Myositis Ossificans Progressiva (Munchmeyer's Disease)

Brief review with report of two cases treated with corticosteroids and observed for 16 years

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Illingworth, R. S. (1971). *Archives of Disease in Childhood*, 46, 264. **Myositis ossificans progressiva (Munchmeyer's disease): a brief review with report of two cases treated with corticosteroids and observed for 16 years.** Two cases of myositis ossificans progressiva were treated by corticosteroids. In one case the course of the disease was not affected. In the other case, after 5 years' progression of the disease without treatment, progression ceased, either because of or in spite of corticosteroid treatment, and there has been a remission of 16 years, up to the time of writing.

Myositis ossificans progressiva is an extremely rare disease, and consequently there is a voluminous literature about it. The *Index Medicus* and allied publications from 1889 list well over 700 papers on the subject—excluding myositis ossificans following local trauma, burns, abdominal scars, tetanus, poliomyelitis, paraplegia, tabes dorsalis, and syringomyelia. There have been excellent reviews by Stonham (1892) with 55 references; De Witt (1900); Rosenstirn (1918) with 246 references, 121 pages of script, and a review of 120 cases; Nutt (1923) with 92 references and 14 case reports; Mackinnon (1924); Mair (1932); and Lutwak (1964). These reviews were so comprehensive that anything but a brief review by me would be unnecessary.

The purpose of this paper is to provide a brief review (after an extensive search of the literature), to provide key references, and to describe the effect of corticosteroids on two cases observed for over 15 years.

It is said that the condition was first described by Guy Patin in 1692 (Pack and Braund, 1942) when he wrote about the woman who turned to wood; that Von Dusch in 1868 first used the name myositis ossificans progressiva; and that Munchmeyer (1869) first gave a comprehensive description of the disease with an account of 12

cases—hence the eponym 'Munchmeyer's disease'. Rosenstirn (1918) thought that a better name would be fibrocellulitis ossificans progressiva; Fairbank (1950) suggested the term 'fibrositis ossificans progressiva', and McKusick (1960), following Bauer and Bode (1940), favoured 'fibrodysplasia ossificans progressiva'.

The incidence of the disease is unknown, but Mair (1932) was unable to find a single case in 130,000 London schoolchildren. The condition has been described in the horse, dog (Rosenstirn, 1918), and pig (Seibold and Davis, 1967). Stonham (1892) illustrated his paper by a picture of a skeleton with the condition in the museum of the Royal College of Surgeons, Trinity College, Dublin, and Fairbank (1950) referred to a similar skeleton in the Hunterian collection of the Royal College of Surgeons in London.

Symptoms

The onset is usually in the first 10 years; it may begin *in utero*, but only rarely after the age of 20 years. It seems that trauma may be a precipitating factor. The first symptom is commonly torticollis, and the sternomastoid muscle is almost always involved; thereafter there is involvement of muscles of the shoulder girdle, upper arm, and then the pelvic girdle. The heart, diaphragm, larynx, tongue, sphincter, and eye muscles are not involved,

FIG. 1.—Case 1. *Microdactyly of hallux.*

and the abdominal muscles rarely so. The first sign of involvement is often heat, oedema, and pain in a muscle; this may subside in a few weeks, followed by a doughy swelling which in a few months may ossify. Eventually columns and plates of bone replace tendons, fasciae, and ligaments.

There is almost always microdactyly of the great toe (Fig. 1), with suppression of the proximal phalanx and synostosis of the remaining phalanges. There may be other digital anomalies, especially in the thumb, exostoses, a broad neck of the femur, abnormal teeth, hypogenitalism, absence of lobules of the ears, and deafness (Lutwak, 1964; Ludman, Hamilton, and Eade, 1968). The condition is sometimes complicated by osteogenic sarcoma (Pack and Braund, 1942; Shanoff, Spira, and Hardy, 1967). Death is from respiratory disease, or ossification in the masseter muscles with starvation.

Remissions and exacerbations are characteristic. Garrod (1908) wrote that in the early stages swellings may disappear without trace. Fairbank (1950) wrote that severe crippling occurs in 'a few years' to 30 or 40 years. Campbell (1933) quoted a case of a man who died of the condition at 70, and Rosenstirn (1918) quoted a case of a man dying in 1744 at 60. According to Rosenstirn, most die before the age of 15.

The condition is thought to be an autosomal dominant mutation. There have been cases in homozygotic twins (Eaton, Conkling, and Daeschner, 1957; Vastine, Vastine, and Arango, 1948), and many examples of two or more in a family, including 5 males in 3 generations (quoted by McKusick, 1960), or of an affected child, with nothing more than the abnormal hallux in the father. The hereditary aspect was reviewed by Tünte, Becker, and Knorre (1967). Chromosome studies in two cases were negative (Letts, 1968).

The pathology of myositis ossificans was reviewed

by Wilkins, Regen, and Carpenter (1935), Ryan (1945), Riley and Christie (1951), Lucherini and Cecchi (1953), with numerous photographs of the histological appearance, and Eaton *et al.* (1957). Histochemical studies were described by Smith *et al.* (1966), and by Bona *et al.* (1967). They concluded that the condition was an hereditary error of metabolism resulting in the modification of mesenchymal cells which differentiate in the wrong way, evolving to chondroplastic and later to bone-forming cells. McKusick (1960) considered that the fundamental change was in the connective tissue between muscles, where there is proliferation of interstitial tissue of muscle, followed by collagenization and bone formation.

All biochemical investigations, including the blood calcium, phosphorus, and phosphatase, and the creatine phosphokinase, have been negative; but Smith *et al.* (1966), on the basis of EMG's and histochemical studies, suggested that the muscle was intrinsically altered before its invasion by connective tissue, with variability in the size of muscle fibres, as in muscular dystrophy, and decrease in adenosine triphosphatase activity.

The differential diagnosis includes calcinosis universalis, with which it is most commonly confused, multiple exostoses (Ollier's disease) and osteogenic sarcoma.

Treatment

Innumerable forms of treatment have been tried. They include local blisters, iodine, mercury, colchicum, local bleeding, sarsaparilla, nitric acid, lactic acid, phosphoric acid, thyroid extract, thiosamine, sodium citrate parathyroid extract, low calcium diet, vitamin B1, vitamin E, disodium hydrogen phosphate, beryllium (because it inhibits alkaline phosphatase), androgens, EDTA, ketogenic diet, ultrasound, antimitotic agents, oestrogens,

FIG. 2.—Case 1. Age 5. Plaque on right side of neck.

thymectomy, radiotherapy, radium implants, and surgical removal of plaques—all to no avail. Surgical removal of plaques is only justifiable if their removal will permit movement in a joint when movement has become impossible; but it is likely to be followed by the reappearance of bone at the site of operation. Lutwak (1964) studied a case on his metabolic unit for a year, giving triiodothyronine, thiouracil, and EDTA, to no avail. Liberman *et al.* (1967) found that EDTA given in an acute exacerbation caused a disappearance of local inflammatory signs, with increased urinary excretion of calcium, phosphorus, and manganese. Bassett *et al.* (1969) treated three cases with disodium ethane-1-hydroxy 1, 1-diphosphate (EHDP), 10 mg/kg by mouth, and reported that in two cases newly formed soft tissue swellings regressed in a few days, and that exacerbation occurred when the treatment was discontinued. Progress seemed to be arrested in the third case. They summarized their findings by writing that 'the beneficial effects of EHDP on the two acute progressive cases of myositis ossificans progressiva have been clearly demonstrated'.

The role of corticosteroids is uncertain. The Table summarizes the findings in 11 papers.

It will be seen that though some writers described improvement with corticosteroid or ACTH treatment, others found that the treatment was of no avail.

Case Reports

Case 1. A girl was seen at the age of 4 on account of torticollis. A hard mass was palpated in the right

sternomastoid muscle (Fig. 2). No abnormalities were found elsewhere except for typical microdactyly of the big toes (Fig. 1). She was given cortisone 300 mg per day, but in spite of this new lesions appeared in the left trapezius muscle and left serratus magnus. Corticosteroids were continued for 9 years; at the age of 6 prednisolone 20 mg was given twice a day. It was discontinued when the girl was 13 years old, because it had not proved helpful.

Special investigations included blood calcium, phosphorus, phosphatase, ESR, SGOT, SGPT, serum aldolase, and creatine phosphokinase which were normal. Histological examination of a biopsy specimen showed gross endothelial cell proliferation in the connective tissue surrounding the muscle bundles, with what appeared to be a secondary degeneration of the muscle cells, with some fatty changes. There was swelling and degeneration of masses of collagen. Special staining did not show undue concentration of phosphatase.

At the age of 7 years, there was a row of 6 swellings in the region of the left erector spinae, with swellings in the left sternomastoid muscle, and swellings over both scapulae. Menstruation started at 13 years. At 14 years the left hip became fixed, so that walking was very difficult. At the age of 20 there was unrelenting progression (Fig. 3); she could not sit without help, but could walk a few yards with a stick.

TABLE
Effect of Corticosteroids or ACTH on Myositis Ossificans

Author	Result
Riley and Christie (1951)	Temporary objective improvement in 1 of 4
Gelli (1952)	ACTH no effect in one
Evans (1952)	Cortisone controlled soft swellings and prevented further ossification, but only temporarily
Lucherini and Cecchi (1953)	No improvement in objective findings, but considerable improvement in mobility, so that patient could leave bed
Lockhart and Burke (1954)	ACTH thought to cause slight improvement, but immobilization was progressive
Dixon <i>et al.</i> (1954)	ACTH no effect
Remolar, Zima, and Espósito (1956)	Some regression
Eaton <i>et al.</i> (1957)	ACTH had temporary effect
Lins and Abath (1959)	No effect
Lutwak (1964)	Dexamethasone relieved symptoms only
Beco (1967)	No effect

Case 2. A girl was seen at the age of 2 by an orthopaedic surgeon on account of torticollis of 2 months' duration. The condition was progressive over the next 5 years. When seen at the age of 7, there were numerous swellings on the back, with large bony masses, restricted movement of the neck, and a bowed posture (Fig. 4). There was typical microdactyly. The x-ray showed

FIG. 3.—Case 1. Age 20, showing extensive progression of ossification of muscles; compare Fig. 2.

extensive ossification of thoracic and lumbar muscles. The blood calcium and phosphorus were normal.

She was given prednisolone 20 mg/day. Within weeks movements were improved; she could touch her toes, while previously she could only touch her knees. In two years she could fasten buttons at the back of her dress, whereas previously she could not achieve this. Corticosteroids were discontinued after two years' continuous therapy.

At the age of 16 she could dress herself with greater ease. There was no progress from the age of 9. At the age of 23 years the condition was clinically and radiologically static; she was working as a secretary.

Discussion

Myositis ossificans is so terrible and so rare a disease, that the results of reasonable efforts to treat it should be published. The known remissions and exacerbations of the disease make the assessment of treatment a matter of great difficulty. It is obvious that no treatment can be expected to remove solid bone; but it may be possible to prevent the formation of new bone. In this connexion the paper from New York (Bassett *et al.*, 1969) concerning EHDP offers some hope, and calls for further study. The role of corticosteroids is uncertain. I have no doubt that of my two patients Case 1 was *not* benefited by steroid treatment which in retrospect seems to have been continued too long. As for Case 2, there is no

FIG. 4.—Case 2. Age 7.

doubt that progression had been continuous for five years up to the time of beginning treatment; there is no doubt from our very full clinical and radiological records that the progress of the disease ceased when steroids were given; but whether this was because of or in spite of the treatment, no one can say. Nevertheless, a remission of 16 years' duration is unusual; I was not able to find a record of such a remission in an extensive search of the literature. Further experience of cases, particularly if they can be treated early, should be reported.

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