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FASCIOLLIASIS IN MAN

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FASCIOLIASIS IN MAN

Fascioliasis is primarily an infection of herbivora, especially domestic ruminants, but a few hundred cases of human infection have been reported in the literature from different parts of the world. Most of these are isolated cases in which the infection was detected when other possible causes of the signs and symptoms noticed were being looked for, or the fluke was found during surgical operations. In a few countries where raw food plants grown in low-lying areas are frequently eaten by the human population, outbreaks involving as many as two to five hundred persons have been noticed. More commonly outbreaks involving a few persons, generally members of the same family, are encountered. The latter type of outbreak is being encountered more frequently in endemic areas and there are indications that the infection is more widespread than is generally realized. In the present note we have tried to summarize the main features of the infection as revealed by observations published during the last 18 years.

The two species of Fasciola generally regarded as valid (F. hepatica and F. gigantica) are both encountered in man. The records of F. gigantica infection are however relatively few and do not present any essential differences from those of F. hepatica except in their geographical distribution. However, it is very probable that infections attributed to F. hepatica in the countries of Africa, Asia and the Pacific where F. gigantica is widespread in animals may have really been caused by the latter species. This was found to be the case in Hawaii by Dr Alicata.

1. Distribution

Animal fascioliasis is nearly cosmopolitan but human infection is not known from many countries because of variations in food habits and probably also due to the varying consciousness of physicians to the possible occurrence of this infection. In the records examined by us the infection was reported from 36 countries* and

* Algeria, Argentina, Belgium, Bulgaria, Canada (old case - an Italian immigrant), Chile, Columbia, Corsica, Costa Rica, Cuba, France, Germany, Greece, Hawaii, Hungary, Iran, Iraq, Italy, Lebanon, Madeira, Mexico, Morocco, Netherlands, Philippines, Poland, Portugal, Puerto Rico, South Africa, Spain, Switzerland, Turkey, SYR (Syria), United Kingdom, Uruguay, USSR and Yugoslavia.

territories in Europe, Asia, Africa and America during the last 18 years. In addition, previous records of its existence in 10 other countries* were noticed. There must be others in the literature not seen by us. Furthermore, mild or even 'sub-clinical infection may occur and would remain undetected, and is likely to be more widespread than the foregoing records are liable to indicate. Within a country the sources of infection remain limited to well defined areas where the topography, moisture and temperature are favourable for the snail intermediate hosts and for the development of the parasites in them. Actual infection may occur at some distance through transport of encysted metacercariae on green vegetables.

2. Epidemiology

The main animal reservoirs of infection are domestic ruminants, particularly cattle in which the infection rate in many endemic areas has been reported to be as high as 60 to 100 per cent. Unlike sheep most of these animals suffer from a mild chronic disease and continue to void eggs for a long time. Among the wild animal reservoirs, rabbits, hares and deer are prominent carriers in different regions. The vertebrate reservoirs are nearly always present in infected districts and it has been observed that dosing them with anthelmintics (carbon tetrachloride) may not have any appreciable influence on the rate of infection in snails. Also, there is no evidence of the development of resistance to re-infection in them.

The snail hosts of F. hepatica (Lymnaea truncatula and related species) generally prefer mud flats or shallow water as their habitat whereas L. rufescens and related snails which are hosts of F. gigantica occur in larger bodies of water such as ponds, lakes and streams. Careful field and laboratory work on the development of F. hepatica has brought out several factors of importance in the epidemiology of this parasite some of which are briefly recounted below.

1. Two critical factors in the development and survival of eggs are moisture and temperature which should be above 10° C. This is also the critical temperature for the discharge of cercariae from the snail.

* Australia, China, Congo, Greece, Mozambique, Senegambia, Somaliland, UAR (Egypt), Venezuela and Vietnam.

2. The number of snails in a given area generally determines the extent of infection but dangerous levels of infection can be built up even with few snails if they are well fed and the conditions of moisture and temperature are favourable.
3. Mass emergence of cercariae is stimulated by the addition of fresh water to habitat of snails in which the infection has matured in the laboratory. In the field, this may occur with showers of rain and flooding in early autumn. Alternate spells of dry and moist conditions are most conducive to this phenomenon.

The type of climate which provides favourable conditions for fascioliasis in temperate regions is typified by moist summers in Western Europe where most of the human and animal infection takes place in autumn and to some extent also in spring from snails in which it has overwintered. In warmer regions, the period of snail activity and infection extends over a longer period but the wet periods are more favourable than dry ones. Careful study of local meteorological conditions, flooding and irrigation often permits accurate forecasting of danger from liverfluke infection which shows cycles of heavy incidence every few years depending on climatic conditions.

Most cases of human infection give a history of having consumed raw water-cress (Nasturtium officinale), particularly the wild variety, which grows in wet low-lying areas and on beds of streams. There is little doubt that this plant is an important vehicle of Fasciola metacercariae in human infection. In other cases, infection is believed to have been contracted through eating sorrel (Rumex spp.) and windfall fruits picked up from low-lying wet meadows, ditches or brooks where vector snails are present. This type of infection generally occurs in children. Sometimes raw vegetables like lettuce (Lactuca sativa) and endive (Cichorium endivia) are soaked for varying periods (30 minutes or more) in water to make them crisp. If the water is derived from infected ditches or streams, the cercariae encyst on the leaves which are then eaten raw. A few infections have been ascribed to chewing grass, licking infected fingers and to drinking infected water in which encysted metacercariae are believed to have been present. In the Levant, halzoun, a pharyngeal infection ascribed to young liverflukes, results from eating raw infected livers of sheep and goats. (It has been suggested that this condition is caused by Linguatula larvae, rather than liverflukes).

In Asia and Africa lotus and water lilies generally grow abundantly in the habitats of the snail hosts of F. gigantica. People often chew the stems of these plants and eat the young fruit raw. Also water-chestnut grown in many infected ponds and is well known in connexion with Fasciolopsis infection. It is very likely that the foregoing plants act as vehicles of F. gigantica.

The metacercariae are quite resistant unless exposed to direct sunlight which kills them in two to three hours. On vegetation sheltered from sunlight metacercariae have been found infective two months after encystment in summer and four months in winter, in England. Thus, water-cress gathered in an infected region may be transported and eaten in a distant place with considerable risk of infection especially as it is kept moist and sheltered from the sun during transport and storage.

The minimum number of metacercariae required to produce infection in man is not known. Nor is the number required to produce acute disease.

3. Clinical

Good recent summaries of the clinical features of the disease have been published and our analysis of recent case reports does not add much to these accounts. We will therefore deal with this aspect very briefly.

The signs and symptoms of the invasive phase of the disease are caused by young flukes migrating through the peritoneum and liver. The first symptoms may commence within a few days of the infected meal and consist of abdominal pain (right hypochondrium or epigastrium), fever (temperature fluctuating between 38 and 40° C) and enlargement of the liver. Other features noticed in a varying proportion of cases are urticaria, asthenia, digestive disturbances, enlargement the spleen, cough and pleurisy. The blood shows marked increase in eosinophils, their numbers going up as high as 40 to 80 per cent.

In the chronic phase of the disease when the flukes have reached the bile ducts, the symptoms are generally milder and may consist of recurrent digestive disturbances such as anorexia, nausea, irregular bowels and sometimes blood in the stools. The liver is enlarged and tender but jaundice is not frequently noticed. If obstruction of the bile duct occurs, the gall bladder is enlarged and there may be acute biliary colic with jaundice. Rarely, the adult flukes re-invade the liver tissue and cause severe haemorrhage and escape of bile,

sometimes into the peritoneal cavity. The disease is often complicated by cholecystitis, gall stones and liver abscesses resulting from secondary infection with pyogenic organisms, but a condition resembling the highly acute "black disease" of sheep caused by Clostridium oedematiens of liver has not been described in man. The bile ducts become markedly thickened but no malignant neoplastic changes in them have been ascribed to fascioliasis.

Ectopic type of fascioliasis appears to be commoner in man than in animals, in which the immature flukes migrate to sites other than the liver. Ectopic flukes have been reported from different sites in the body, mostly from the abdominal wall and the chest cavity. They generally cause granulomatous lesions and their migrations sometimes bring them out on the surface of skin or a mucous membrane. They do not attain maturity.

Although a few deaths have been recorded in fascioliasis from mass migration of young flukes through liver tissue or from complications like haemorrhage, the vast majority of cases pass into the chronic phase or recover. Adult flukes in bile ducts live for a long time so that the chronic infection may last for many years. As has already been stated, there is no immunity to re-infection and infected persons living in endemic areas may acquire fresh infections. From the relatively small numbers of records of F. gigantica infection it does not appear to differ from that by F. hepatica, although in sheep the former is distinctly severer.

Pharyngeal fascioliasis (Halzoun, Arabic for "snail"). In Lebanon and in the neighbouring regions a naso-pharyngeal infection with immature Fasciola* results from eating raw infected livers of sheep and goats in the spring. Within a few minutes to half an hour of eating the infected liver the patient feels a marked irritation in the throat. Subsequently, there develops a marked oedematous congestion of the buccopharyngeal mucosa, often extending to the larynx, nasal passages and the conjunctiva. In severe cases the swellings may lead to asphyxiation and death but the majority of cases recover when the flukes have been dislodged. A syndrome similar to the above is also set up by the leach Limnatis nilotica in the same regions, but in this case the infection is associated with drinking water from springs and not with eating raw liver.

* Some recent workers consider that halzoun is caused by the larvae of Linguatula rather than Fasciola.

4. Diagnosis

The diagnosis of fascioliasis presents difficulties especially during the invasive phase when the flukes are immature and eggs cannot be demonstrated. In endemic areas the occurrence of fluctuating temperature, hepatomegaly and marked eosinophilia in persons eating raw vegetables (during the appropriate season) is highly significant, especially if other parasitic infections likely to cause such symptoms are not prevalent. During the chronic phase, eggs of the liverfluke can usually be demonstrated in the faeces, but more reliably in the duodenal contents removed by incubation. Care should be taken to avoid a mistaken diagnosis because of the patient having eaten infected animal liver or confusion due to the presence of fluke eggs (e.g. Fasciolopsis buski) which are very similar to those of Fasciola.

Allergic and serological diagnosis of fascioliasis is also unsatisfactory because of cross reactions with other helminthiases and the frequent occurrence false positive and negative reactions. Recent work in animals indicates that the reliability and usefulness of these methods could be increased.

5. Treatment and prophylaxis

No controlled trials of therapeutic agents appear to have been carried out. Emetine hydrochloride inoculated subcutaneously or intramuscularly in daily doses of 4 cg till a total amount of 0.5 cg per kg of body-weight has been reached is widely used with success in the treatment of the chronic disease, though its benefits in the invasive phase are doubtful. Surgical treatment is indicated when warranted by complications.

To prevent infection, water-cress and other vegetables eaten raw in endemic areas should be grown and washed under controlled conditions, but in practice this is difficult as much of the water-cress consumed is collected from natural beds. Reduction in the number of snails and administration of anthelmintics to animals will reduce losses in animals but the effect of these measures on human infection is doubtful, unless complete or nearly complete eradication is achieved. Health education of the population at risk which is not difficult to determine, is essential.

6. Concluding remarks

Fascioliasis appears to be a relatively rare infection of man, but there are indications that in areas where the infection is endemic in animals and human beings consume raw vegetables or water liable to be contaminated with metacercariae, it may be more widespread than is known. Epidemiological surveys are indicated for the proper appraisal of infection in such areas. Further work is however needed on reliable diagnostic methods for the detection of early, mild and possibly sub-clinical infections. Further work is also required to establish the efficacy of therapeutic procedures currently in use and to try other likely anthelmintics.