metronidazole and doxycycline a last examination of the urine performed two months after the release of the patient from the clinic did not show any more *Colpoda* spp. cysts or trophozoites.

Table 1: Blood biochemistry and serology of the patient

Test	Value	Units	Normal values
Leukocytes count	4.5 x 10^3	/ mm^3	4.0 – 10.0 x 10
Eryhtrocytes count	4.62 x 10^6	/ mm^3	4.2 – 5.4 x 10^6
Hemoglobin	14.6	g / dl	14.0 – 18.0
Hematocrit	41	%	40 – 54
Platelets count	285 x 10^3	/ mm^3	150 x 10^3
Erythrocyte sedimentation rate (ESR)	4	mm / 1 h	<10
ASAT	16	U/l	0 – 37
ALAT	37	U/l	0 – 40
Y-GT	93	U/l	10 – 45
Glucose	61	mg/dl	70 – 105
Colesterole	154	mg/dl	109 – 202
Triglycerides	249	mg/dl	50 – 160
Urea	16	mg/dl	15 – 40
Creatinine	1.2	mg/dl	0.6 – 1.3
Calcium	2.21	mmol/l	2.25 – 2.75
Magnesium	2.5	mg/dl	1.6 – 2.5
Ig G	188	UI/ml	90 - 220
Ig A	170	UI/ml	60 - 240
Ig M	215	UI/ml	50 - 250
Total Ig E	7.3	UI/ml	< 50
C3 complement fraction	83	mg/dl	60 - 120
C4 complement fraction	33	mg/dl	16 - 35
RPC (reactive protein C)	Negative	mg/dl	< 0.1
Rheumatoid factor	Negative	UI/ml	negative
HBs Antigen	positive DO450 – 1812		negative
HCV Antibody	Negative		negative
HIV	Negative		negative
Urinalysis (using commercial strip)	(extra space was here)		
Bilirubine	negative		
Urobilinogen	normal		
Ketones	negative		
Glucose	negative		
Protein	negative		
Blood	negative		
pH	5		
Nitrite	negative		
Leukocyte	negative		
Specific gravity	1020		

Fig.1: Trophozoite of *Colpoda* spp. (Optical microscopy 40X)

Fig.2: Cyst containing 2 mobile (at the time of observation) trophozoites (Optical microscopy 40 X).

Discussions

According to data in literature, being unable to divide at 37 ºC, the development of the *Colpoda* genus is inhibited at the temperature of the human body (4). The ciliate divides and excysts only at temperatures between 8 and 35 ºC, the excystment being optimal between 25 and 28 ºC. This is the reason why *Colpoda* is not adapted to a parasitic life in homeothermae animals, but only of the poichylothermal ones. Nevertheless, when introduced in a thermostat at 37 ºC, continue to move and feed for a few more hours (4). Then it forms division cysts but being unable to divide at this temperature, it forms unstable cysts. Brought back at room temperature, the division and the excystment can take place, as our wet mount preparation left over night in the wet chamber showed.

Knowing the adaptability of the *Colpoda* genus in different surrounding conditions (pH, osmolarity, aerobic environment), we do not exclude the hypothesis of a multiplication of the ciliate through the urinary tract.

The question as to what favored the persistence of the *Colpoda* in our patient's urinary tract imposes itself. Before anything, we took into consideration the precarious immunitary state of the patient. Besides, it could be possible that the urinary stasis generated by the renal microlithiasis or chronic prostatitis allowed the prolonged presence of the ciliate at the level of the urinary tract. That could explain the massive elimination of trophozoites and cysts following the antiparasitic treatment. The fact that the Algerian patient in whose urine the *Col-*

poda steinii was first described for the first time in 1968 was also having a uricemy crisis cannot be a mere coincidence. In this case we ask ourselves if some of the inferior urinary tract symptoms (fever, haematuria) could be an effect of the parasitic action of this ciliate.

Acknowledgments

We thank Zoe Coroiu, PhD, biologist for their advice and support. The authors declare that there is no conflict of interests. The experiments that were performed totally comply with the current laws in Romania.

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