

INCIDENCE OF HYPERSENSITIVE AREAS IN POSTERIOR SHOULDER MUSCLES

A SURVEY OF TWO HUNDRED YOUNG ADULTS

ANDRES E. SOLA, M.D., USAF (MC)¹, MIRIAM L. RODENBERGER, CAPT.,
USAF (WMSC), AND BETTY B. GETTYS, 1ST LT., USAF (WMSC)²

Myofasciitis as a clinical entity represents one of the most frequent problems seen by the physician, but it has not, until recently, received the attention it deserves. This has been due, perhaps, to the wide variety of clinical symptoms it may present, the diffuse and variable nature of the pain, and its often stubborn lack of response to treatment. The term "myofasciitis" is preferable over such less exactly descriptive terms as muscular rheumatism, fibrositis, myositis, fasciitis and myalgia, although these are often used to describe essentially the same clinical entity. The myofasciitic syndrome may present a wide variety of clinical symptoms. These include pain, stiffness, limitation of motion, tremors, weakness, and other manifestations of autonomic nervous system dysfunction. These changes may be present as alterations of the sweat pattern, paraesthesias, and local changes in skin temperature. But the chief complaint of the patient is usually pain. This pain may vary in quality and intensity from a low grade discomfort to a type of pain which is severe and incapacitating and which is frequently associated with a deep burning, aching sensation.

This myofascial pain has recently been the subject of intensive investigation. Travell and Rinzler (1), Gutstein (2) and others have done much to demonstrate the high incidence of its occurrence as a clinical entity and have outlined an effective regimen for its treatment. They have demonstrated the presence, in such cases, of small abnormally sensitive areas of tenderness in muscle or other connective tissue. These sensitive points, upon pressure or other local stimulation, appear to "trigger off" the myofascial pain syndrome. For this reason they have been designated "trigger points". The pain pattern arising from stimulation of a trigger point may be relatively local in distribution or may radiate, or be referred, to a site at some considerable distance from the point of stimulation.

It has been hypothesized that upon stimulation of the trigger point impulses arise to bombard the central nervous system. If the stimulation exceeds the threshold, a reflex cycle is set up whereby the sensation of pain may be referred to another area. These reference sites do not follow the well-known peripheral sensory nerve patterns, and this has led to delay in their acceptance as an objective finding. However, the constancy of the patterns of reference is such as to have forced their recognition as a clinical entity. Such variations as are noted may

¹ Formerly Chief, Physical Medicine Service, Lackland Air Force Base, San Antonio, Texas. Present address: 1718 Wetmore, Everett, Washington.

² With the assistance of Suzanne E. Downing, 1st Lt., USAF (WMSC), Barbara D. Gray, 1st Lt., USAF (WMSC), and Lorraine E. Stuckman, 1st Lt., USAF (WMSC). Received for publication September 15, 1954.

be explained on the basis of the degree of injury present and/or the type of musculo-fascial tissue involved. Travell and Good have also carefully outlined these pain patterns with their reference sites, and their work represents a close approximation of the more common trigger areas.

A recent clinical study of 100 cases of myofasciitic shoulder and neck pain conducted in the Physical Medicine Service of the 3700th USAF Hospital at Lackland Air Force Base was reported by Sola and Kuitert (3). Each patient was given a careful manual examination for the presence of trigger points in the associated soft tissues. These were recorded on an outline chart along with notes concerning the character of the pain elicited, whether this was local or referred, and, if referred, the area of referral. In the course of examining these patients it was observed that, in addition to the presence of "active" trigger points which contributed to the patient's clinical symptoms, other acutely tender points were also frequently found. These, although producing local or referred pain upon stimulation, did not contribute to the patient's symptomatology. They were observed to occur most frequently at sites where mechanical stress in the muscles appeared to be greatest.

These observations led to the question of the possible existence of these "latent" trigger points in asymptomatic individuals, where, upon being subjected to the physiological insult of strain, chronic fatigue, chilling, or other irritating stimuli, they might serve as the source of clinical symptoms. It was decided, therefore, to survey a group of unselected, asymptomatic individuals for the presence of such trigger points, their location, and their ability to produce, upon local stimulation, local, radiating, or referred pain.

Accordingly a questionnaire was developed which included information concerning weight, height, and age; history of head, neck, chest, or upper extremity pain; injuries incurred, with description of residual symptoms, if any, illnesses, brief clinical history, trigger points found, with the amount of pressure required to elicit pain, description of this pain (local, radiating, or referred) and its characteristics. The back of the questionnaire presented outline silhouettes of the human head, trunk, and upper extremities projected in anterior, posterior, and lateral views. Subjects for the survey were 200 unselected basic airmen (100 male, 100 female), obtained by requesting the assignment for this purpose, of flights chosen at random from the Basic Military Training Squadrons of Lackland Air Force Base. These individuals fell into a relatively narrow age range, with males ranging in age from 17 to 27, and females from 18 to 35. The greatest numbers of individuals fell into the younger age groups. Median age for the 200 individuals was 19; the Mean age, 19.5.

SURVEY PROCEDURE

Subjects were interviewed individually by Physical Therapists, and histories were recorded on the questionnaire form. Each subject was then examined manually for the presence of hypersensitive areas, which will be referred to as trigger points, although they may or may not cause clinical symptoms. The following muscles: trapezius, infraspinatus, supraspinatus, levator scapula, scalenes,

teres major and minor, and rhomboid major and minor were examined and marked with red "X" 's on the outline drawing mentioned above. Areas of radiation of referral were delineated and cross-hatched in blue. On the front of the questionnaire the involved muscle was checked and marked left or right, the amount of pressure noted, and the type of pain checked and briefly described. These examinations were carried out and recorded by teams of Physical Therapists, who had been given special training in the method of examination. Results were checked by the Chief of the Physical Medicine Service.

STATISTICAL RESULTS

The completed questionnaires were then subjected to statistical procedures with the following results: Of the 200 subjects examined, 99 or 49.5% were found to have one or more trigger points. Taken separately by sex, the female group showed a somewhat higher incidence, with 54 of the 100 female patients having positive findings. Radiating or referred pain could be demonstrated in 25, or 12.5% of all subjects. Here the sex difference was insignificant, as such pain could be demonstrated in 13% of the females and 12% of the males.

It was further observed that trigger points tended to occur in multiple rather than isolated phenomena affecting only one muscle. Of the 99 subjects having trigger points, 62, or 62.5%, had more than one. This trend was more pronounced among the male subjects where multiple trigger points occurred in 73.3% of the 45 males with positive findings. Of the 54 females with positive findings only 53.6% had multiple trigger points.

The incidence of trigger points was found to be significantly higher in certain

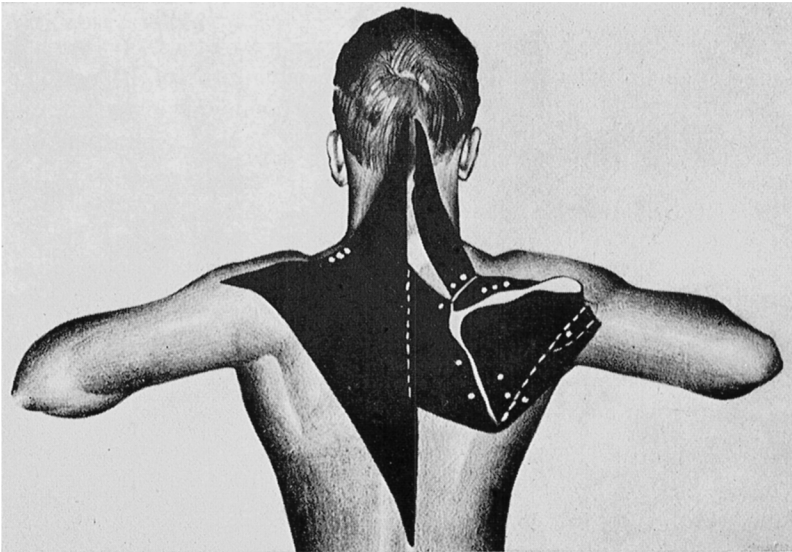


FIG. 1. Illustration, with white dots, showing the most frequent location of the hyper-sensitive areas in the posterior shoulder muscles. These correlate with the trigger points found in clinical myofasciitis.

muscles. Of the 253 trigger points occurring in the 99 positive subjects, 84.7% occurred in four muscles, the trapezius, levator scapula, infraspinatus, and scalenes, in that order. Thirty-four and seven-tenths per cent occurred in the trapezius, 19.7% in the levator scapula, 18.5% in the infraspinatus, and 11.6% in the scalenes, with the remainder scattered through the other 5 muscles. There was also a tendency for trigger points to occur bilaterally in a given muscle. Here again the trapezius was the chief offender. Among 57 individuals having trigger points present in the trapezius, 38 were affected bilaterally, 14 on the right only, and 5 on the left only. The same tendency was reflected in the levator scapula, where 19 of 33 subjects were affected bilaterally, and in the infraspinatus where 12 of the 35 subjects showed bilateral involvement (fig. 1). Handedness appeared to be a factor only among the females and was marked only where there was involvement of the infraspinatus or scalene muscles. It was noted that of 19 trigger points found in the infraspinatii of female subjects, 16 were found on the right and 3 on the left; of 14 trigger points found in the scalene muscles of female subjects, 12 occurred on the right and 2 on the left.

DISCUSSION

The incidence of these tender areas, or trigger points, in the various muscles can be most easily accounted for on the basis of mechanical stress. Trigger points tend to develop with regularity in certain portions of a given muscle. In the trapezius one finds trigger points occurring with regularity at the angle of the neck, or, literally, where the muscle attempts an angle. In the levator scapula the trigger area corresponds with the greatest point of mechanical stress, the attachment of the muscle on the upper medial border of the scapula. Here the muscle must take the strain of the weight of the inclined head, a habitual position among office workers. An increased dorsal kyphosis serves to intensify this strain as do repetitive fatiguing shoulder movements or positions. The infraspinatus is most frequently involved along its attachment on the lateral border of the scapula. This may be the most active part of the skeletal portion of the muscle.

Mechanical stress on a muscle can be due either to acute injury or to the repetitious microtraumata of daily living. On such a substrata, multiple stress factors can so lower the threshold as to precipitate a painful lesion. Despite the fact that these myofascial points of tenderness can and do occur in any part of the musculo-skeletal system, one with any experience in the treatment of these entities quickly comes to recognize the somewhat orderly pattern of their incidence. Sub-clinical lesions such as those found in this survey must be considered to be forerunners of potential clinical trigger points even though at this time they manifest only local tenderness either with or without pain referral. The relatively high incidence (roughly 50%) occurring in this particular age group is somewhat surprising. Previous experience indicated that this syndrome was most frequent in the middle age group or older. It is probable that this entity may have an insidious onset at an early age.

A previous study of clinically symptomatic lesions as found in 100 cases of

TABLE 1

Muscle	Survey (99 subjects), % Involved	Previous Clinical Study (100 sub.) % Involved
Trapezius.....	34.7	2
Levator Scapula.....	19.7	55
Infraspinatus.....	18.5	31
Scalenes.....	11.6	
Rhomboids.....	8.9	2
Supraspinatus.....	3.8	3
Teres Major and Minor.....	2.8	7

neck and shoulder pain offers an interesting basis of comparison (table 1). This clinical study, which was conducted with a slightly older age group, showed the trapezius involvement to be minimal. It was our impression that the trapezius had a high percentage of these hypersensitive tender points, although not contributing greatly to active clinical lesions. The incidence of involvement of the levator scapula and infraspinatus indicates a future trend of involvement of these muscles in clinical lesions at an earlier age than the trapezius.

The survey indicated that the three most frequently involved muscles of the upper shoulder girdle are the trapezius, the levator scapula, and infraspinatus. As yet in this young age group the trapezius was not involved as much as the other two muscles. However, Travell (4) has pointed out that this muscle is one of the most frequent sites of active clinical lesions, but usually found so in older age groups.

As previously reported, myofasciitis seems to occur more commonly in certain individuals. It is commonly seen in individuals with a rheumatic diathesis, and frequently heralds the approach of collagenous diseases. Individuals who suffer from vaso-motor instability are particularly prone to this disease. There seems to be a definite increased incidence in sedentary workers. Myofasciitis may reflect organic disease in a particular segment if it does not respond to treatment. Finally, there is much clinical evidence to indicate that these trigger points act as sympathetic excitants and accentuate autonomic dysfunction. As such, they would respond readily to any stress factors, especially those of psychic origin.

SUMMARY

Two hundred unselected basic airmen (100 male and 100 female) were studied for the incidence of hypersensitive areas in shoulder girdle muscles among asymptomatic persons. Such areas (trigger points) were found in 54% of the female subjects and 45% of the male subjects. Radiating or referred pain could be demonstrated in 12.5% of all subjects. Trigger points tended to occur in multiple, rather than as isolated, phenomena affecting a single muscle. Sixty-two per cent of the subjects having positive findings had more than one trigger point. The incidence of trigger points was higher in certain muscles. Of the trigger points noted (25), 84.7% occurred in four muscles, trapezius, levator scapula, infraspinatus, and scalenes, with frequencies in that order. A comparison with a

previous clinical study of shoulder lesions indicated that there is a definite correlation between asymptomatic hypersensitive areas and clinical myofasciitis.

REFERENCES

1. TRAVELL, J., AND RINZLER, S. H. Myofascial genesis of pain. *Post Grad. Med.*, **11**: 425-434, 1952.
2. GUTSTEIN, M. Diagnosis and treatment of muscular rheumatism. *Brit. J. Phys. Med.*, **1**: 302, 1938.
3. SOLA, A. E., AND KUITERT, J. H. Saline injections in the diagnosis and treatment of myofascial trigger point pain of the neck and shoulder, report of 100 cases. (To be published).
4. TRAVELL, J. Rapid relief of acute "stiff neck" by ethyl chloride spray. *J. A. M. Women's A.*, **4**: 89-95, 1949.