TUBERCULOUS DACTYLITIS IN INFANCY.

BY

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Tuberculous dactylitis, though not one of the commoner tuberculous lesions, is frequently seen in young children of the class who attend a Hospital Out-Patient Department. It is, however, rare to see adults with scars or deformity resulting from this lesion. We were so much struck by this fact that we thought it would be interesting to try to ascertain the end results of treatment of tuberculous dactylitis in infancy.

In the five years from 1920 to 1924 inclusive, 1,403 patients suffering from tuberculosis attended the Surgical Out-Patient Department of the Royal Edinburgh Hospital for Sick Children, and of these 97 had tuberculous dactylitis, representing 6% of all cases of surgical tuberculosis.

We have had great difficulty in tracing our cases. Many of them are the children of the very poor, who have no fixed homes, and who disappear completely as soon as they stop attending hospital. We have, however, been able to collect a series of 60 cases which illustrate some points of interest.

Pathogenesis.

As in other forms of tuberculosis, ætiology and pathology are of the greatest importance, and we therefore venture to go over some familiar ground. It is generally accepted that tuberculous dactylitis is a secondary manifestation and that the infection is blood borne. Much careful research by Stiles, Fraser and Mitchell in Edinburgh, and workers in other countries has established the fact that many young children are infected by drinking unboiled milk from tuberculous cows so that the infection is a bovine one.

Working in a busy Out-Patient Department it was impossible to investigate all our cases in order to ascertain whether the infection was human or bovine, but it is often possible to get a rough idea from the history. Seven of our patients were living with adults known to be suffering from active phthisis; in these instances the infection was probably human. Nearly all the other cases had been fed, in part at least, on unboiled cow's milk, and the infection may be regarded as bovine.

The route by which the tubercle bacillus reaches the position where the obvious focus of infection appears, has also been widely discussed. It is known that the tubercle bacillus can pass through the apparently normal mucous membrane without leaving any trace of its passage. This is what commonly occurs when the bacilli are ingested, and it seems that the weak points in the alimentary canal where the tubercle bacilli most frequently pass through are the tonsils and the lymphatic tissue at the lower end of the ileum. Having passed through the mucous membrane, the bacilli enter the lymphatics, and are carried to the glands where they are probably always arrested. Here the organisms may be destroyed by the natural resistance of the tissues, or they may multiply. The result in a short time is a typical primary focus situated in one of the ileocaecal lymphatic glands. This focus may still be overcome and we know how frequently the presence of fibrosed or calcified glands without other evidence of tuberculosis shows that this has occurred. On the other hand, the focus may extend rapidly and the gland breaking down, the disease begins to spread.

Often this spread is local and how common this is appears from the fact that tuberculosis of the cervical glands due to spread from the tonsils or lymphoid tissue of the pharynx constitutes 62% of our cases of surgical tuberculosis, and tuberculosis of the mesenteric glands about 8%. Regarding this latter figure it must be remembered that, unless complicated, most cases of abdominal tuberculosis are treated on the medical side of the Hospital.

At any moment a blood vessel may become involved in the tuberculous process and through the damaged vessel wall the tubercle bacilli gain access to the blood stream, and the infection now becomes generalised.

The bacilli may be arrested at any point, but as Fraser has pointed out, the distribution of the blood supply to the growing bones of children makes it easy for the bacilli to be held up at certain definite points.

A list of the various bones and joints affected in our series of 1,403 cases of surgical tuberculosis may be given here:—

Bones.

Small bones of hands or feet ...	...	...	...	...	97
Spine ...	...	...	...	...	73
Tibia ...	...	...	...	...	13
Ribs ...	...	...	...	...	9
Malar ...	...	...	...	...	6
Mandible ...	...	...	...	...	5
Radius or Ulna ...	...	...	...	...	5
Tarsus ...	...	...	...	...	3
Femur ...	...	...	...	...	1
Fibula ...	...	...	...	...	1

Joints.

Hip	...	...	...	...	...	...	...	93
Knee	...	...	...	...	...	...	...	66
Ankle	...	...	...	...	...	...	...	29
Shoulder	...	...	...	...	...	...	...	6
Elbow	...	...	...	...	...	...	...	7
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We find, then, that the small bones of the hand or foot are affected in 6% of all our cases of surgical tuberculosis, and we have gone carefully into the route of infection so as to emphasize the fact that the bacillus must reach the extremities through the blood stream.

It often happens that a mother comes up to consult a doctor with the feeling that a tiny swelling on her baby's toe is hardly worth troubling about; or it may be that a fusiform swelling of a finger is discovered while the infant is being examined for some other reason. These children, however, have had tubercle bacilli circulating in the blood and a tuberculous meningitis may be the next manifestation.

Every case of tuberculous dactylitis then must be regarded as serious and treated with the greatest care. The parents should be told that treatment must be persevered in until the doctor is satisfied that the lesions are completely healed, however long this may take.

Clinical Diagnosis.

Clinically these cases are not difficult to diagnose. Occasionally, as already mentioned, the condition is discovered accidentally, but usually the child is brought to the doctor with the history that there has been a painless swelling in the hand or foot of some weeks' duration.

On examination there is found to be either the typical fusiform swelling of a finger or toe, or a diffuse swelling on the dorsum of the hand or foot according to whether a phalanx, a metacarpal or a metatarsal is involved. Sometimes an abscess has formed, with discoloration of the skin and fluctuation, and this may have burst or have been incised, leaving a discharging sinus. Unless there has been a secondary infection there is only slight tenderness and practically no pain or heat, but the part may appear red and glazed. Where secondary infection of a sinus has occurred the condition closely resembles a sub-acute osteomyelitis of pyogenic origin.

The child generally uses the affected hand or foot quite freely, and unless there are complications, appears to be in good health.

Both hands and both feet should always be carefully examined as these lesions are frequently multiple. In our series of cases, 40 showed multiple bone lesions. Many of these children have also small foci of tuberculosis in the skin, evidenced by localised thickening, with possible fluctuation and discoloration.

An X-ray photograph of a typical case shows expansion and rarefaction of the bone often with a formation of new subperiosteal bone. The entire phalanx or metatarsal is usually involved, the disease being of the infiltrating variety. It is not common to find that the epiphysis is involved, but the disease may spread through the end of the bone where there is no epiphysis, into the neighbouring joint.

There is sometimes a history of slight injury, but we only obtained this in six of our cases, and this is only of importance in that it may delay the diagnosis.

The age of the child varies, but the disease is essentially one of the first year of life, as the following table shows:—

Age in Years.								Number of Cases.
Under 1	...	...	...	...	...	...	...	14
1—2	...	...	...	...	...	...	...	24
2—3	...	...	...	...	...	...	...	7
3—4	...	...	...	...	...	...	...	5
4—5	...	...	...	...	...	...	...	5
Over 5	...	...	...	...	...	...	...	7
								—
								60
								—

Treatment.

(i) *Local Conservative Treatment.*—Immobilisation as in other forms of bone tubercle is the first principle of local conservative treatment, and this is obtained in various ways.

For the hand, the most useful splint is a flat piece of aluminium cut to an oval shape broad enough for the whole hand to rest on, and extending from the tips of the fingers almost to the elbow. The splint is covered with boracic lint, and the hand, with cotton wool between the fingers, is firmly strapped on with adhesive plaster and further secured by a bandage. The splint should be changed once a week, and it is not advisable to allow the mother to do this herself.

For the foot, plaster of Paris is often useful, and good results may also be obtained by strapping the foot into a Jones' Talipes Splint, which also allows of a dressing, should a sinus be present.

(ii) *General Conservative Treatment.*—This is simply that for tuberculosis in any part of the body, and for older children a long stay in a sanatorium may work wonders. Babies on the whole are better at home, and with careful attention to diet and plenty of fresh air, often do very well. Cod liver oil may be prescribed and the syrup of the iodide of iron is useful. We have recently tried the effect of artificial sunlight from an arc lamp on one or two cases and the results, though naturally inconclusive, are distinctly encouraging.

The question of the use of Tuberculin is one which must be decided on the merits of each individual case. We have used it frequently both in the form of hypodermic injections and of Moro's ointment, and have not been able to convince ourselves that the cases who had this treatment did any better than those who did not.

(iii) *Operative Treatment.*—(a) It will be necessary to open and scrape an abscess when the skin is already infected or on the point of breaking down. This practically always results in a sinus, but has the advantage of removing the tuberculous granulation tissue and the pyogenic membrane of the abscess wall. This should be done through a small incision preferably in healthy skin which is afterwards closed by a stitch. Where a sinus is already present, it is naturally not advisable to risk forming another sinus in healthy skin.

(b) The abscess and the track leading to the bone may be more freely exposed and the bone debris deliberately scraped out with a sharp spoon. These two methods merge into one another and in either case no drain should be inserted.

(c) Where there is no superficial abscess subperiosteal resection of the affected bone is theoretically the ideal method of treatment, but in practice it does not answer so well. The wound may heal by first intention, but frequently a week or so later it breaks down and results in a troublesome sinus, and in many cases there may result considerable shortening of the affected finger or toe. The method is mainly applicable to metacarpal and metatarsal disease.

(d) Amputation should be carried out only when a single phalanx is affected and it must always be well above the disease, or there will be recurrence in the scar.

Whether conservative or operative treatment gives the best result in surgical tuberculosis is very debatable, but in tuberculous dactylitis the main question in deciding between the various methods is that of the ultimate function of the part. The importance of function in the hand cannot be over-estimated, so we have made it a rule never to interfere with a hand unless we are convinced that the disease will cause as much loss of function as will our operative treatment.

In the foot, operation is probably more often justified, but in any case conservative treatment should be uppermost in the mind when considering a case of tuberculous dactylitis.

In our series we operated on 24 cases. The operations consisted of ten amputations, two subperiosteal resections, and in the remainder opening and curetting. Seven of the 24 cases had more than one operation.

Complications.

Unfortunately, as is to be expected where we have an infection of the blood stream with tuberculosis, these cases are often complicated by the appearance of tuberculous foci elsewhere. The following table shows what complications we should be on the lookout for, and also gives the length of time which intervened between the diagnosis of tuberculous dactylitis and the appearance of the other foci.

This table shows that out of our 60 cases, 29 had complications, many of a serious nature, but that in spite of this the results are encouraging and most of the children are doing well. Only one death has been recorded.

TABLE SHOWING TUBERCULOUS COMPLICATIONS IN 60 CASES OF TUBERCULOUS DACTYLITIS.

Age.	Date when first seen.	Date of complication.	Site of complication.	Result.
$\frac{8}{1\frac{1}{2}}$	2/4/21	25/1/22	Synovitis of knee and skin foci	Child very well but has partial backward displacement of knee, and two deformed fingers
$\frac{9}{1\frac{1}{2}}$	18/3/22	18/3/22	Focus in right humerus and skin foci	Cured. One finger amputated
$1\frac{4}{1\frac{1}{2}}$	12/4/21	9/6/21	Kidney	Kidney excised. Child now very well
$3\frac{1}{2}$ yrs.	26/5/22	3/10/22	Focus in upper end of right tibia	Cured
* 7 yrs.	18/6/24	18/6/24	Right elbow	Much improved. Epitrochlear gland removed recently
4 yrs.	3/4/23	3/4/23	Cervical glands	Cured. Operation for glands
$1\frac{0}{1\frac{1}{2}}$	16/2/21	16/2/21	Cervical glands	Much better. Recently had trouble with glands
$\frac{10}{1\frac{1}{2}}$	2/5/22	2/5/22	Extensive skin lesion of hand and arm and disease in metacarpal bone	Cured. Sunlight
$\frac{11}{1\frac{1}{2}}$	31/8/23	6/6/24	Cervical glands	Cured. Operation for glands
$\frac{8}{1\frac{1}{2}}$	14/6/21	14/6/21	Cervical glands epitrochlear gland and ankle joint	Cured
$1\frac{0}{1\frac{1}{2}}$	21/3/22	21/4/22	Temporal bone	Improved. Sinus still present when last seen
$1\frac{4}{1\frac{1}{2}}$	1/12/23	1/12/23	Cervical glands and abdominal gland	Improved. Still in a sanatorium
$\frac{10}{1\frac{1}{2}}$	8/1/23	23/4/23	Malar bone	Better. Still in sanatorium

*.Note.—Treated for dactylitis elsewhere before seen by us.

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TABLE SHOWING TUBERCULOUS COMPLICATIONS—*continued*.

Age.	Date when first seen.	Date of complication.	Site of complication.	Result.
2 yrs.	2/7/23	2/7/23	Abdomen	Cured
2 $\frac{1}{2}$	29/4/24	26/5/24	Multiple skin foci	Bad case requiring several operations. Now much better
1 $\frac{1}{2}$	1/6/23	1/6/23	Multiple skin foci	Cured
1 $\frac{1}{2}$	7/1/24	20/6/24	Epitrochlear gland	Improved. Discharging sinus at elbow
3 yrs.	17/7/23	28/3/24	Cervical glands	Improved. Still has sinus on hand and on neck
3 $\frac{1}{2}$	6/2/24	3/3/25	Cervical glands	Improved. Still has sinuses
1 $\frac{1}{2}$	17/3/22	31/3/22	Ulna	Better. Still in sanatorium
1 $\frac{4}{5}$	20/4/22	30/4/23	Cervical spine	Much better. Still on frame, but lesion nearly healed
1 $\frac{3}{4}$	21/2/22	21/2/22	Shoulder	Cured. Shoulder ankylosed
1 $\frac{7}{8}$	17/5/21	28/6/21	Cervical glands	Cured
* 6 yrs.	17/2/22	21/2/22	Femur	Improving. Still has Thomas walking Calliper
1 $\frac{8}{9}$	3/3/19	15/1/20	Mastoid	Died
1 $\frac{6}{8}$	30/3/19	1/2/20	Testicle	Cured. Operation for testicle
5 yrs.	20/11/19	22/12/21	Cervical glands	Cured. Bad scar
$\frac{8}{9}$	20/3/24	20/3/24	Mastoid	Improved—facial paralysis
1 yr.	21/6/24	23/8/24	Dorsal spine	Still on frame but improving

*Note.—Treated for dactylitis elsewhere before seen by us.

Conclusions.

Tuberculous dactylitis, being a blood borne infection, must always be regarded seriously.

Much patience is required as the treatment may have to be continued for years, but in nearly every case we have the satisfaction, despite complications, of seeing the children recover.

Except in severe cases recovery is often so complete that it is difficult to be certain where the lesion was.