TROPICAL PYOMYOSITIS
A MANIFESTATION OF LARVA MIGRANS?

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That tropical myositis, or pyomyositis, is a much more common condition than the space allotted to it in the literature would suggest is a personal conviction which has grown with experience in various parts of tropical Africa. Reports of the disease have come from world-wide tropical areas including the West Indies (Scott 1912), Samoa (Buxton 1928), the Solomon Islands (Sayers 1934), East Africa (Gelfand 1949) and Malaya (Robin 1961). It is also well recognized by the indigenous peoples of West Africa where more cases are treated by witch doctors than ever reach the care of the medical profession.

The “bush” method of treating these intramuscular abscesses in Nigeria is of interest. A number of superficial cuts are made in the skin overlaying the tender area and blood-letting is performed by suction through a horn. The agony of the procedure is described in eye-witnesses’ accounts: “Many relatives are required to hold the patient down”; “I have seen as much as one pint of blood drawn off by this method.” This treatment is meted out for many other ailments, although usually with less success than in tropical myositis which has a tendency to natural resolution beneficial to the reputation of many a “bush doctor.”

The 65 cases of tropical myositis or pyomyositis reported here were treated at the military hospital, Kaduna, during the period June, 1958, to October, 1961. The patients came from a mixed community of northern and southern Nigerians, and included military and police personnel and their families. Two European patients treated had atypical features, and are not included in the series.

**Incidence**

The youngest patient treated was aged ten months, the oldest about 60 years. Males were more frequently affected than females (Table 1). (Allowances must be made for the fact that more male than female adult patients attended the hospital although the children were in approximately equal numbers of each sex.) No seasonal variation occurred.

<table>
<thead>
<tr>
<th>Age and sex distribution</th>
<th>Number of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
</tr>
<tr>
<td>Children (14 years and under)</td>
<td>24</td>
</tr>
<tr>
<td>Adults</td>
<td>23</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>47</td>
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</table>
Symptoms and signs

Localized pain was almost invariably the presenting feature, having been present on average for some 3 to 7 days. In only 2 cases was there a previous history of any similar complaint. Three patients complained of minor traumata.

On examination a hard, tender mass was palpable in the affected muscle. The outline of the mass was vague, sometimes simulating a fibrosarcoma, but the marked tenderness was a point of distinction from the latter. If difficulty was encountered in identifying a tumour in a deep muscle like vastus intermedius, comparison with the contralateral muscle proved a useful guide. Frequently the lesions were accurately mapped-out by the scratch marks of recent ministrations of a “bush-doctor.” Pitting oedema or fluctuation occurred only in late cases in which the abscess had burst through its fascial envelope into the subcutaneous tissue. Active contraction of the affected muscle group against resistance produced pain. Regional lymphadenitis was sometimes present, but was not a prominent feature.

Pyrexia of varying degrees of severity was present in all but 7 patients and only a few of those reporting in the early stages showed any other constitutional upset. Toxemia was evident in a few who delayed reporting until late in the disease, and one patient who refused treatment other than with antibiotics was severely toxemic before she finally consented to operation.

Site of Lesions

Single lesions occurred in 55 patients; multiple lesions (max. 4) occurred in 10.

| TABLE II |
| Distribution of site of lesions |
| Abdominal wall muscles | 17 |
| Quadriceps femoris | 20 |
| Adductores femoris | 5 |
| Hamstrings | 3 |
| Gastrocnemius | 5 |
| *Gluteus maximus | 2 |
| Pectoralis major | 5 |
| *Deltoid | 4 |
| Biceps brachii | 3 |
| Triceps | 2 |
| Ant. antebrachial muscles | 2 |
| Latissimus dorsi | 3 |
| Trapezius/rhomboïds | 3 |
| Erector spine | 5 |
| Sterno-mastoid | 1 |

* All intramuscular abscesses were excluded in which the site suggested the possibility of previous injections.

Thus, out of a total of 80 lesions, 63 (approximately 80 per cent) were situated in the muscles of the trunk and thighs. This distribution follows closely that of other reports (Buxton 1928; Sayers 1934; Manson-Bahr 1960; Robin 1961). The possible significance will be discussed below.
Course of the disease, characteristics and significance

Three distinct phases were seen:

Phase 1. In eight instances it was considered likely (mainly from patients’ subjective impressions) that the tumours were undergoing resolution at the time of examination. These were treated conservatively and the masses disappeared completely in a period of 1 to 2 weeks. This is “tropical myositis,” and it is here suggested that these transient lumps represent a host tissue reaction to the presence of migrant larvae in muscle.

Phase 2. Suppuration, or “pyomositis”; this had occurred in 65 of the 72 lesions explored.

Histologically, the picture was one of interfascicular hæmorrhages, round-cell infiltration with prominent eosinophils and hyaline degeneration of muscle fibres.

The sequence of events could be as follows: Hæmorrhage from capillaries through which larvae have broken out, tissue reaction and necrosis of muscle accompanied by secondary infection, frequently staphylococcal.

An analogy with the picture of ascarid pneumonitis could be drawn. (Buxton recorded concomitant pulmonary infections in 4 of his 41 cases of myositis. One other had urticaria with œdema of eyelids.)

In one instance (case 44) nematode larvae were demonstrated in the pus evacuated.

Case 44:

Adult male presenting with a tender, hard mass in left hypochondrium, which had been present for 2 weeks. Apyrexial, E.S.R. = 6 mm./hr., white blood count = 6,330/cu. mm. (polymorphs 55 per cent; lymphocytes 39 per cent; monocytes 4 per cent; eosinophils 2 per cent). Blood films (day and night x 3): No parasites seen. Stools: N.A.D.

Findings at operation: Pale edematous adherent internal oblique muscle containing a large abscess of brownish pus. Microscopic examination of latter (Captain C. Walker) revealed numerous nematode larvae, the structure of which was not sufficiently well preserved to permit further subclassification. (Plate 1) Stools re-examined 40 days later contained ova of Ascaris lumbricoides and Trichuris trichiura.

Photomicrograph of larva in pus from an abscess of internal oblique muscle (Case 44). Actual length of larva: 0.4 mm.
Tropical Pyomyositis

Phase 3. Occasionally a chronic, granulomatus mass was encountered in the affected muscle, with caseation in the centre, or with microscopic evidence of an organizing haematoma. Histologically the appearances were those of granulation tissue, with degenerated muscle fibres, macrophages, eosinophils, giant cells and fibrosis.

Laboratory investigations

A complete laboratory investigation for every patient was not feasible; this will be readily understood by anyone with experience of a busy out-patient department in tropical Africa. However, a fuller investigation was possible in respect of those patients admitted to hospital wards. In the following account the numbers investigated will be bracketed beside the figures given.

Pus: Staphylococcus aureus was grown in 33 cultures from a total of 48 patients (approximately 69 per cent). Of these, 28 were resistant to penicillin, but sensitive to at least three of the other antibiotics tested (streptomycin, chloramphenicol, terramycin, erythromycin).

Faeces: Routine stool examination was performed in respect of 33 patients. Seventy controls were also tested, taken at random from patients with other complaints in the male, female and children’s medical and surgical wards. The comparative results are shown in Table III.

**TABLE III**  
Routine stool tests

<table>
<thead>
<tr>
<th>Faeces</th>
<th>Tropical Myositis (33)</th>
<th>Controls (70)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. cases +ve</td>
<td>Approximate per cent</td>
</tr>
<tr>
<td>Ancylostoma</td>
<td>20</td>
<td>60</td>
</tr>
<tr>
<td>Ascaris lumbricoides</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>T. trichiura*</td>
<td>7</td>
<td>21</td>
</tr>
<tr>
<td>Strongyloides stercoralis</td>
<td>1</td>
<td>—</td>
</tr>
<tr>
<td>Entamœba histolytica</td>
<td>1</td>
<td>—</td>
</tr>
<tr>
<td>Pathogens +ve</td>
<td>Total 25*</td>
<td>76</td>
</tr>
</tbody>
</table>

* In six of these patients *Trichurus trichiura* ova were present in conjunction with ancylostome and in one case with ascarid ova.

The high incidence of ancylostomiasis in our series (60 per cent) confirms Manson-Bahr’s report. In consideration of the possibility of insufficient time lapse between exposure and maturation of worms, 10 stools which had been negative in the first instance were re-examined once at intervals varying from 1 to 5 months. Of these, 5 revealed ancylostome ova, 1 ascaris and 1 *S. stercoralis* (figures included in Table III).
Blood: Hæmoglobin estimations (35) averaged approximately 80 per cent, the lowest recorded being 51 per cent (7.5 G) (Case 5—hookworm sufferer).

Erythrocyte sedimentation was raised in 20 cases (25) = 80 per cent; the highest figure recorded being 60 mm./hr. (Wintrobe).

Total White Cell count was raised in 12 cases (40), or 30 per cent, but in only 3 of these was there a relative polymorphonuclear leucocytosis. (A feature noted also by Buxton 1928, and Robin 1961).

Eosinophilia, ranging from 5 to 42 per cent, was present in 15 cases (40) = 37.5 per cent. (Of these 15 cases, 5 were infested with hookworm, one with both *W. bancrofti* and *onchocerca volvulus*, and one with *A. perstans*.)

Repeated (day and night × 3) blood films and skin snips (51) demonstrated microfilariae of *O. volvulus* in 3 cases, one of which had also *W. bancrofti* infestation, and of *A. perstans* in 3 cases. M.T. “rings” were seen in one case.

Kahn reaction was tested in 10 cases, all of which proved negative.

Numerous other investigations including radiography, urine examination and blood cultures, revealed no significant abnormality. (Two patients had ova of *S. haematobium* in the urine.)

Treatment
(a) Surgery. Of the 80 lesions treated, 72 were explored surgically (generally within 48 hours of presentation) and pus was encountered in 65 (90 per cent) in the remainder, a granuloma or evidence of myositis or of hæmorrhage was found.

Operation. Careful skin preparation and towelling were performed (particularly necessary with masses in obliquus internus where the preoperative differentiation from an intra-peritoneal tumour was sometimes in doubt).

Thiopentone—gas-oxygen—trilene anaesthesia was employed; a careful search for pus is required, therefore gas-oxygen alone is quite unsuitable.

A skin incision of 2 to 3 in. (5 to 7.5 cms.) was found to be adequate in most cases for inspection and drainage. The fascial sheath of the affected muscle was usually thickened, and, on incision, was found to be densely adherent to the underlying muscle belly, the colour of which was usually pale pink or white. Further exploration revealed pus in quantities up to 500 ccs. The pus was frequently of a typical, creamy staphylococcal appearance and sometimes of a pink colour, as described by Gelfand (1949), and with an admixture of blood clot. Loculations were broken down digitally.

Biopsy of the abscess wall was performed in 44 cases, and a specimen of pus taken for laboratory investigation. The cavity was packed with ribbon gauze (removed in 24 to 48 hours) which effectively controlled any tendency to post-operative hæmorrhage. Purulent discharge was not great and in no case was there any difficulty in healing. The relief of pain was marked and virtually immediate. In one instance (Case 23) pus was missed at the first exploration and two further operations became necessary. The findings are of interest and exemplify two different stages of the disease.

Case 23:

Second operation: Incision of the right buttock over point of maximal tenderness revealed thickened muscle, but no pus. Further incision, close to midline located pus coming from a large abscess in the depths of the gluteal muscles. On the following day, an indurated mass was discovered
in the left iliac fossa. Investigations revealed ancylostomiasis, eosinophilia (15 per cent) and m.f. perstans in blood films. *Culture of pus:* Coagulase positive *Staphylococcus aureus*, resistant to penicillin. A course of aChromycin was instituted; 12 days later the mass was still palpable but had resolved to form a smaller oval lump of almost bony hardness and exploration was undertaken.

**Third operation:** Transverse incision in left iliac fossa, ext. oblique aponeurosis opened. Beneath it was a thick layer of pale, tough muscle in the depths of which was found a nodule of chronic abscess formation. This was excised and found to contain caseous pus in its centre. Wound closed in layers with drainage. Eight days later both wounds had healed.

(b) **Chemotherapy.** Sulphonomides or antibiotics (aChromycin, chloramphenicol, streptomycin or penicillin) were administered to 22 patients, either pre- or post-operatively. No benefit was evident and the time taken for complete healing of incisions was almost identical with that of the series in which incision alone was employed (average 18 and 17 days respectively).

**Post-operative Course**

Although it took some 17 to 18 days to complete healing, the majority of patients were back at their various duties much earlier, attending the hospital for dry dressings only. Robin (1961) has stressed the difficulties encountered where there has been delay in diagnosis and, consequently in surgical intervention. In his series there was an average stay in hospital of 16 days prior to operation and of 29 days post-operatively. His views support our policy of early exploration and evacuation. Amongst the ten cases in which multiple intramuscular abscesses occurred, there was a time lapse of some weeks before further abscesses became apparent; in no other case was there any recurrence of the condition.

**Complications**

Septicaemia has been described in connection with tropical pyomyositis and the impression gained from discussion with surgeons who have worked in more remote places is that it is a common complication where access to medical care is not as easy as it is in a military hospital.

Two cases of staphylococcal septicaemia admitted during the period under review (one of which proved fatal) had metastatic abscesses in various organs, but the history suggested that in each case an intramuscular abscess may have been the original focus of infection. As this could not be proved, these cases have been excluded from this review.

The foster-parent of one pyomyositis case claimed that the child’s father had died of the same disease (without operative treatment) and this proved to be one of the only two cases in the series in which any difficulty was encountered in obtaining consent to operation; as refusals were quite common even in cases of such urgency as acute intestinal obstruction, this was a surprising feature.

**Discussion**

Diverse suggestions have been made with regard to the aetiology of tropical pyomyositis. Filarasis was at one time thought to be associated with the disease, but this was discounted by the work of Buxton (1928), Sayers (1934) and Grace *et al.* (1934). Manson-Bahr found a high rate of ancylostomiasis in his series, a finding
which was repeated in ours, but his findings of increased incidences of malaria and positive Wasserman reactions (50 per cent) are not repeated in our series. Vitamin C deficiency, with secondary infection of intramuscular hemmorhages, has been suggested as a possible cause (MacArthur et al. 1946). Our patients came from a privileged section of the community, fruit was plentiful in the area and clinical evidence of malnutrition or avitaminosis was lacking. Occasional instances of intramuscular abscesses following direct trauma appear in most reports, but confusion may arise in attempting to distinguish such infected hæmatoma from tropical pyomyositis. Mayer-May (1936) suggested an association with leptospirosis, but in Nigeria leptospirosis is not a problem of endemic proportions as it is in Malaya (Robin 1961). Robin found a definite eosinophilia in 3 of his 12 cases and helminthiasis in one of them.

Pursuing further the larva migrans hypothesis, it is known that nematode larvæ, having followed the usual pathways to the right side of the heart and pulmonary capillary bed, may enter the general circulation and thus reach the spinal cord, brain, eyeball, kidney, thyroid, spleen, etc. (Craig and Faust 1957). Regarding skeletal muscles, it is tempting to assume that those groups which are most centrally placed, and which have supplying arteries of the widest diameter would receive the largest shoals of larvæ, an assumption which coincides with the common distribution of abscesses in the larger muscle groups of trunk and thigh. Experimentally, it has been shown that the filariforma larvæ of Strongyloides stercoralis can pass from the pulmonary capillary bed into venules, thereafter being demonstrated in the central nervous system (Yamaguchi 1925; Faust 1935).

In visceral larva migrans, where man becomes the accidental host of the animal roundworms Toxocara caris or Toxocaris cati, a similar chain of circumstances exists. Larvæ are carried to the liver, lungs, brain, eye and skeletal muscles, where they set up a granulomatous reaction (Beaver et al. 1952; 1957: Wilder 1950; Nichols 1956; Duguid 1961; B.M.J. 1962). In certain circumstances, it is believed that accidental infestation with Ancylostoma braziliense or A. caninum, and internal auto-infection by S. stercoralis may give rise to similar lesions (Craig and Faust 1957).

There is, therefore, abundant evidence that migrating larvæ can give rise to lesions similar to those of tropical myositis; it is significant that this condition occurs only in areas where nematode infestation-rates, especially ancylostomiasis, are high.

**Conclusions**

1. The geographical distribution of pyomyositis indicates a causative agent which is either confined to tropical countries, or to those in which parasite loads are heaviest.

2. The macroscopic and microscopic appearances of the lesions and the presence of eosinophilia in 37 per cent of the cases reported above lend support to the hypothesis that the condition is due to secondary infection of a host-tissue reaction set up by dead migrant larvæ. The finding of nematode larvæ in the pus from one case gives further supportive evidence. The failure to demonstrate larvæ in any other biopsy or pus specimen could be ascribed to degeneration and necrosis associated with abscess formation.
3. The incidence of ancylostomiasis in this (60 per cent) and in other series suggests that it may play a part in the aetiology of the disease.

4. With regard to treatment; the discovery of pus in 90 per cent of the cases explored indicates, on first principles, the need for early exploration and evacuation. Chemotherapy, if indicated, should be provided by a wide spectrum antibiotic.

Summary

Sixty-five cases of tropical myositis, or pyomyositis, are described. Treatment is discussed and the literature briefly reviewed. It is suggested that the disease is a sequela of larva migrans.

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REFERENCES