THE NECESSITY FOR A MORE THOROUGH CONTROL OF THE MILK SUPPLY IN COMBATING SURGICAL TUBERCULOSIS IN CHILDHOOD.

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THE British Royal Commission, along with Theodore Smith and others, have done valuable work in developing the methods by means of which we are now able to ascertain whether a given case of tuberculosis is of human or bovine origin.

Professor Delépine has for several years carried out important investigations in Manchester in regard to the tuberculous milk question, and he has shown that much still remains to be done to diminish the amount of tuberculous milk which is supplied to our large cities.

The control of the Edinburgh milk supply is very inadequate, and it is a remarkable fact that the Public Health Department has no power to enforce the slaughter of the cows with tuberculous udders which the veterinary inspector comes across from time to time in the city byres; the medical officer of health has merely power to order the diseased animal to be removed outside the city boundaries.

Fortunately comparatively large quantities of the bacilli are necessary to produce tuberculosis by ingestion; were it otherwise the disease would be even more prevalent amongst children than it is. *Post-mortem* records in this country show that in about 25 per cent. of the children possessing tuberculous lesions the infection has taken place through the alimentary tract.

As the result of my clinical experience in the Royal Edinburgh Hospital for Sick Children, I have for many years been convinced that Koch and his disciples committed a serious error in practically disregarding the milk as a source of tuberculous infection in children. I could adduce many instances from my own personal observation where the etiological relationship between the disease and the "milk history" of the child was so closely associated as to amount almost to proof that the bovine bacillus was the source of infection.

It occurred to me that the wealth of material derived from my operations on bone and joint and gland cases at the Royal Edinburgh Hospital for Sick Children might be utilized to supplement the work of the British Royal Commission, and to determine more precisely the relative frequency of human and bovine infections in the surgical forms of tuberculosis in childhood.

The bacteriological researches were carried out in the laboratory of the Royal College of Physicians of Edinburgh by my assistants, Drs. John Fraser and A. P. Mitchell. The former undertook the investigation of the bone and joint material; the latter that derived from the cases of cervical adenitis. Both Dr. Fraser and Dr. Mitchell embodied their results in a thesis for which the University of Edinburgh has awarded them a gold medal.

Of the 67 consecutive tuberculous bone and joint cases in children which Dr. Fraser investigated, the bovine bacillus was present in 41 (61 per cent.), the human bacillus in 23 (34 per cent.), while in 3 cases both types were present.

Forty-one of the children were under 4 years of age, and in these no less than 78 per cent. owed the disease to the bovine bacillus. On going into the history of the cases it was found that in those in which the bacillus was of the human type there was a history of consumption in at least one member of the family in 71 per cent. of the cases—a fact which brings out very forcibly the importance of segregating cases of active pulmonary tuberculosis. The bovine bacillus was the organism found in all the children less than 12 months old, and it is important to note that each of these

had been entirely nourished on cow's milk. Of the 12 children between 1 and 2 years of age, 8 owed the disease to the bovine bacillus; and here, again, they had all been brought up from birth on cow's milk. In none of the children artificially fed had the milk been sterilized.

Dr. A. P. Mitchell, my present private assistant, has just completed the investigation of 72 cases of tuberculous cervical glands operated on at the Royal Edinburgh Hospital for Sick Children during the past two years. He found that in 65—that is to say, in no less than 90 per cent.—the disease was due to the bovine bacillus, while in only 7 (10 per cent.) was it caused by the human bacillus.

I desire to draw special attention to the fact that Dr. Mitchell's results give a far larger proportion of bovine infections than has been found by other observers. The great value of his results lies in the fact that they have been obtained from a consecutive series of cases derived from one institution. Moreover, by going carefully into the records of the cases he has been able to correlate his pathological findings with the clinical histories, and has found ample explanation for the very large proportion of bovine infections.

Of the 72 cases no less than 38 occurred in children under 5 years of age, and of these all but 3 were bovine infections. The maximum incidence occurred during the second year, and it is interesting to note that Dr. Mitchell found that 84 per cent. of the children under 2 years of age had been brought up since birth on raw cow's milk.

With regard to the history of tuberculosis in other members of the family, it was found that out of 65 children infected with the bovine bacillus there was not a single case in which a history of pulmonary tuberculosis could be obtained in the family. In 14 cases, however, one or more of the other children suffered from some form of surgical tuberculosis, and the evidence pointed to the strong probability that in each of these families the children had acquired the tuberculous disease from an infected milk supply. In the 72 cases there were only 3 instances in which a history of pulmonary tuberculosis could be obtained in the parents, and it is interesting to note that in each of these 3 cases it was the human bacillus which was isolated from the cervical glands. It is not surprising to learn that Dr. Mitchell found that practically half the cases he investigated came from rural districts, where, as is well known, there is little or no veterinary inspection of cows.

Dr. Mitchell found that in 51 of the cases the tonsillar lymphatic gland was the first to become involved, and in 44 of the cases the posterior as well as the anterior group of upper deep cervical glands was also involved.

Most observers are agreed that the faucial tonsils are the chief portals by means of which the bacilli reach the upper carotid glands. Some years ago Mr. Scott Carmichael, who was then assistant surgeon to the Royal Edinburgh Hospital for Sick Children, and myself, endeavoured to obtain definite information as to the frequency with which tuberculous disease of the tonsil could be demonstrated histologically in the tonsils which were removed in children who suffered also from tuberculous disease of the upper carotid glands. Of the 50 tonsils examined, 7 (14 per cent.) showed histological evidence of tubercle.

Dr. Mitchell investigated the faucial tonsils removed from 64 consecutive cases of children suffering from tuberculous disease of the upper deep cervical glands. He found histological evidence of tubercle in the tonsils in 39 per cent. of the cases. In 30 per cent. positive results were obtained by inoculating guinea-pigs, and in these the bovine bacillus was isolated in 12 cases, and the human in 3 cases. Dr. Mitchell also investigated the hypertrophied tonsils removed from 90 children in whom the cervical glands showed no clinical evidence of disease; 6.5 per cent. of these hypertrophied tonsils gave microscopical evidence of tuberculous disease, while 10 per cent. gave positive results when inoculated into guinea-pigs.

Dr. Mitchell has thus afforded us proof of the great importance of the tonsils as portals of entrance through which the bacilli reach the cervical glands. The tonsils must therefore be looked upon as the chief manufactory

*A paper read in the Section of Diseases of Children of the International Medical Congress. A detailed report on the treatment of tuberculosis in childhood from the surgical point of view, with special reference to the bones, joints, and glands, was presented in print to the Section by Mr. Stiles.

and storehouse from which the cervical glands derive a continuous and progressive supply of infective material. In this connexion I may mention that for some years back I had observed that in those cases in which the cervical disease was unusually rapid and extensive the tonsils were almost invariably tuberculous. The reason why greater attention has not been paid to primary tuberculous disease of the tonsils is no doubt because, in the majority of cases, the naked eye changes are not sufficient to enable the disease to be recognized clinically.

Dr. Mitchell's researches prove that, in this country at any rate, tuberculous disease of the upper carotid glands in children is due to the ingestion of tubercle bacilli contained in cow's milk much more frequently than to the inhalation of human tubercle bacilli in the form of dust contaminated with dried sputum or in the form of a moist spray derived from the coughing of a consumptive patient.

I do not agree, however, with the view held by von Behring and his followers—namely, that pulmonary tuberculosis is almost invariably due to tubercle bacilli which have been ingested during infancy and childhood, and which have passed from the lymphatics into the venous circulation, and thence to the lungs. As only bacilli of the human type have been isolated from cases of true pulmonary tuberculosis, von Behring's hypothesis necessarily implies a transformation of the bovine into the human type. Most observers are, I think, agreed that such a transformation does not take place, and Drs. Fraser and Mitchell assure me that throughout the whole of their investigations they have never come across transitional types, and they have never had any difficulty in determining whether the disease was of human or bovine origin.

As regards the more important portals and channels of infection, the researches of Drs. Fraser and Mitchell support the view that in this country infection takes place in the adult mainly through the respiratory channels, while in children it more frequently takes place through the alimentary tract. This view is strongly supported by the feeding and inhalation experiments of Cobbett.

Nathan Raw's hypothesis that practically all surgical tuberculosis is of bovine origin cannot be admitted, as Dr. Fraser found that 38 per cent. of the tuberculous bone and joint cases contained the human bacillus; and, as already mentioned, in no less than 71 per cent. of these one or other parent suffered from pulmonary consumption. It is not surprising, therefore, to find that surgical tuberculosis is also met with in countries where cow's milk is not consumed.

I must confess that, having regard to the present inadequacy of the control of the milk supply, it has always been a matter of surprise to me that the medical profession in this country should still encourage the use of raw milk in the bringing up of infants and young children. Professor Delépine has shown that at least 10 per cent. of the milk supply of our large cities is tuberculous. There can be no doubt, therefore, that under the present unsatisfactory legislative control of bovine tuberculosis and of the milk supply, sterilization of the milk is the only reliable prophylactic measure we possess if we wish to safeguard our children against acquiring bovine tuberculosis. There is good reason to believe that we have more surgical tuberculosis in our large cities than in most European countries, and the explanation is no doubt largely due to the fact that there still exists a strong prejudice against sterilizing the milk in this country, whereas in France and Germany, for example, it is almost the universal practice to do so.

From the point of view of prophylaxis it is satisfactory to know that the Government of this country is at last becoming alive to the fact that bovine tuberculosis is a real source of danger to the community. That the Board of Agriculture and Fisheries and the Local Government Boards for England and Scotland now propose to make a really serious attempt to grapple with the evil is shown by the Tuberculosis Order which has recently been issued. It is to be regretted, however, that the Milk and Dairies Bills have again been shelved to make room for more contentious but less important legislation.

With regard to the Tuberculosis Order, which came into force on May 1st of this year, it is to be hoped that the veterinary practitioners throughout the country will assist in loyally carrying out the Order by notifying the local authorities of any cow they may come across in the course of their private practice which is suffering from "tuberculosis of the udder, indurated udder, or from tuberculosis with emaciation."

In grappling with the milk question, it is to be noted that an important effect of the Milk and Dairies Bills will be to obtain the sanction of Parliament to give powers to the Local Government Boards to force the local authorities to carry out the provisions of the bill.

Once again let me point out that many of the cases of surgical tuberculosis which are admitted into the children's hospital come from remote rural districts where only single cows, or small herds, are kept. Moreover, they are often old cows, and hitherto they have almost entirely escaped inspection. It is earnestly to be hoped, therefore, that by means of the Tuberculosis Order of the Board of Agriculture and Fisheries and the Milk Bills the community will shortly be provided with a uniform and thorough system of inspection and control of dairy cows, and of the milk and milk products which are consumed throughout the country.

I have long been convinced that the reason why surgical tuberculosis is so prevalent amongst the children in this country is (1) because of the prevalence of tuberculosis amongst dairy cows, and (2) because it is the exception rather than the rule to sterilize the milk. Now that notification of all forms of tuberculosis is compulsory, and now that the Tuberculosis Order has made provision for a uniform veterinary inspection of cattle throughout the country, it will be interesting to compare the incidence of tuberculosis in the cows with the prevalence of surgical tuberculosis in the children of the corresponding districts. This is neither the time nor the place to discuss the details of the Milk Bills and the provisions of the Tuberculosis Order, but I should like to point out that, in this country at any rate, both are essential if we are to make any real headway in our warfare against surgical tuberculosis. In my opinion, the stamping out of bovine tuberculosis amongst dairy cows will, in the long run, prove to be a more economical method of dealing with surgical tuberculosis than the building of special hospitals for its treatment. The treatment of surgical tuberculosis by conservative means is, on account of its long duration, a very costly procedure, hence the maxim that "Prevention is better than cure" applies with particular force to tuberculosis.

Unfortunately the stamping out of bovine tuberculosis will take time, and until we have a more perfect system of segregation of human consumptives we shall still have to make provision for the treatment of surgical tuberculosis due to the human bacillus. It is to be hoped, therefore, that an adequate proportion of the money provided by the National Insurance Act for treating tuberculosis will be devoted to providing country hospitals for the treatment of surgical tuberculosis by conservative means. Moreover, there should be an endeavour made to co-ordinate the work done in such institutions with that which will still remain to be done in our large general and children's hospitals. When operative treatment is called for in surgical tuberculosis, it is hardly necessary to point out that this ought to be carried out by skilled surgeons with special experience in this branch of surgery. Cases requiring such treatment will either have to be transferred to a general hospital for operation and then return to the country hospital for convalescence, or a consulting surgeon will have to be appointed to do the operative work in the tuberculosis hospital. I mention this merely to show that it will be impossible to divorce altogether the work done in the tuberculosis hospitals from that which is at present being done in our large city institutions.

It is to be hoped, however, that by the erection of properly equipped country hospitals for the treatment of surgical tuberculosis by conservative means fewer radical operations will be called for. Moreover, there can be no doubt that by the increased facilities and more prolonged supervision which such institutions will afford, still better functional results will be obtained in the cases which still require to be operated on.