The scapulocostal syndrome

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Summary

The scapulocostal syndrome, a hitherto insufficiently understood condition, was clinically studied in 201 cases. The main findings were: (*i*) pain was the presenting symptom in all cases and was mainly cervicobrachial (90%); (*ii*) the syndrome is a definable entity within the wide spectrum of fibromyalgia (fibrositis); (*iii*) the pain originates mainly from an enthesopathy of the serratus posterior superior muscle; and (*iv*) physical degeneration was present in 76,5% of patients.

Conservative treatment, successful in 95,9% of cases, consisted of an intralesional injection of a steroid-analgesic-mixture of 1 ml Celestone-Soluspan (Scherag) plus 1,8 ml Xylotox E80A (Astra), and physical rehabilitation. It was deducted that the dyskinesia was mainly due to an overload of the scapulocostal articulation, forcing the rib cage down to exert a stretching force on the serratus posterior superior muscle. The operation of 'serratotomy' (severing the serratus posterior superior muscle) was performed with excellent results in 6 patients in whom conservative treatment failed, and is described here for the first time.

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The scapulocostal syndrome (SCS) causes considerable morbidity,[1-4] but is an insufficiently understood condition that is probably often wrongly diagnosed and treated.

Historically, inferences about the existence of this syndrome can be drawn from material published in 1873,[2] 1881,[2] 1904[5] and 1913.[2] The syndrome was well described, but not named, by Travell *et al.*[1] in 1942. The first publication using the term appeared in 1950 (Michele *et al.*[2,4]).

It is likely that various destructive operations were performed for this condition, e.g. partial scapulectomy, scapulopexy, rib resections and unnecessary explorations.

A study of the SCS was undertaken in order to: (*i*) document its clinical presentation in my practice; (*ii*) establish the anatomical diagnosis; (*iii*) explain the dyskinesia; and (*iv*) evaluate a specific treatment protocol.

The four posterior shoulder girdle muscles are the trapezius, the two rhomboids and the levator scapulae;[6] they originate mainly from the spine, implant and act mainly on the scapula, and are the 'antigravity' muscles of the shoulder girdle.

In the third muscle layer of the back is a flat, rather obscure muscle — the serratus posterior superior — which originates just lateral to the angles of ribs 2 - 5, runs superomedially, and implants with a long aponeurosis on the spinous processes C6 - T2 inclusive (Fig. 1). The muscle is situated in the scapulocostal articulation and apparently acts as an accessory muscle during inspiration.[6]

In man, the muscle seems to be regressing phylogenetically and appears kinesiologically unimportant.

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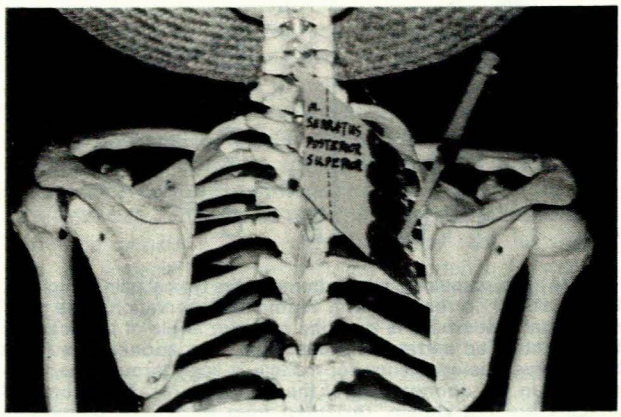

Fig. 1. The serratus posterior superior muscle, and the need for critical accuracy of the intralesional injection of the steroid-analgesic mixture.

Patients and methods

In this prospective study, 201 cases were enrolled at first consultation between 21 July 1983 and 10 March 1986.

At enrolment, a patient was assessed generally and regionally. Data recorded included previous management; pain (duration, localisation, range, severity); occupation; physical fitness; cause; gender; ethnicity; age; co-existing conditions; rib/s involved; and treatment. Follow-up for a minimum of 1 year was planned.

By palpation, a point of maximal tenderness ('trigger point'), as well as other tender areas were localised (Fig. 2A).

The diagnosis of the SCS was entirely clinical and the cardinal diagnostic criteria were locomotor pain and tenderness in the scapulocostal region. Further investigations were carried out only when indicated by co-existing conditions.

Conservative treatment

An intralesional injection of a steroid-analgesic mixture of Celestone-Soluspan (Scherag) 1 ml plus Xylotox, E80A (Astra) 1,8 ml into the trigger point was administered for immediate relief and to verify the anatomical diagnosis (Fig. 1).

Physical rehabilitation, crucial for long-term relief, included graded exercises to strengthen the posterior shoulder girdle muscles and to stretch their antagonists; and sensible domestic and/or occupational adjustments.

Operative treatment (Fig. 2B)

A 'serratotomy' (severing the serratus posterior superior muscle) was performed in patients in whom at least 6 months of conservative treatment had failed. The operation was designed to: (*i*) eliminate the dolorific stretching force exerted on the serratus posterior superior muscle by the rib cage sagging from overload and/or posture degeneration; and (*ii*) cause the serratus posterior superior muscle to atrophy and so render it less vulnerable to the articulating scapula.

The 'serratotomy' operation involves making an incision in the midline from C5 - T4 down to the tips of these spines. At

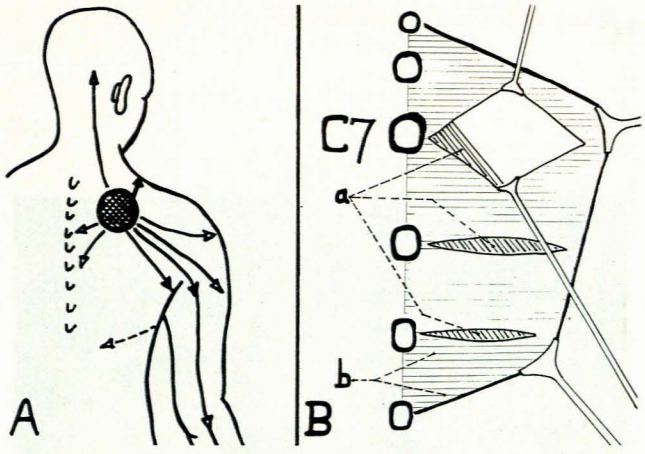

Fig. 2. (A) The scapulocostal syndrome — the typical pain complexes do not usually correspond with segmental innervation.[6] The point of maximal tenderness is near the superior angle of the scapula. (B) A right-sided serratotomy operation. The aponeurosis (a) of the serratus posterior superior muscle is seen through the fenestrations in the aponeurosis of the trapezius (b). The rhomboid muscles are not shown. (Adapted from Hart[6] with permission from Ciba-Geigy Limited, Basle, Switzerland.)

the spines of C7, T1 and T2, the trapezius and rhomboid muscles are traversed in a grid-like fashion to make fenestrations through which the silvery glistening aponeurosis of the serratus posterior superior muscle is strikingly visible, with its fibres running at about 45°. The superior border of this aponeurosis is well defined and relatively thick, while the inferior border thins out. The whole aponeurosis is easily dissected free and severed. Postoperatively, the patient should be nursed in a supine position on pillows. The patient should be allowed up after about 24 hours; and the drain removed after about 48 hours. The patient can be discharged from hospital on day 3. Free, non-weight-bearing movements of the upper limbs should be encouraged immediately postoperatively.

Results (Tables I and II, Fig. 3)

Previous management

Seven patients had previously been treated only by chiropractors; 22 oral paracetamol-codeine-based analgesics only; 7 by oral non-steroidal anti-inflammatory drugs only; 4 by intralesional injection of a steroid-analgesic mixture, including a patient who had had two explorations — one by a general surgeon and then by an orthopaedic surgeon; 141 had had no previous treatment (70,5%); and management of the remaining patients had been diverse.

Incidence

One new case of the SCS was found per 288 of all consultations. The average time between these new cases was 6,4 calendar days (range 0 - 19 days).

Pain

This was the main presenting complaint in all patients; in 181 it was cervicobrachial in nature (90%) (Fig. 2A). Descriptions of the pain given by patients included burning, aching, pulling, and pinching. It was severe in 74 cases (34%) and caused lying down, sitting, crying or waking up. Twenty-five patients had had pain for at least 5 years, including 1 case of 21 years' duration. There were 75 acute cases (37,5%) and 126 chronic cases (62,5%).

TABLE I. DEMOGRAPHY, DURATION AND LATERALISATION EMPIRICALLY CATEGORISED AS ACUTE OR CHRONIC CASES, RESPECTIVELY, < 21 > DAYS' DURATION

	No. of acute cases	No. of chronic cases	Total
Women			
White	30	53	83
Black	6	18	24
Asian	6	9	13
Coloured	0	1	1
	40	81	121
Men			
White	19	20	39
Black	13	23	36
Asian	3	1	4
Coloured	0	1	1
	35	45	80
Both genders			
White	49	73	122
Black	19	41	60
Asian	7	10	17
Coloured	0	2	2
	75	126	201
Lateralisation			
Left side	38	57	95
Right side	34	64	98
Bilateral	3	5	8
	75	126	201
Average age (yrs)			
Men	39 5/12	42 0/12	41 2/12
Women	36 11/12	42 9/12	40 2/12
All cases	38 3/12	42 3/12	40 9/12
Duration (d)			
Women	8,5	1 230,0	826,2
Men	8,8	462,5	264,0
All cases	8,6	955,9	602,4

TABLE II. DIAGNOSTIC PITFALLS, PRESENT AT FIRST CONSULTATION

Condition	No. of cases
Symptomatic cervical spondylosis	3
Neck pain of undetermined origin	4
Previous cervical fusion	1
Scalenus anticus syndrome	2
Supraspinatus tenosynovitis	4
Biceps tenosynovitis	3
Symptomatic Scheuermann's disease	1
Scoliosis	1
Symptomatic peripheral osteo-arthritis	14
Rheumatoid arthritis	1
Homolateral anterior chest wall pain	2

Movements

Active and passive movements of the shoulder girdle were full and painfree.

Occupation

Of the 121 women, 58 were full-time and 14 were part-time housewives. The occupations of the men in this series were very diverse.

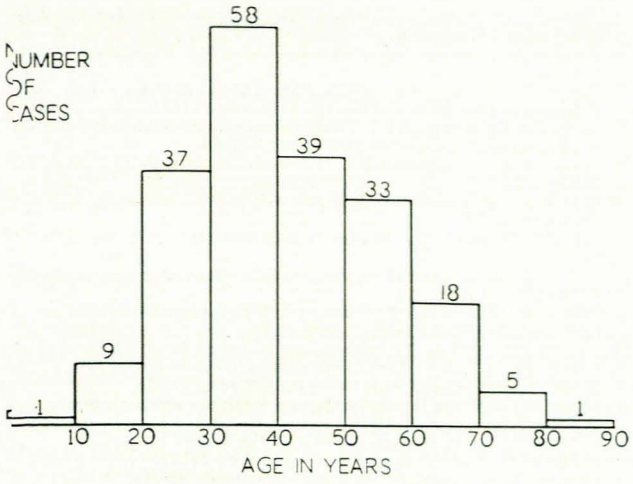

Fig. 3. Age stratification of patients in this study.

Physical fitness

A state of physical deterioration prevailed in 153 patients (76,5%).

Anatomical diagnosis

At entry into the study, a point of maximal tenderness was present in the origin of the serratus posterior superior muscle in 119 patients (99%). Other tender points were also always present, especially in the occiput, the scapular spine and the mid-point of the upper border of the trapezius. With the exception of 2 cases, these other points were less tender than the trigger point and were not recognised by patients as the seat of pain. The fourth rib was involved in 162 cases (80,6%).

The dyskinesia involved is dealt with in the 'Discussion'.

Conservative treatment

Intralesional injections of a steroid-analgesic mixture were given to 60 of the 75 patients with acute SCS and to 116 of 126 patients with chronic SCS. Of the 176 patients receiving these injections, 175 were treated at first consultation and of these 161 did not require follow-up injections. The 25 patients not treated by injection, preferred physical rehabilitation only. Of the 195 cases followed up, conservative treatment was successful in 187 (95,9%); the 8 failures received intralesional injections plus physical instruction.

Operative treatment

A 'serratotomy' was performed in 6 of the 8 patients in whom conservative treatment failed. The first operation was carried out on 7 November 1984. Postoperative results were excellent in all at the 1-year postoperative follow-up.

Discussion

Clinically, the SCS is a distinct variety of fibromyalgia (fibrositis), which encompasses a wide range of pain syndromes very commonly seen in general practice. It causes considerable suffering.[7-12]

Further, enthesis means the attachment of ligaments, tendons, joint capsules and muscles to bone.[13] According to Ball,[14] the term 'enthesopathy', denoting a disorder of the enthesis, was coined in 1966 by Niepel *et al.* of Czechoslovakia. It would appear that the SCS is, in the main, an enthesopathy of the origin of the serratus posterior superior muscle.

The intensity and nature of arterial and peri-osteal pains in particular and, to a lesser extent, deep fascial pain, as described by Bazett and McGlone[15] in 1928, resemble the pain of the SCS fairly closely and do not contradict the enthesopathy hypothesis.

Suggesting a possible ischaemic basis for the syndrome is not new — back in 1769 Morgan remarked that headaches could be caused by ischaemia from contraction of the cranial musculature.[16] Localisation of pain by nociception from deep structures of the girdle and trunk is notoriously inaccurate.[9,17,18] Crucial to my new perception of the SCS, was the accurate localisation of the trigger point in the origin of the serratus posterior superior muscle without prior knowledge of the work of Travell *et al.*,[1] who found that this muscle was involved in 57 of their patients. Using digital pressure on the trigger point, and especially by intralesional injection of a steroid-analgesic mixture, patients immediately recognised the source of their pain. These palpations were exercises in doctor-patient communication because all patients initially adducted their shoulders and extended their necks, thereby covering the serratus posterior superior muscle with the scapula and tense posterior shoulder girdle muscles. The very location and innervation of the serratus posterior superior muscle explains why the pain of the SCS is mainly cervicobrachial. The success of the 'serratotomies' further vindicated the anatomical diagnosis. The differential diagnosis of cervicobrachial pain is extensive,[19,20] therefore relief of SCS pain does not absolve one from determining a possibly more serious cause.

Previous management of the SCS was as diverse as could be expected for an ill-defined condition, given the many modes of treatment available. Altogether 141 patients (70,5%) in this study group had had no previous treatment because they consulted me first.

The SCS remained relatively obscure because it is not life threatening, and the pain originates mainly from a 'grey area' of medicine, involving the disciplines of neurosurgery, orthopaedics and rheumatology especially — but none of them takes precedence.

With due cognisance taken of Halliday's[21] article on psychosomatic medicine and rheumatism, the pain of my patients was genuine, and could not be fitted into the procrustean bed of psychosomatic conditions. On presentation, 153 patients (76,5%) lived in physical sloth, best typified by the 53 white women with chronic pain (26,4%); their lifestyles were busy, often hectic but of suboptimal locomotion, inducing chronic fatigue rather than maintaining good posture. The SCS was quite appropriately also called the 'fatigue-postural paradox' by Michele *et al.*[2]

The gradual process of posture degeneration explains the insiduous onset of chronic cases of the SCS. More serious regional conditions, e.g. scalenus anticus and related syndromes, can be induced by posture degeneration, and alleviated by physical rehabilitation.[22-26] 'The frequency with which symptoms . . . appear . . . after some serious illness, childbirth or some general debilitating state, is familiar and the normal descent of this girdle during middle age, particularly in women, is known.'[25]

Since the SCS is a locomotor affliction, I sought the cause primarily in dyskinesia and the following relevant factors, alone or in combination, were hypothesised: (*i*) an abnormal stretching force on the serratus posterior superior muscle by a rib cage sagging from overload and/or posture degeneration; (*ii*) an abnormal scapulocostal articulation, should the normal double convex arch of the rib cage and the articulating scapular concavity have changed; the borders of the scapula, notably the vertebral border, can also change significantly;[27] and (*iii*) dolorific pressure on the serratus posterior superior muscle, with overload and/or retaining a position too long.

Physical rehabilitation, especially if encouraged by a doctor, is a potent catalyst for a patient to re-appraise his/her whole lifestyle. Thus simple rehabilitation can develop into a very beneficial holistic process. Observing the dictum *primum non nocere*, the 'serratotomy', being a world first, was designed with due trepidation. Major fears were about weakening the trunk and about eliminating the SCS, which might be a herald of more serious posture degeneration. Fortunately these fears were not fulfilled.

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