

Shoulder pain and tension neck and their relation to work

by John AD Anderson, MD, FFCM¹

ANDERSON JAD. Shoulder pain and tension neck and their relation to work. *Scand J Work Environ Health* 10 (1984) 435—442. Reliable information about shoulder girdle pain in relation to work practices is difficult to obtain from routinely acquired statistics. On the basis of data obtained from a special study of 2 648 manual workers from jobs without special demands for neck or shoulder activity, an estimate has been made of the size of the problem. The results indicate that 23 % of a manual workforce reported having suffered from pain in the neck, shoulder, or upper arm on at least one occasion during their work-life and that 15 % had had such pain during the year prior to the study. These pains arose through a number of causes collectively grouped as shoulder girdle pain. The relative importance of trivial injuries, degenerative changes, and structural abnormalities is considered along with the possible work-related role in contributing to the onset of such painful syndromes. In light of these possibilities the contribution which primary preventive measures could make to reducing the problem by altering the posture at work is discussed, and an indication is given of the likely limitation of secondary preventive measures (screening) in this field. On the other hand there is room for increased diagnostic accuracy to ensure better management and rehabilitation for those with prolonged or recurrent painful symptoms.

Key terms: cervicobrachial disorders, cervical disc, ergonomics, occupation, posture, shoulder girdle pain, shoulder pain, spondylosis, tension neck.

The shoulder is the most mobile joint in the human body (18), and painful conditions with limitation of movement may be linked with a number of associated conditions, such as painful arc syndrome (19), supraspinatus syndrome, and glenoid capsulitis. These syndromes may occur alone or in association with tension neck, which in turn may merge imperceptibly with pain in the suprascapular and upper dorsal regions, the place depending on whether or not pain arises locally or is referred from a nerve root or other spinal source (13). Various collective terms have been used to describe these pains, eg, cervicobrachial syndrome (25), neck and upper limb disorders (22), neck shoulder problems (31), and shoulder girdle pain (4). So far as can be judged from the literature, the terms are used synonymously, and in the absence of unanimity the last-mentioned term is used in this paper.

Those seeking to study occupational aspects of this field have to face several semantic difficulties. Not only is there a general lack of specificity of diagnostic labeling, which has been discussed elsewhere in relation to osteoarthritis (5), but there is added confusion because the symptoms of shoulder girdle pain can arise from a large number of diagnoses, which are summarized in table 1. This shows that the

rubrics of the International Classification of Diseases (35) which refer to problems related to shoulder girdle pain cover a wide range of sections so that classification under a single heading is virtually impossible.

Additional problems arise from the fact that many syndromes causing shoulder girdle pain, as well as pain in the upper arm, tend to be engulfed in the more general problem of spinal pain — that is, pain which occurs anywhere between the occiput and the gluteal folds. In this context there have been improvements recently, thanks largely to the efforts of Wood and his co-workers (34). These improvements have resulted in the rationalization of back problems in the current International Classification of Diseases (35). However, the term dorsopathies has been used to incorporate back conditions as a whole. Thus spondylosis and disc disease only distinguish the cervical from the lumbar region at the level of the fourth digit, while the rubric for nonspecified backache is placed alongside lumbago, sciatica, and affections of the sacroiliac joint, all of which are clearly related to the lower back. Furthermore, brachial neuritis and radiculitis, as well as sciatica and cruralgia, are included under the section on dorsopathies even though there is no concurrent symptom related to the axial skeleton or adjacent muscle masses. Thus it would appear that only those persons with such an obsessional zeal for diagnostic clarity that they indicate specifically that the pain is in the neck, shoulder, or upper arm will be able to ensure that the label used is allocated to the shoulder girdle.

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Table 1. Work-related shoulder girdle pain — Selected rubrics from the International Classification of Diseases (35) to show the inadequacy of the three-digit code and the wide range of diagnoses associated with pain in the neck, shoulder, or upper arm, which may be either caused or aggravated by work conditions.

Section	Rubric	Diagnosis (subsidiary disease label included in rubric)
I	Infections	015 Tuberculosis 053 Herpes zoster (post herpetic neuralgia 053.1)
II	Neoplastic	232 Skin
III	Endocrinological	250 Diabetes (diabetic neuropathy 250.5)
IV	Hemopoetic	289 Other diseases of blood forming organs (lymphadenitis 289.1)
V	Mental	300 Neurotic disorders (hysterical torticollis 300.1) 306 Physiological malfunction arising from mental factors (psychogenic torticollis 306.0)
VI	Nervous	337 Diseases of autonomic nervous system (shoulder-hand syndrome 337.9) 354 Mononeuritis (causalgia 354.4)
VII	Circulatory	443 Other peripheral vascular disease (pneumatic drill disease 443.0)
VIII	Respiratory	500/507 Pneumoconioses 511 Pleurisy 515 Massive fibrosis of lung
IX	Gastrointestinal	530 Diseases of esophagus } with diaphragmatic 570 Necrosis of liver } involvement
XII	Skin	682 Cellulitis 692 Allergic eczema
XIII	Musculoskeletal	
	710—719 Arthropathies	715 Osteoarthritis 721 Spondylosis (cervical 721.1; lumbosacral 721.3)
	720—724 Dorsopathies	722 Disc disorders (cervical 720.0; lumbar 722.1) 723 Other cervical disorders (brachial neuritis 723.4; torticollis not elsewhere classified 723.) 724 Other unspecified back (thoracic radiculitis 724.4; lumbago 724.1)
	725—729 Rheumatism	726 Peripheral enthesopathies (rotator cuff syndrome 726.1; gluteal tendinitis 726.5)
	730—739 Osteopathies	737 Curvature of the spine
XIV	Congenital	756 Other congenital musculoskeletal (cervical rib 756.2; spondylolisthesis 756.1)
XVI	Ill-defined	786 Chest symptoms (pleurodynia 786.5)
XVII	Injuries	805 Fractured spine (805.0 cervical; 805.5 lumbar) 812 Fractured limbs (812.1 upper; 812.4 lower) 831 Dislocated shoulder 839 Other dislocations (sternoclavicular 839.6; sacroiliac 839.4) 840 Sprain/strain shoulder and upper arm (rotator cuff syndrome 840.4) 847 Other back sprains (neck 847.0; lumbar 847.2) 862 Injury to other internal thoracic organs (diaphragm 862.0; pleura 862.20) 880 Open wound, shoulder and upper arm 903 Injury to blood vessels, upper extremity 912 Superficial injury, shoulder and upper arm 923 Contusion, upper limb (shoulder 923.0; finger(nail) 923.3) 927 Crushing injury, upper limb (shoulder 927.0; finger 927.3) 943 Burn, shoulder and arm 953 Injury to nerve root (cervical 953.0; lumbar 953.3) 959 Injury unspecified (shoulder 959.2; hip 959.6) 992 Effects of heat (heat cramps 992.2) 995 Adverse effects not elsewhere classified (allergy not elsewhere classified 995.3; battered baby syndrome 995.5)

A further development which might have been expected to improve clarity was the publication in Britain of the report by the Cochrane Working Group on Back Pain (9) some five years ago. However, this report did little to help — indeed some might say that it made the confusion over shoulder girdle pain even worse than before. Admittedly the terms of reference were largely service-oriented, but those who recognized the chairman as an epidemiologist of distinction might have been forgiven for expecting a report containing more epidemiologic enlightenment and clarity of definition. There may have been reasons for such shortcomings, one being that there was no information and another that the content of the available information did not meet the standards of orthodox

epidemiology in relation to such criteria as objectivity and reproducibility. Indeed there seems to be little agreement on the definition of what is meant by either back pain on the whole or shoulder girdle pain in particular.

Grahame (15) commented on the report in a contemporary editorial and echoed the view expressed in the first recommendation (9):

Further improvements in services can be planned rationally only when there is better understanding of the nature, occurrence and causes of back pain and of effective ways of modifying it. The Working Group recommends that sustained and increased support for research relevant to these areas is not only essential, but should command high priority [p 23].

This statement appeared at the time to be encouraging to those interested in looking at occupational aspects of shoulder girdle pain, but unfortunately the bulk of research since then — at least as far as can be gleaned from the literature — has been conducted in relation to the lower back, rather than the shoulder girdle.

Under these circumstances health statistics which are collected routinely and even special studies of back pain as a whole are unlikely to contain reliable data about the incidence or prevalence rates of shoulder girdle pain and whether these rates can be related to occupation. Instead, reliance must be placed on specially conducted surveys, and this paper looks at some data with particular reference to the possible relationship between shoulder girdle pain and work. It considers the size of the problem, the causes of pain, risk factors, and preventive measures.

Size of the problem

The size of the problem depends on the population being studied and the emphasis placed on the problem of shoulder girdle pain in the course of the interview and examination. Thus, in a general study of musculoskeletal problems among random samples of 2 648 men with a range of manual occupations in the United Kingdom, there were 1 399 (52 %) who had rheumatic complaints at some time during their worklives (1). Of these 805 (30 %) had pain in the back in its broadest terms (ie, neck, shoulder, thoracolumbar spine, and buttocks); of these, 551 cases (21 %) were predominantly in the lower back and 264 (10 %) in the shoulder girdle. However 276 (10 %) had coexistent pain in both sites. In addition to these cases there were 81 (3 %) with upper-arm pain, including three with osteoarthritis and one with rheumatoid arthritis of the shoulder joint. The proportion of men with pain confined to the shoulder girdle (13 % since starting work) is lower than that noted by Westerling & Jonsson (31) among 1 239 men (16 % during the previous 12 months), but, if those with pain in both the low back and the shoulder girdle are included, then the rates are comparable (23 % since starting work, of whom 15 % had had pain during the previous 12 months). Westerling & Jonsson also made observations on 1 298 female workers and found a prevalence of neck and shoulder pain of 20 % during the previous 12 months. This figure is somewhat higher than most of the prevalence rates reported by Ohara and co-workers (25) on the basis of a series of studies among female workers in Japan. They found a range of 2.1 % among 247 cash register operators to 28 % among 337 key punchers. However, it is not clear from their report if the data are based on point prevalence studies or the length of time involved if they were period prevalence studies.

In the British study (1) there was little indication that those engaged in heavy manual work, such as

Table 2. Sickness absence from shoulder girdle pain. Annual rates for 2 684 male manual workers contrasted with rates for low back and hip pain.

Diagnosis	Site of pain	
	Shoulder girdle	Low back
Disc disease		
Number of men affected	89	238
Annual days lost	432	2 137
Annual days lost/100 manual workers	16.1	79.6
Vague axial pain		
Number of men affected	191	287
Annual days lost	261	1 193
Annual days lost/100 manual workers	9.7	18.4
Pain in shoulder joint and upper arm or hip joint and upper thigh		
Number of men affected	81	215
Annual days lost	22	94
Annual days lost/100 manual workers	0.8	3.5
Total		
Number of men affected	361	740
Annual days lost	715	2 724
Annual days lost/100 manual workers	26.6	101.5

coal miners and foundry workers, had higher than average rates for shoulder girdle pain. However when such pain was associated with concurrent low-back pain, there was a higher rate among the workforce engaged in the heavier end of the work spectrum (16 %). By way of contrast those groups of workers whose tasks predominantly involve use of their arms (electronics assembly and those in the bottling hall of a brewery) had a slightly higher rate for pain confined to the shoulder girdle (15 %), but this difference was not statistically significant.

Sickness absence caused by shoulder girdle pain is summarized in table 2. There was an estimated loss of 266 d/1 000 men employed from among those with pain mainly affecting the shoulder girdle; this number included 16 men who had pain both in the shoulder girdle and in the low back but who associated their sickness absence during the past year to pain in the shoulder girdle. This loss contrasts with 1 015 d/1 000 men employed for those in whom low-back pain predominated, including 226 who also had pain in the shoulder girdle but ascribed their absence to low-back pain.

It is thus apparent that, as a cause of sickness absence among industrial workers, shoulder girdle pain takes second place to painful conditions of the lower back. Even though, in many cases, the two conditions may have markedly different epidemiologic backgrounds, there remain those for whom there is overlap. For instance, when shoulder girdle pain arises from postural impairment of disc disease of the cervical spine, similar predisposing conditions may prevail in the lower back, the latter appearing to cause the greater handicap. Furthermore, if the original cause of lower-back pain was accepted as being

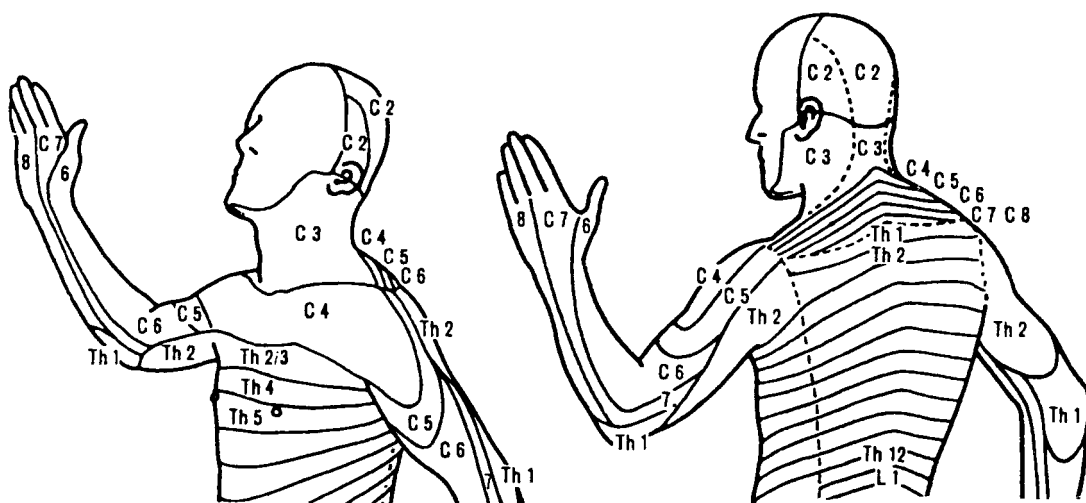


Figure 1. Dermatomes of the anterior and posterior primary rami spinal nerves in the shoulder girdle pain [reproduced from Geigy (14) with the kind permission of Geigy Pharmaceuticals].

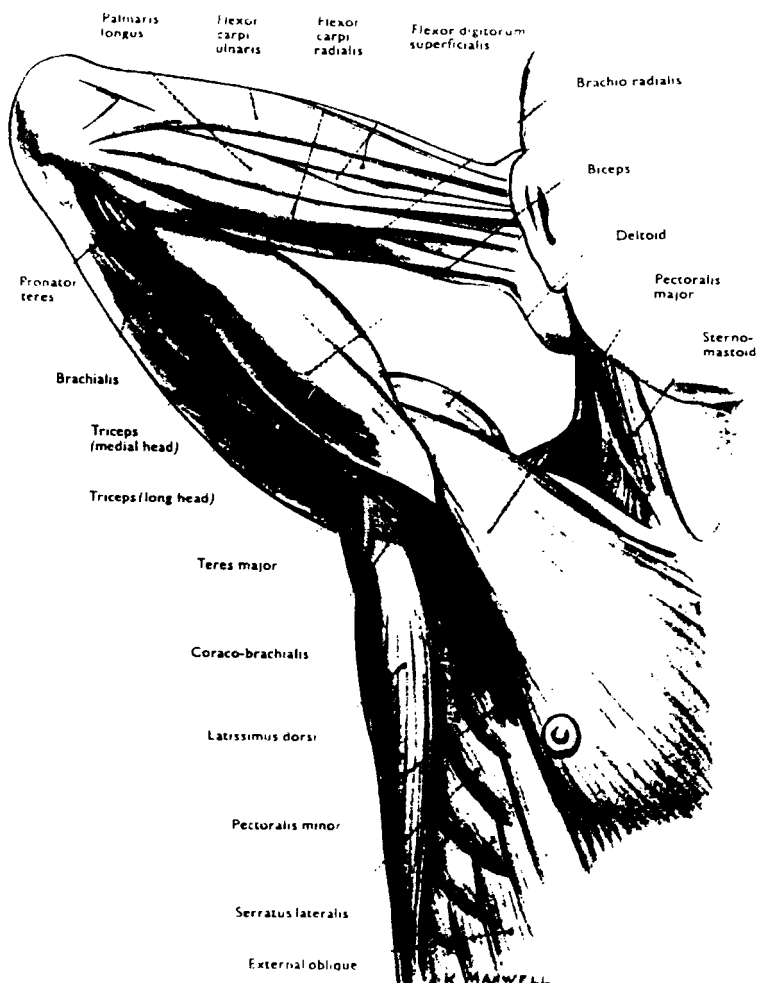


Figure 2 A. Shoulder girdle muscles, tendons, and bone prominences — Anterior view [reproduced from Appellton et al (6) with the kind permission of MacMillan Press Ltd].

due to an injury at work, then financial pressure may tend to lead to a dominance of this site even if there is a subsequent development of quite severe pain in the shoulder.

In the face of these difficulties it is important to determine the extent to which sickness absence attributable to shoulder girdle pain can be ascribed to occupational factors, and also possibilities for modifying these factors and so reducing sickness absence. However such work can only be done if the possible causes of shoulder girdle pain are understood.

Pain in the shoulder girdle area

Wyke (37) has pointed out that pain can only be experienced when there is stimulation of the appropriate afferent nerve fibers and the nociceptive pathways, either at the site of pain itself or in another structure for which the sensory nerves enter the same segment of the spinal cord (referred pain). Thus any painful lesion causing stimuli of the cutaneous nerves, or affecting bones, ligaments, synovial membranes, muscles, tendons, and their sheaths in the region of the shoulder girdle, may be involved in the produc-

tion of shoulder girdle pain. Nerve root pain with radiation to the shoulder or upper arm and hand (21) may also arise from lesions of the appropriate segment of the cord, including the apophysial joints and their surrounding tissues associated with that segment. Similarly shoulder girdle pain may be caused by pressure from a herniated disc or through root compression arising from degenerative disc changes even though the discs themselves do not have a direct nerve supply. Figure 1 shows the generally accepted pattern of segmental distribution for the afferent nerve roots from the front and back.

Figures 2 A and 2 B show the structures of the musculoskeletal system in the region of the neck, shoulder, and upper arm. Lesions of any one of these areas may cause shoulder girdle pain at the site of the lesion or referred pain from elsewhere with common innervation. Muscle spasm may also lead to pain, and, if it is involuntary, the innervation of the muscles concerned is likely to show a pathway common with that of the organ in which the primary lesion is located. However such a situation may well not be the case if the muscles are being activated as part of a voluntarily induced protective mechanism.

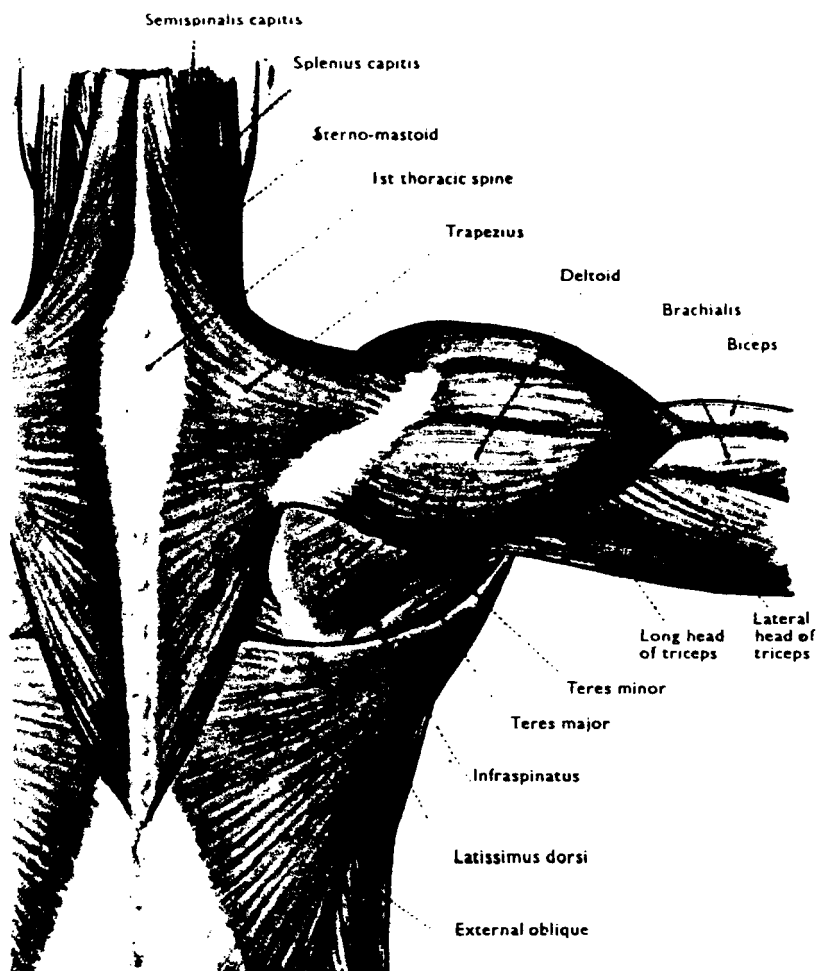


Figure 2 B. Shoulder girdle muscles, tendons, and bone prominences — Posterior view [reproduced from Appellton et al (6) with the kind permission of MacMillan Press Ltd].

Causes and risk factors

An injury sustained at work may lead to fracture or, more commonly, acute strain of muscles, ligaments, or other tissues. It may arise from a single act, including injury while falling or slipping, overreaching upwards or sideways, and acute rotation of the neck or, more seriously, whiplash injury. The last-mentioned can be sustained from incidents other than motor vehicle accidents, for example, from violent impact from moving machinery and from falling objects hitting the worker either on the forehead or in the dorsolumbar region.

In addition repetitive tasks, particularly if unaccustomed to the worker or if done after return from a spell of leave, may lead to tears of the tendons (24) or inflammation of sheaths or the subacromial bursa, while the capsule of the shoulder joint itself may be similarly affected. In this broad category one important risk factor, which is acknowledged by most doctors and indeed by many patients, is strain resulting from tasks associated with maintaining the arms in a position above the shoulder level, particularly, but not exclusively, when the subject is unaccustomed to this position. Such actions are likely to impose stress on the supraspinatus and the upper part of the trapezius and deltoid muscles in particular.

Some trades have their own descriptive titles for the conditions that have been described, such as *painter's hump* in the neck or *maltsman's monkey* (which affects those who have to turn the germinating grain with manual shovels in breweries); these tend to affect the cervicodorsal spine or interscapular muscles but may be manifest as shoulder girdle pain. *Beat shoulder*, though less common than similar lesions of the knee or elbow among coal miners, is another term which practitioners with patients in such occupations have to take in their stride. It must also be remembered that similar conditions, such as golfer's shoulder and baseball player's glassarm, though only *work-related* in professional sportsmen, may affect amateurs who overindulge without proper training or after a period of prolonged inactivity.

The importance of precipitating injury was assessed in an analysis of 78 patients attending a hospital clinic because of shoulder girdle pain. The analysis showed that 48 (62 %) had a history of precipitating injury or short-term overindulgence in an unaccustomed activity. However, there were obvious pitfalls. First, patients from industry in Britain, as in many other countries, require evidence of precipitating injury to qualify for higher rates of benefit and compensation. Even when there is no question of direct financial benefit (for instance for housewives), many patients like to identify a clear starting point for their illness and tend to link this with a causal injury or a period of unusual activity. By way of contrast minor trauma resulting in transitory difficulty will often be forgotten almost at once. Thus, when

patients attending general practitioners and suffering from conditions other than those affecting the shoulder girdle and lower back were interviewed in depth, it was possible to obtain a recollection of minor trauma indistinguishable from incidents claimed to be causal by those with persistent pain (3).

Much more difficult to assess is the risk of chronic strain over long periods contributing to the accelerated onset of degenerative changes such as cervical spondylosis or osteoarthritis of either the spinal apophyseal joints or the shoulder itself. Although the latter is said to be comparatively rare (26), it can and does occur, as indicated by degenerative changes of the shoulder joint demonstrable in radiographs of three patients currently under treatment in my own clinic, whose occupations are French polisher, telephone engineer, and retired docker (whose main worklife occurred before the era of containers).

As far as those who work with their arms above the horizontal are concerned, there has been substantial research carried out in Scandinavia to show the relationship between such physical demands and shoulder pain. The publications of Hagberg and others (8, 16, 17) and Westgaard & Aarås (32) are well known examples. Similarly neck pain may arise from the head being held too close to work material (28), while pain in the shoulder may result from repetitive action such as that involved in mopping and swabbing by cleaners (33).

One factor which is blamed for contributing to problems of the shoulder and upper arm is that machines are designed throughout the world for right-handed workers. However observations among machine operatives (1) show no obvious relationship between left-handed dominance and shoulder girdle pain. Indeed attempts to demonstrate asymmetrical movement of the upper limbs among postmen performing different tasks in a sorting office with actimeters (made by interfering with the release mechanism of self-winding watches) failed to give conclusive evidence of increased shoulder girdle pain associated with eccentric movement of the upper limbs (29).

A further commonly recognized risk factor of shoulder girdle pain is impairment (often congenital) which results in pain following occupational demands well within the capacity of normal people. The use of routine radiographic examinations of healthy subjects is open to challenge on ethical grounds even though there may be less concern in this respect at the level of the shoulder girdle than in the pelvic region. However, there is evidence from previous surveys (12) and from patients radiographed for other conditions that cervical ribs and other impairments are found frequently in those without symptoms, while osteophytic lipping of the cervical spine can be observed in so many of those over the age of 55 years that it has to be considered an almost normal change with age (23). It is also well known

that the lordotic curve of the lumbar spine varies widely among normal subjects (2), and the cervical spine is likely to have just as wide variations. Furthermore compensatory scoliosis because of abnormalities primarily attributable to the thoracolumbar spine or even pelvic tilt from asymmetric leg length are often symptomfree. Thus 4 % of 218 symptom-free postmen showed evidence of shoulder tilt.

Preventive measures

What implications do these findings have in relation to prevention or the management and rehabilitation of established cases? Prolonged work with the arms raised above the head has been shown to be associated with an increased prevalence of shoulder girdle pain (8, 16, 17, 32). Accordingly attention to this problem in terms of work conditions would seem to be a reasonable starting point. In addition eccentric posture of the cervical spine should be avoided whenever possible, as for instance with the aid of a special rest holder for notebooks used by typists or by the proper positioning of cash registers used by those employed as check-out assistants in self-service stores (20).

Increased mechanization has also diminished, and is likely to continue to diminish, the need for repetitive movements over a long period, and this phenomenon could reduce the problem of work-associated shoulder girdle pain. However, the measures recommended must be realistic in relation to both the tasks being performed and the work circumstances. Thus adjusting the height of the standing level so the arms do not have to be elevated may be reasonable if all work requirements come into this category. On the other hand, if an operative on a raised platform has to indulge in prolonged stooping to perform tasks at the lowest level of the work schedule, then the reduction of shoulder girdle pain may be more than counterbalanced by an increase in disability from low-back pain.

As far as secondary prevention is concerned, there is no indication currently that routine examination involving the shoulder girdle can identify an at-risk group in terms of bony abnormalities in the region. Many of those with cervical ribs or bizarre impairments of the cervical spine go through their worklives without problem only to have the impairment identified when they are being radiographed later for some totally unrelated condition. Further work needs to be done in this field, but at the present state of knowledge overenthusiastic indulgence in the search for predictors of shoulder girdle pain is unjustified and may be counterproductive. The lack of specificity is likely to lead to the exclusion of people who will never develop shoulder girdle pain, and obviously this practice could counterbalance any reduction in sickness absence which may be achieved by the procedure of excluding from work those deemed to be at risk.

Once shoulder girdle pain has developed, it is important to select the right therapy to reduce the handicap and prevent recurrence; indeed at the present state of knowledge such selection and prevention may prove to be a more practical proposition in many cases than either primary or secondary prevention. One of the problems is that many practitioners who encounter shoulder girdle pain among their patients are unable to identify with certainty the physical signs which help diagnose the exact site of the lesion, either in relation to a cervical segment (38) or in the shoulder region itself (10). It follows that therapy for shoulder girdle pain is likely to be as haphazardly selected by different therapists (7, 30) as it appears to be for pain in the lower back (11). Not only is there a need to tighten up on diagnostic techniques, but, once this has been done, randomized trials of different therapies are required as a matter of urgency.

For those who have the misfortune to develop chronic shoulder girdle pain to such a degree that handicap, as defined by the World Health Organization (36), ensues and there is significant interference with work patterns, there may be merit in accepting such a state of affairs early rather than late. Prolonged unsuccessful treatment may be counterproductive in that it can lead to a shoulder girdle fixation with psychosocial overlay (27). This situation is particularly likely to occur in the present state of therapeutic knowledge since there is a temptation to switch to more and more exotic therapies in order to be seen to be showing concern. Furthermore rehabilitative measures and retraining for more suitable work become progressively more difficult as time passes. However it must be remembered that rehabilitation is unlikely to achieve success as long as there is any question of litigation. It is indeed unfortunate that, in the present state of uncertainty about the possible causal relationship between work conditions and pain in this region, the settlement of claims speedily, which might help reduce chronicity, remains outside the control of the medical profession.

Conclusion

There seems little doubt that the shoulder girdle pain described in this paper presents a substantial problem to those engaged in occupational medicine and the workforces for whom they are responsible. However continuing lack of consensus about the terminology of syndromes leading to shoulder girdle pain makes it difficult to compare the results of the survey used as the main background information in this paper with similar information from elsewhere, except in a most superficial way. There is also a danger of overlap between some of the painful syndromes ascribed to the shoulder girdle and those sited elsewhere in the back. This possibility means that, at least for the present, this field of study is likely to be confined to

a few enthusiasts and that their findings may be regarded with scepticism or even suspicion by those involved in other, more broadly based health problems related to occupation.

One measure which might be helpful in resolving these issues would be for those concerned with the problem to meet and agree on terminology. It would obviously be useful if such a meeting could be held under the auspices of the World Health Organization so that any agreement reached could be reflected in the rubrics of the International Classification of Diseases.

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