TUBERCULOUS TENOSYNOVITIS

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Tuberculous tenosynovitis is a less common, but a far more disabling and recurrent, infection than is generally appreciated. The natural history of the lesion in its various sites has been studied, particularly in relation to the results of treatment. It is thereby hoped to determine a more satisfactory basis for the management of future cases now that streptomycin and the other anti-tuberculous drugs are freely available.

HISTORICAL REVIEW

Ganglia containing loose bodies were described in the eighteenth century and it is likely that at least some of the records represented cases of tuberculous tenosynovitis. The earliest account was that of Silvert (1717) from Paris, and in this country Warner (1754) and Monro (1788) recorded operations for the condition.

Excellent clinical descriptions of what we now call a compound palmar ganglion were given by Cruveilhier (1816), Brodie (1818) and Syme (1837). The term is of English origin and appeared when Erichsen (1853) differentiated simple from compound ganglia. It was not in universal use when in 1871 the British Medical Journal published a symposium on the treatment of ganglion (Adams 1871, Heath 1871, Shillitoe 1871). In France Chassaignac (1846) introduced the term “hygroma bisaculaire.”

The nature of the “rice” bodies in these swellings was for many years a matter for debate (Pimm 1955). Dupuytren (1839) was convinced that they were living hydatid bodies, but Hyrtl (1842) showed that they were detached papillary outgrowths from the wall of the sac. Michon (1851) considerably clarified the pathology, but it was Hoeftmann (1876) who finally demonstrated histologically the tuberculous nature of the swellings, and subsequently Garr (1891) and Goldmann (1896) implanted the rice bodies intraperitoneally into guinea-pigs, thereby producing tuberculosis.

<table>
<thead>
<tr>
<th>TABLE I</th>
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<tbody>
<tr>
<td>SITE OF LESION</td>
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<tr>
<td>Ulnar and radial bursa (compound palmar ganglion)</td>
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<tr>
<td>Common extensor sheath at wrist</td>
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<tr>
<td>Isolated lesions of flexor sheaths in fingers</td>
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<tr>
<td>Dorsiflexor sheath at ankle</td>
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<td>Posterior tibial sheath</td>
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<td>Total</td>
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By the beginning of this century tuberculous tenosynovitis was established as a clinical and pathological entity, and many isolated case reports were published, but it was not until the papers by Kanavel (1923), Mason (1934), Adams, Jones and Marble (1940) and Bunnell (1944) that any number of cases were reviewed systematically.
CLINICAL MATERIAL

Forty-four patients with tuberculous tenosynovitis have been studied. Four of these patients have died (three from pulmonary tuberculosis and one from paralysis agitans). Five have not been traced. Of the remainder, the authors have seen thirty and followed up the other five by letter.

In the forty-four patients there were fifty-two tendon sheath lesions which are grouped together in their anatomical sites for convenience of presentation (Table I).

Complete proof that a synovial lesion is tuberculous rests in the identification of the organism by culture or guinea-pig inoculation from material removed at operation or from a discharging sinus. Two further findings provide strong presumptive evidence. First, microscopy may show morphological appearances typical of tuberculosis. Second, other tuberculous lesions may be present. Diagnosis was supported by one or both of these criteria in all patients whose records fail to give bacteriological proof.

ULNAR AND RADIAL BURSAE
(Compound palmar ganglion)

Compound palmar ganglion describes a swelling in the hand and wrist which may or may not be of tuberculous origin. It is a well established term and is used in preference to tuberculous tenosynovitis of the ulnar and radial bursae. Twenty-nine patients with this condition have been reviewed.

<table>
<thead>
<tr>
<th>TABLE II</th>
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<tr>
<td>AGE AT ONSET IN TWENTY-NINE PATIENTS WITH COMPOUND PALMAR GANGLION</td>
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<tr>
<th>Age (years)</th>
<th>Number of cases</th>
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<tr>
<td>Under 20</td>
<td>7</td>
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<tr>
<td>21–40</td>
<td>6</td>
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<tr>
<td>41–60</td>
<td>14</td>
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<td>Over 60</td>
<td>2</td>
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<th>TABLE III</th>
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<td>SHEATH AFFECTED IN THIRTY-ONE CASES OF COMPOUND PALMAR GANGLION</td>
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<table>
<thead>
<tr>
<th>Sheath affected</th>
<th>Number of cases</th>
</tr>
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<tr>
<td>Ulnar bursa alone</td>
<td>20 (18 patients)</td>
</tr>
<tr>
<td>Radial bursa alone</td>
<td>0</td>
</tr>
<tr>
<td>Ulnar and radial bursae</td>
<td>11 (11 patients)</td>
</tr>
</tbody>
</table>

**Age**—The age at onset of symptoms is shown in Table II. The youngest patient was eight years and the oldest 73 years.

**Sex**—There were eighteen males and eleven females.

**Occupation**—No significant relationship was established between occupation and the disease, but it is interesting that three patients were butchers and two farmers. The rare possibility of direct infection is referred to later.
Side—In seventeen patients the right hand was involved and in ten the left. In two patients both hands were affected. Thus the series comprises thirty-one ganglia in twenty-nine patients.

Tendon sheaths involved—This is shown in Table III.

When both radial and ulnar bursae were involved, the infection may have appeared simultaneously in both, but on three occasions the radial bursa was affected later than the ulnar and on three occasions it was affected earlier. There was an associated infection of the flexor sheath of the middle finger in two patients (these are considered in a later section). In one patient who had compound palmar ganglia in both hands both the extensor tendon sheaths were also affected.

Pathology—The wall of the tendon sheath may be thin and almost translucent or thick and fibrotic. The lining membrane is replaced by tuberculous granulation tissue. The swelling may contain serous fluid, masses of fibrinous material, melon-seed bodies or caseous material. Melon-seed bodies were present in sixteen out of the thirty lesions examined at operation.

The visceral, as well as the parietal, layer of the sheath is affected so that the tendon itself becomes involved, granulation tissues spreading longitudinally among the fibres, which become separated into bundles. The tendon may finally consist of a few strands of tissue which rupture spontaneously. In this series one or more tendons have been completely destroyed in at least ten patients. The little finger tendons are most commonly affected; sublimis may rupture alone or more rarely sublimis and profundus together. Flexor pollicis longus has been found disintegrated twice.

Clinical features—Swelling is an invariable feature (Fig. 1) but it may be preceded for a considerable time by an aching feeling or stiffness in the fingers. In only one patient were the symptoms or signs in any way acute (Fig. 2). Pain is usually present but is seldom severe. Paraesthesiae were present in one case.

Associated tuberculous lesions—Fifteen patients had other tuberculous lesions in addition to the tendon sheath infection. Of these six developed tuberculosis of the wrist joint. On each occasion the ganglion was noted before there were radiological signs of joint involvement. The diagnosis was made twice before operation. One further patient had a localised bone lesion in the ulnar styloid process which was excised. Involvement of the joint is a serious complication. In four cases it has followed operation on the tendon sheaths, but the interval was usually more than a year, which suggests that the wrist infection was not the immediate result of surgery.

Results of treatment—The general policy has been to excise the involved tendon sheaths as completely as possible and then to immobilise the wrist, but not the fingers, in a plaster for about three months. Most patients were treated before anti-tuberculous drugs were available.

Immobilisation alone was tried in a number of cases before operation was advised. Six had splinting for between three months and a year; in no case did the swelling disappear completely. Simple incision was equally unsuccessful in five patients, all of whom finally had radical operations.

Twenty-eight patients (with thirty ganglia) of the twenty-nine reviewed were operated upon. The single exception was a man with multiple tuberculous lesions of a senile type. Two patients died of generalised tuberculosis six months and one year after operation; one has not been traced. Of the remaining twenty-five patients, ten had no recurrence of the swelling after a single adequate operation (the five patients who initially had an incision only are included). The length of follow-up in each case was nineteen, fifteen, thirteen, nine, eight, eight, seven, three and two years. The remaining fifteen patients had recurrences, which were usually noted within a year of the previous operation. Two patients developed sinuses: one cleared up rapidly after immobilisation and she remains free of recurrence five years later. The sinus in the other patient is associated with tuberculosis of the wrist joint and is still under treatment.

The recurrent, like the primary, lesion was unaffected by conservative treatment and eleven out of the fifteen patients had further surgery. Of these, six needed three or more
FIG. 1
Compound palmar ganglia of both hands in a woman aged twenty-eight years. The swelling in palm and forearm and the flexed position of the fingers are well shown.

FIG. 2
In this patient, a butcher aged forty-two, there was a relatively acute swelling of the left thumb, which was red and inflamed but not painful. At operation the radial and ulnar bursae were found involved. He had three further operations for recurrences (see Fig. 4).
Function six years after excision of a compound palmar ganglion in a man aged fifty-four years. There is slight limitation of flexion and extension of the little finger. This is a typical result after operation.

Fig. 3

Function in the patient shown in Figure 2 after four operations for recurrent compound palmar ganglion. This shows limitation of flexion of the fingers and is typical of the three patients classified as having bad results.

Fig. 4
operations. None had any recurrence when reviewed, the follow-up being thirteen, thirteen, ten, seven, six and five years; but in four cases too short a time had passed for final assessment. Amputation through the forearm was done in one patient in whom two operations on the tendon sheaths were followed by involvement of the wrist, with sinus formation and stiffness of the fingers.

Although recurrence is common after operation there is no way of assessing the likelihood of recurrence in any particular patient. Age, sex and occupation, length of history and the pathological features cannot be related to the recurrence rate. The presence of other tuberculous lesions is apparently without relevance. It is, however, of interest that the three patients who each had four operations had no evidence of any other tuberculous infection.

Apart from the freedom from recurrence, the function of the hand is of great importance in assessing the results. Function is good in most patients when there has been no recurrence. A number have a virtually normal hand (Fig. 3) but a common minor disability is slight limitation of extension of the metacarlo-phalangeal and interphalangeal joints. A few patients are not quite able to get their finger tips (especially the little finger) right into the palm in making a fist. In the more serious cases flexor tendons have ruptured spontaneously or been sacrificed at operation. This usually affects the little finger or the thumb. In only three patients (all of whom had several operations) had stiffness and loss of power been of such a degree that the result is classified as bad, but even they are able to use their hands at work (Fig. 4).

THE FLEXOR TENDON SHEATHS OF THE FINGERS

Tuberculosis may involve the flexor tendon sheaths of the index, middle and ring fingers, but it is uncommon. There were only seven examples in this series.

Since the sheath of the little finger is in communication with the ulnar bursa in at least 50 per cent of subjects (Kanavel 1939) this finger is excluded. In two patients infection of the middle finger sheath was later associated with compound palmar ganglion, and although a communication may exist between these two tendon sheaths it is of such rarity (Kanavel 1939) that these finger sheaths have been considered separately and included in this section. Age—The ages of the patients at the time of onset were twenty, twenty-eight, thirty-one, thirty-one, forty, forty-four, fifty-one.

Sex—Six patients were male and one female.

Occupation—The patients' occupations varied widely and only in one case seemed to be of any significance. A milkman pricked his finger and bathed it in milk, after which tuberculous tenosynovitis developed. Girdlestone (1940) quoted the instance of the infection of his own middle finger flexor sheath during an operation on a tuberculous lesion.

Site—Only one patient had more than one finger involved: so eight fingers were involved in seven patients, as follows: index finger four (left two, right two); middle finger four (left one, right three).

Associated lesions—Four patients suffered from active pulmonary tuberculosis and two in addition had a compound palmar ganglion. No association with tuberculous dactylitis was found.

Clinical features—Tuberculous infection of the flexor tendon sheaths in the finger is accompanied by swelling, with little or no pain, and function is often surprisingly good. The onset is slow, and the length of history before operation varied from one to six years.

Results of treatment—There was no recurrence in five patients after excision of the affected sheath. The flexor tendons were infiltrated with tuberculous granulation tissue on two occasions: once sublimis had to be sacrificed. Slight impairment of flexion movement and power is usual, but all the patients have been able to resume their original occupations. In one case the affected finger was amputated.

There were two exceptions to radical excision. One patient, a man of thirty with active pulmonary tuberculosis, had a biopsy of the tendon sheath. Despite two three-months courses
of antibiotics this patient has, six years after the onset, a swollen finger with fine crepitation within the flexor tendon sheath. The other patient, aged forty, also had an active pulmonary lesion; eight years later there is almost full function and no recurrence.

THE EXTENSOR TENDON SHEATHS OF THE HAND

There were ten lesions of the common extensor sheath in eight patients. Five affected the right hand alone; the only left-handed patient was affected on the left side; and in two patients both hands were affected. In one of the bilateral cases both compound palmar ganglia and both wrist joints were also infected. Lesions of other sheaths on the dorsum have been reported but none occurred in this series.

Fig. 5

Photograph taken at operation showing extent of the swelling of the common extensor sheath and the "waist" produced by the retinaculum.

Age—The ages of the patients at the time of onset were twenty, twenty-six, twenty-eight, twenty-eight, thirty, forty-one, fifty-four, seventy-three.
Sex—There were six males and two females.
Occupation—The occupation of these patients varied and was of no apparent significance.
Associated tuberculous lesions—Other tuberculous foci were demonstrated in seven of the eight patients. In no case was the wrist joint involved.
Clinical features—The swelling on the dorsum of the wrist and hand corresponds to the common extensor sheath and has a waist at the level of the extensor retinaculum (Fig. 5). Sometimes fine crepitus may be elicited. There is usually no pain.
Results of treatment—The results of radical excision have been good: three of the patients seen have had no recurrence after eleven, sixteen and seventeen years and a fourth had had twenty-seven years without recurrence at the time of his death from pulmonary tuberculosis. The other four patients have all had a radical excision within the last four years, three of them under cover of streptomycin therapy, without recurrence. One patient with involvement of
both common extensor sheaths had a recurrence on the left side within a year of the first operation and recurrence on both sides six years later, but now after seventeen years has an excellent result (Fig. 6). She was the one patient in this group in whom another tuberculous lesion was never demonstrated. In four instances tuberculous granulation tissue infiltrated the tendons but in only one patient was there a complete rupture, affecting the extensor communis tendon to the middle finger. One patient developed tuberculous abscesses in the axillary and epitrochlear lymph nodes.

![Functional result seventeen years after excision of tuberculous sheath on the dorsum of both wrists.](image)

The functional results in this group have been good with one exception, in a patient who was also suffering from bilateral compound palmar ganglia and tuberculous wrist joints. Bow-stringing of the common extensor tendons across the back of the wrist occurred in several patients but did not affect function.

**THE TENDON SHEATHS ABOUT THE ANKLE**

Tuberculosis only very rarely involves the peroneal, anterior or posterior tibial tendon sheaths, and the literature on the subject is confined to a few isolated reports such as those of Beach (1889) and Miller (1912). The three cases in this series are recorded briefly.
Case 1—Man aged twenty-eight at onset. Nine months' history of pain and swelling of the sheath of the tibialis posterior with crepitus. The sheath was excised and there was histological evidence of tuberculosis. Nineteen years after this operation the patient remains free of recurrence and has no disability.

Case 2—Boy aged four at onset. Painful swelling on the dorsum of the left foot of one week's duration. A large mass of tissue around the dorsiflexor tendons was excised and this, on histological section, was shown to be tuberculous. Thirteen years later he is now a farm worker with no disability.

This boy, the youngest in our series, is also we believe the youngest patient with tuberculous tenosynovitis reported; Evans (1892) recorded a case in a patient aged seven, Beger (1885) a child of eight and Curtis (1898) one of ten.

Case 3—Man aged forty-four at onset. Large swelling in front of the ankle present for six weeks. The swelling was excised. Bacteriological and histological evidence of tuberculosis was obtained. Streptomycin and sodium aminosalicylate were given and eighteen months later the patient is at work and has no disability.

DISCUSSION

Tuberculous compound palmar ganglion presents a most difficult problem because there have been recurrences after the primary operation in just over half the patients. The value of different methods of treatment is not easy to assess because the condition is rather uncommon. It seems to be relatively benign, and life is not endangered unless there are other active tuberculous lesions. The swelling may be present for years without causing pain or seriously interfering with function. On the other hand, a sinus may develop or tendons may rupture spontaneously. These latter considerations demand treatment as early as possible in the disease.

It might be hoped that the use of anti-tuberculous drugs together with immobilisation would eliminate surgery (Miller, Lipin and Ginsberg 1950). But this seems unlikely because the avascularity of the lesion (together with the masses of granulation tissue, fibrinous material or melon-seed bodies which have to be absorbed) suggest that resolution, if it will ever occur, will take a long time and may be accompanied by excessive fibrosis. A more attractive possibility is the combination of limited surgery with chemotherapy and immobilisation (Wiles 1955, Malkin and Jackson 1955). Since aspiration is usually technically impossible, it will be necessary to make one or more small incisions to evacuate the contents of the sheath. This also has an advantage over more conservative methods in that it allows tissues to be taken for histological and bacteriological examination.

Although recurrence is frequent after seemingly adequate operations on tuberculous compound palmar ganglia, the results in the other sites are good, even without chemotherapy. There may be several reasons for this, but the most likely is anatomical. Complete, or nearly complete, excision is much easier to achieve in the extensor, finger flexor or ankle sheaths. The ramification of the visceral layer of the sheath about the flexor tendons in the palm and forearm, and the proximity of major nerves and vessels, make dissection difficult and tedious; consequently more infected tissue may be left behind than when one is dealing with the readily accessible sites.

The functional results after extensive dissection in the palm and wide removal of infected tendon sheath are good. Recurrence or the extent of the original disease, rather than the surgery itself, is the cause of residual disability.

In some text-books (Romanis and Mitchiner 1952, Handfield-Jones and Porritt 1951) a period of three months' immobilisation together with a course of chemotherapy is advised before operating. Similarly, Adams, Jones and Marble (1940) suggested that surgery should be delayed until the disease becomes quiescent. This contention is difficult to justify because the administration of the anti-tuberculous drugs eliminates the potential dangers of operating in the florid stage. Furthermore, the extent of the tendon invasion is directly related to the time which the lesion has been present; so delay may be positively harmful. In patients with no associated lesions, the diagnosis will remain in doubt until excised tissue is examined.
microscopically and cultured for tubercle bacilli. Treatment in these cases should be planned as though the condition were tuberculous until the laboratory investigations have provided definite information. If there is no evidence of a rheumatoid or villo-nodular synovitis, tuberculosis remains the most likely cause of a compound palmar ganglion.

A course of streptomycin, sodium amino-salicylate and iso-nicotinic acid hydrazide should be begun a week before operation and continued after operation for at least three months. In dealing with compound palmar ganglia a long incision in skin creases, extending on to the little finger if necessary, is made. Once the median and ulnar nerves have been identified, the sheath is opened and its contents evacuated. The wall is excised and then the tendons, which may be more extensively involved than can be suspected clinically, are cleared of granulation tissue. If a sublimis tendon is extensively involved it should be excised. Every care must be taken to preserve the profundus tendons, but if any are completely disintegrated they must be sacrificed. Free tendon grafting may be feasible at a later stage (Mason 1934, Barron 1948). After operation the wrist is supported by a light plaster splint: early finger movements are encouraged.

A similar procedure is recommended for tuberculous tenosynovitis in other sites, various modifications being necessary to deal with individual circumstances.

All patients must be followed up carefully. They should be seen every three months during the first year and then every six months for five years or more. Recurrence should be dealt with in a similar way to the primary lesion, excision being recommended without delay in an attempt to preserve the tendons from progressive disintegration.

SUMMARY

1. Forty-four patients with tuberculous tenosynovitis have been reviewed.
2. The lesions (fifty-two in all) are classified and described according to their anatomical sites.
3. Particular reference is made to the natural history of the condition and the results of treatment.
4. Early and extensive excision of the affected tendon sheaths combined with the use of anti-tuberculous drugs is recommended.

We wish to thank all the members of the Nuffield Orthopaedic Centre for permission to review their cases. Mr G. Platt of Aylesbury has kindly allowed us to include two of his patients. We are particularly grateful to Professor J. Trueta for his continued help and encouragement.

REFERENCES


