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Hydatid Disease Is Endemic in California

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■ *Hydatid disease, a parasitic infection of global importance and a condition for which there is no known medical treatment, is established endemically in the Central Valley of California. Only further study will reveal whether or not the infection is now spreading or intensifying or is remaining fairly stable at a relatively low level of endemicity. California physicians should be aware of its presence and the fact that in most sheep-raising areas of the world it constitutes a problem of major medical and public health importance.*

Although a number of national or regional programs for hydatid disease control have been undertaken, clear progress has been evident only in Iceland, in New Zealand and in the Australian state of Tasmania.[2,4,5]

UNTIL RECENTLY, LITTLE WAS KNOWN about hydatid disease in the contiguous United States except that it existed, although presumably at a very low level. Evidence for this was its sporadic diagnosis over the years in about 60 persons who apparently had never traveled outside this country, Department of Agriculture veterinary postmortem summaries from slaughterhouses indicating occasional condemnations of cattle livers because of hydatid cysts, two surveys reporting infections in slaughtered swine in Mississippi, and the diagnosis since 1892 of Echinococcus tapeworm infections in 15 dogs, mostly in the southeastern United States, and in several timber wolves in Minnesota.[1] Hydatid cyst infections had not been reported in sheep in the United States, although that species is the most important intermediate host for Echinococcus granulosus in endemic areas of Latin America, Australasia, the Mediterranean littoral, the Middle East and Central Asia.[2-5]

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Present Knowledge of Hydatid Infection in California

Until our studies, which began in 1967, published knowledge of the occurrence of hydatid disease in California consisted of two case reports from 1951 and 1957 describing operations on a 14-year-old boy and a 27-year-old man, neither of whom apparently had been outside of this state.[6,7] Since then, however, we and our associates have described an area for E. granulosus transmission in the Central Valley of Cali-

fornia extending from Tehama County in the north to Kern County in the south.[1,8,11] These investigations began with a prevalence survey in 1967 and 1968 which disclosed hydatid cysts in 4.8 percent of a series of 22,720 adult sheep submitted for slaughter in California. Several lots of infected sheep were traceable to their ranches of origin, where the complete dog-sheep cycle of the parasite was demonstrated for the first time in the United States; and associated human infections were found.[1,8] Two of these human cases were definitely autochthonous to California. Further research revealed relatively common infections both in coyotes and deer,[9,10,12] particularly in the northern part of the Sacramento Valley.

Subsequently, retrospective epidemiologic studies of the records of 82 California hospitals (located from the Bay Area and Sacramento south) for 1960-69,[11] and for a number of years before that for two hospitals in San Francisco and Fresno,[13] yielded information on 97 human cases of hydatid disease, at least 14 of them definitely acquired in California. Most of the patients had been associated with the sheep industry of California, and a number of them were of Basque extraction.

A further extension of these epidemiological studies to 44 hospitals in California north of San Francisco and Sacramento[14] yielded data on five additional infections, none of which could be proven autochthonous.* Studies are now in progress to determine the extent to which a sylvatic cycle of infection exists, and to define the possible relationship of the Basque sub-culture in California to the history, distribution and maintenance of hydatid infection in this state.

Diagnosis of Hydatid Infection

Relatively few American physicians have had experience in the diagnosis of hydatid disease. In man roughly 65 percent of hydatid cysts occur in the liver, 25 percent in the lungs and the remainder in other organs. Hydatid infection should be considered whenever a space-occupying mass is revealed in the thoracic or abdominal cavities. For this purpose, the liver scan is of definite value, and chest radiographs which show a sharply demarked, spherical or nearly spherical shadow are particularly suggestive.[11] An elevated blood eosinophile count is not a consistent finding in hydatid disease, but if present supports a diagnosis. The patient's history will frequently indicate present or past association with sheep or dogs. Paracentesis is definitely contra-indicated because of danger of cyst rupture or leakage with the possibility of anaphylaxis or secondary cystic sequellae.

The Casoni intradermal test should be performed if possible in all suspected cases.[1,15] This test has a sensitivity of about 90 percent and most infected persons show an immediate-type wheal of over 1 sq cm in area with a negative control within 45 minutes.** As the specificity of this test, as routinely performed, is not particularly high, skin test-positive patients, and preferably all suspected patients, should also be subjected to the indirect hemagglutination test. This test is available in the United States only at the National Center for Disease Control. Arrangements to have it done may be made through the laboratories of the California State Department of Public Health. A diagnosis is confirmed by the finding of typical hooklets, protoscolices or cystic membrane on pathological examination of the surgical specimen.

Epidemiological Follow-up

Although hydatid disease is not now reportable in California, epidemiological follow-up should be done in all cases for the following reasons: (1) Other persons in the patient's family or close associates may have been at similar risk of exposure to the same infected dog, (2) an infected dog or dogs may still be present in the patient's household,* (3) a focus of transmission involving farm animals may be disclosed and steps taken for its control. A fourth and obvious purpose of such a follow-up is its value for the education of the patient and his family. For these reasons, reporting of cases in humans to the Veterinary Public Health Section of the California State Department of Public Health is urged.

The nature of the patient follow-up required is indicated in the following four examples, the

*However, one woman patient in this group was born in Colorado but raised on a farm in the Central Valley of California, where she had had numerous contacts with dogs. She very probably acquired the infection in this state.

**Casoni skin test antigen is not obtainable commercially in the United States. Small quantities are sometimes available from the senior author's laboratory or from the National Center for Disease Control, Atlanta, Georgia.

*In consulting the family's veterinarian it is important for the physician to know that most American veterinarians are as yet unfamiliar with the procedure for the diagnosis of E. granulosus infections in dogs. Since the eggs of this parasite are identical to those of several other commonly occurring taeniid tapeworms of the dog (none of them of human health importance), none of the usual stool examination techniques are of value in diagnosis. The somewhat laborious diagnostic procedure which is required is fully described in one of our earlier reports.[8]

first three of which are previously unpublished accounts of investigations on autochthonous cases revealed in our studies of California hospital records.[11]

Case 1.

Admission: In March 1969 a seven-year-old boy, the son of a farmhand, was admitted to the hospital with a tentative diagnosis of echinococcal cyst. Three weeks earlier he had been struck in the chest by a shoe thrown by a brother. The resulting pain prompted a medical examination, and a radiograph showed density low in the right side of the chest. Fluid was withdrawn and "bodies resembling echinococcal scolices were found." No serologic or skin tests were mentioned in the records.

Diagnosis: One day following admission a lower lobe lobectomy was performed on the right lung. The pathology report confirmed the diagnosis of an E. granulosus cyst.

Follow-up: In July 1970 we visited the home of the patient. He had been born in Selma, California, in 1961, had lived there all his life and had not been outside the San Joaquin Valley except for an occasional few days' vacation at Hollister, California. While at Hollister he had had no contact with livestock. Also he had had no known association with livestock in the Selma area, except during one school field trip to the Fresno zoo. He had had numerous contacts with dogs, however. He brings stray dogs home, where they are sometimes allowed to remain for extended periods. According to the patient's teacher, he has a great deal of freedom after school and spends many hours roaming around town. He probably thus has had many opportunities for contact with dogs.

The patient's mother is a Mexican woman who moved from El Paso, Texas, to the San Joaquin Valley in 1935. Except for a two-month period in Mountain View, California, shortly after coming from Texas, she has lived continuously in the San Joaquin Valley. She has 12 living children, all of whom were born in the valley and still live in the central part of the valley, including six who remain at home. Several of the patient's brothers and sisters sometimes work as farm laborers. At the time of our visit the family had two dogs, one they had had for several months, the other for only two weeks. The chronology of events in this case indicated that neither dog could have been the source of infection.

Blood specimens were drawn* from eight members of this family for serologic testing. The results of indirect hemagglutination tests performed at the National Center for Disease Control (CDC), Atlanta, included two borderline titers and prompted us to obtain a second series of serum specimens about nine months after the first sample, and to request chest radiographs on two sisters of the patient, one 8 years old, the other 13. The radiology reports indicated normal chests. None of the serum specimens showed a diagnostic titer nor had any of the titers changed significantly over the nine-month period.

Although the source of this infection was not found, it was clearly autochthonous to California.

Case 2.

Admission: The patient, a girl two and a half years old, was admitted to the hospital in August 1963 with a history of coughing for 24 hours. On the day of admission a chest radiograph revealed a mass in the upper lobe of the left lung.

Diagnosis: On the third day a Casoni skin test was performed and found to be positive (erythema 2 cm in diameter, no induration). On the tenth day exploratory thoracotomy led to the removal of two cysts from the left upper lung lobe. Pathological examination confirmed the diagnosis.

Follow-up: In July 1970 we visited the home of the patient, who was then 9 years old, to obtain information about her residential history and past association with dogs or livestock. Her father was a farm laborer. The family had moved many times, but all of the moves had been in the area of south-central Fresno County or northwestern Tulare County in the San Joaquin Valley.

The patient had been born in the Fresno General Hospital in 1961. At that time the family was living in Orange Cove, California. When she was a few months old the family lived with her father's father on a citrus ranch southeast of Orange Cove. There were a few sheep and goats at his home on the ranch, and the patient's father recalled that goats occasionally came into the house. After a few months on this ranch the family returned to Orange Cove and lived at two addresses in town. They then moved to a rural address east of Reedley, California. During that

*The cooperation of Dr. Edward Kitts, Selma, California is gratefully acknowledged.

entire period the family often visited the grandfather on the ranch.

The patient thus could have been exposed to hydatid infection at several locations, even at home. Her father occasionally purchased goats or sheep while she was a baby and these animals were slaughtered at home and the viscera fed to the family's dogs. At the time of our visit the father had two young dogs which he intended to train for hunting.

We had blood specimens drawn* from all five members of the family. Indirect hemagglutination test results from the CDC led us to believe that the patient's father and one of her sisters might possibly be infected. In May 1971 we obtained a second series of blood specimens and arranged for a complete medical examination on the father and the sister in question plus chest radiographs on all members of the family. None of the serological titers were considered diagnostic at that time and the medical examinations revealed no abnormalities. The radiologic reports indicated "negative chest," with the exception of the patient's, which was reported as showing "some scoliosis of the spine and an abnormal rib 4th posterior on the left."

We could not identify the source of the patient's infection but concluded from her residential history that she had acquired it within California.

Case 3.

Admission: A 34-year-old woman was admitted to the hospital in April 1966 because of increasing pain of long standing in the epigastrium. On the first day of her stay in the hospital a radiologic examination disclosed two large densities in the liver, one on the right and one on the left. On the third day the following operations were carried out: cholecystectomy and evacuation of a hydatid cyst in the left side of the liver (the radiographic density on the left). Records indicated that the less accessible suspected cyst in the right side of the liver was not evacuated or excised during this stay at the hospital, nor were there any later admissions. It was left undisturbed, and the patient is aware that this was so.

Diagnosis: There is no mention of a skin test nor serologic tests for echinococcosis in this patient's records. However, microscopic examination of the contents of the removed cyst revealed protoscolices and hooklets characteristic of Echinococcus.

Follow-up: We carried out investigation in 1970. The patient had been born in Porterville, Tulare County, California, and was currently employed as a waitress. She had never been outside the United States, and had only been outside California one time, when she traveled briefly to Reno, Nevada in 1950 to be married. Her travel within California also has been very limited.

Her father, now dead, was of Austrian descent. He sometimes worked with cattle and he had raised as many as 500 sheep at a time. He had also worked occasionally as a commercial sheep shearer. His children, three boys and four girls, often helped him with the livestock at home and accompanied him while he sheared sheep in the Porterville area.

Attempts to obtain blood specimens from the patient and her siblings were unsuccessful in 1970. Inasmuch as other members of her family apparently had had opportunities for exposure to echinococcosis, we continued our follow-up efforts. In May and June 1971 we were successful in locating the patient's sisters and brothers and in obtaining blood from all of them.* A telephone conversation with the patient convinced us that she apparently was experiencing no difficulties from the continued presence of a possible hydatid cyst.

The results of serologic tests performed at the CDC showed that there was only one positive serum in this group, that of the patient herself. It is presumed that she still has a hydatid cyst and she was advised to obtain periodic medical examinations.

Case 4.

An epidemiologically more significant follow-up occurred in the previously reported case[8] of a 49-year-old Kern County sheep rancher of Basque extraction who died following operation for removal of a hydatid cyst. We found ten of the eleven dogs examined on his ranch to be infected with E. granulosus. Infection in sheep was also found at autopsy, and the patient's brother, also a sheep rancher, had a positive Casoni reaction (5 cm square in area). The in-

*We are grateful to Dr. William DeFries, Fresno, for his willingness to cooperate in this study.

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direct hemagglutination test on the brother's blood, performed at the University of California, Davis, gave a diagnostic titer of 1:6400. His chest was normal on radiographic examination and, to date, he has not agreed to a liver scan. The members of the patient's immediate family have also refused so far to submit to serological testing or medical examination. Further attempts will be made.

The family's veterinarian was consulted during this investigation and he was advised as to appropriate therapy and prophylaxis for the infected dogs.

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TUBE CECOSTOMY IN PATIENTS WITH COLONIC CANCER

This is known as the bee in my bonnet; but I do pass it on to the younger surgeons. We know that tension inside an anastomosis is dangerous. Tension inside the colon is dangerous. I was brought up never to do a cecostomy. I am sure that many of my colleagues here who are my age or perhaps a little younger heard their chief say the same thing. But I do put this into your minds. If I were having a left colectomy myself, including an anterior resection, I would have a tube cecostomy. We started doing this some 10 years ago. There are five completely different types of surgeons at St. Mark's [hospital in London]—five personality types. I would tell you that all of them are now doing cecostomies.

What we do is use a No. 30 Foley catheter. We put it into the cecum through a pursestring suture. The trick is to put it half way up the ascending colon. Only put 5 cc of normal saline solution into the bag. We have never had to close one. We have had no morbidity except a hemorrhage from a vessel in the abdominal wall. . . . That cecostomy tube is out within seven days. It is essential obviously that if you have a tube in the cecum, unless that tube is patent the whole time, the cecum and the colon are not being decompressed. So a nurse has to inject 100 cc of normal saline solution down the tube every six hours, day and night, to keep it patent. Obviously the cecostomy tube is dangling over the side of the bed; there is no clamp on it.

—Sir Clifford Naunton Morgan, London

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