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Research article

SCHISTOSOMA HAEMATOBIIUM BILHARZIASIS DURING OVERWINTERING IN ADELIE LAND: HEALTH AND OPERATIONAL RISK IN ANTARCTICA

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While serving from December 1970 to January 1972 as a medical doctor of the 21st French Polar Expedition in Adelle Land, Antarctica, at Dumont d'Urville Station, the author diagnosed Schistosoma haematobium urinary bilharziasis in a winterer who suffered from pain in the right iliac fossa, at the beginning of the overwintering. The patient had participated in a bush investigation in West Africa, but, despite his complaints, the illness had not been diagnosed prior to the Antarctic expedition. Microscopic examination revealed Schistosoma haematobium eggs in the urine centrifugation deposit. In the absence of anti-bilharziasis medication, the patient was treated symptomatically with urinary antiseptic or antibiotic, hemostatic and antihistamine medications to palliate the egg deposition in the bladder wall and the subsequent induction of inflammatory reactions. Nine months later, a US Navy plane landed on the continent in the vicinity of the French Station and delivered the specific parasitocidal niridazole tablets. The patient received three niridazole tablets per day during one week. He returned to Paris in March 1972. Exploratory medical tests did not reveal any bladder or urinary tract alteration. He never since complained of any related problem. Recommendations are provided to avoid personal and / or operational risks due to such tropical infectious diseases during Antarctic expeditions.

Key words: Adelle Land, Antarctic, overwintering, Schistosoma haematobium, niridazole, medical risks.

Introduction to the case study. Polar expeditions offer unique medical challenges when medical emergencies or peculiarities arise. The latter may endanger individual and/or overwintering groups, particularly if these occur after the so-called summer campaign, during the actual winter-over. Outside access is then out of the question and evacuation of medical emergencies may reveal impossible. Besides, medications are in limited supplies reinforcing the medical challenge and risk. The author wishes to present the exceptional and 'exotic' case of *Schistosoma haematobium* bilharziasis that occurred while he served as a medical doctor on the 21st French Polar Expedition in Adelle Land at Dumont d'Urville Station or DDU Station (66° 40'

South, 140° 01' East, Figure) between December 1970 and January 1972 [1].

On January 16, 1971, the author received, for the statutory monthly consult, a 29-year-old mechanic. He was meant to winter-over at DDU until the end of December 1971 and to participate in the following January and February 1972 summer campaign. His polar expertise had been acquired previously in 1967, as a member of the second International Glaciological Expedition to Greenland. As a volunteer for the 1971 overwintering, he had followed the enrolment procedure including a medical consultation at the Paris Val-de-Grâce military hospital (March 19, 1970) that only revealed a slight blood eosinophilic polymorphonuclear cell count (222/ml). He was

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Figure. Watercolor sketch of Dumont d'Urville Station built on Petrel Island in Adelie Land, Antarctica, during the overwintering between December 1970 and March 1972

selected and underwent a voluntary “preventive” appendectomy in October 1970 in Paris. Such a recommendation had been issued by French Polar Medical Services after the 1961 Leonid Rogozov’s self-operated appendectomy while overwintering at the Antarctic Novolazarevskaya Soviet base [2].

Over several months since summer 1969, the patient had occasionally noticed red traces in his urines, associated with slight perineal pain and itch, and frequent urinations. Nevertheless, he had not worried about it. On February 16, 1971, he complained about perineal itch, associated with pollakiuria and dull pain in the right iliac fossa. The symptoms had recently become exaggerated. On examination of the patient, the author did not observe any pathological signs, and the symptoms were attributed to the hard outside physical work in preparation for the Antarctic overwintering.

Diagnosis of bilharziasis. On March 1st, the patient mentioned casually to the author that he had worked eight months in West Africa between October 1968 and May 1969. He had been hired as a mechanic and driver to

serve in a field trial organized by the French National Institute of Geography (French acronym IGN) at the Senegal-Mali border. He was notably in charge of the safety of the IGN trucks in fording across the Falémé River. The author himself had spent several years in Africa and had recently completed courses to familiarize in tropical diseases at the Marseilles “Pharo” Institute of Tropical Medicine. He became suspicious of a potential contamination of the patient by *Schistosoma haematobium*.

The author summoned the patient to the infirmary and requested a urine sample. After centrifugation of the urine sample for 5 min at 4,000 revolutions/min using the old hand centrifuge that equipped the laboratory, a microscopic examination of the centrifuged deposit revealed numerous *Schistosoma haematobium* eggs, with their characteristic apical spine. Egg vitality was tested under the microscope by adding a drop of lukewarm water, which provoked immediately the exit of miracidia easily visible by light refraction. The author concluded that the patient was at the second egg laying stage of urinary schistosomiasis. He

called the patient, showed him the eggs and performed a demonstrative water test. Small pelvis radiography did not reveal any bladder wall thickening or calcifications. No specific treatment could be undertaken, as the DDU Station pharmacy did not contain any specific antiparasitic medication, such as niridazole, nor any other parasitological product (praziquantel had not yet been approved for humans), to treat parasitosis.

The Thala Dan ship, operated then by the French Polar Expeditions to support DDU Station, arrived on March 2, 1971 to transfer the members of the summer campaign back to Hobart (Tasmania). The Chief Medical Officer of the French Polar Expeditions was on board for a three-day inspection. The author presented the patient's case and identified the potential risk of inflammatory granulomatosis susceptible of evolving towards carcinogenesis.

Symptomatic palliative treatment during overwintering. Pressure was exerted by the summer campaign field authorities to allow the patient to remain in Antarctica due to his polar field expertise, especially in operating the M29 Weasel Half Tracks of the French Polar Expeditions. It was decided that the patient would winter-over at DDU Station. A symptomatic treatment was undertaken after reception of an informative telegram from the Director of the Marseilles Pharo Institute. Diverse medications present in the DDU pharmacy stock were used to palliate oviposition in the bladder wall: urinary antiseptics or antibiotics (sulfamethizole, tetracyclins), hemostatics and antihistamines. By the end of the overwintering, this medication stock was almost worn out [3]. Urinary *Schistosoma haematobium* eggs were counted weekly using the laboratory microscope to verify that the bladder wall was permeable for the eggs.

During the overwintering, the symptoms diminished progressively, except for a dull pain at the right iliac fossa that gradually subsided by mid-April. Acute short pain episodes supervened occasionally. Blood eosinophilia

persisted at around 400 cells/ml. After the patient himself interrupted his treatment during one month in June, he complained of right iliac fossa pains and presented a slight hematuria with tiny blood clots in the urine. Viable eggs (lukewarm water test) were present. Symptomatic treatment was resumed in July 1971, but was again interrupted by the patient in August. He was consulted on September 7, 1971 to resume symptomatic treatment because he had been concerned by post-defecation hematuria. Hematuria decreased under symptomatic treatment over a period of three weeks.

Specific parasitocidal treatment and cure. On November 1st, 1971, a US Navy Lockheed LC-130 Hercules plane landed an International Antarctic Glaciological Project French team on the D10 continental plateau landing strip, at 10 km from DDU [4]. The team conveyed the niridazole medication to treat the patient. The niridazole treatment session was undertaken on November 18, 1971 with three tablets administered daily, still accompanied by the symptomatic treatment [5].

On November 25, a small basin radiography test showed an enlargement of vesical and right ureteral walls. No undesirable neuropsychological or cardiac side effects were noted [6]. The iliac fossa pain and hematuria disappeared in two weeks. On December 7, 1971, the patient still didn't have any symptoms and *Schistosoma haematobium* eggs were not detectable in his urine samples.

The author left DDU Station at the beginning of January 1972 to return to France and was replaced by a new medical doctor. The patient continued to work at DDU Station during the summer campaign that ended at the beginning of March 1972. Being symptomless, he did not consult the new DDU medical doctor.

After he returned to France, the patient reported to the Paris Medical Services of the French Polar Expeditions in April 1972. He underwent a medical check-up at the Paris Pitié-Salpêtrière Hospital [7]. His urine did not contain any *Schistosoma haematobium*

eggs, and eosinophilia had decreased to 2 % of white blood cells. Specific serologic tests showed residual antibody levels. Cystoscopy and intravenous urography did not reveal any lesions.

The patient has never experienced any related problems since then [8], especially, no sequelae due to oviposition, such as bladder wall calcifications, bladder masses, small capacity scarred bladder, bladder stones, bladder neck sclerosis, stenosis of ureteral orifices, ureteral stones, ureteral wall calcifications, hydro ureter or bladder cancerization. This may have been helped by the maintenance of urinary bladder wall permeability during the several months-long symptomatic treatments, which palliated any egg deposition.

Conclusion and learning points on health and operational risk. The author chose to report this unique case of *Schistosoma haematobium* bilharziasis as it constitutes an historical ‘exotic’ medical case in Antarctica, along with a personal risk for the patient as well as an operational risk for the expedition team.

Key points concerning the health and operational risk of such a disease occurring in a small human group isolated in Antarctica are as follows:

- The parasite is encountered principally in African and South or Oriental Mediterranean areas. Except for the present case, schistosomiasis has never been observed in Antarctica. The present case surfaced after the patient’s sojourn in West Africa.

- Health risk assessment for tropical diseases at the recruitment medical visit should be sought by simply asking all candidates preparing to sojourn in Antarctica or Sub-Antarctic territories if they have ever worked or lived in areas where tropical diseases are prevalent.

- The decision to use of symptomatic palliative treatment during several months seemed to help cure the disease with specific parasiti-

cidal treatment. The patient never suffered from any specific treatment adverse effect.

- On the patient’s point of view, the decisions taken in Antarctica, regarding his maintenance as a member of the expedition while receiving symptomatic treatment followed by specific anti-bilharziasis treatment when available, allowed the patient to complete his winter-over, and permitted his professional carrier development.

- This case study illustrates unique unexpected risks that may confront medicine in isolated small groups separated from broader medical assistance.

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