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MEASUREMENT OF SKIN MOBILITY IN THE UPPER BACK

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ABSTRACT. On manual testing for skinfold tenderness greater resistance has been reported in patients with marked skinfold tenderness. On objective measurement of skin mobility, by raising a skinfold with a vacuum pump and by establishing a stress/strain curve, no difference in skin mobility was found between subjects with and without skinfold tenderness. Furthermore, contrary to manual testing, the suction testing causes no pain in subjects with clinical skinfold tenderness. In a second series of suction tests, comparing skin mobility in a subject with relaxed and contracted underlying muscles, it was found that muscular contraction reduces skin mobility by 50 %. The conclusion is that resistance felt by manual skinfold testing is not inherent in the structures, but is caused by contraction of underlying muscles because of pain caused by the manual skinfold test.

Key words: skinfold tenderness, panniculosis, fibrositis

BACKGROUND

As early as in 1900, a Swedish physician described a painful rheumatic condition with tenderness of the subcutaneous tissues under the name of panniculitis (7). He attributed the findings to an inflammatory process of the subcutaneous structures. Since that time, many articles have appeared in the European literature repeating the description of the clinical findings but differing in their assessment of pathology (1, 4, 5, 6, 8, 9). The prevailing opinion now is that there is no detectable pathology in the subcutaneous tissues. In the United States, this condition is synonymous with fibrositis, or myofascial pain, two clinical syndromes, which also lack pathological documentation (2, 3).

The clinical diagnosis is made by the skinfold test. This consists of raising a fold of skin with thumb and forefinger (Fig. I). If the test is positive, the patient complains of excruciating pain and the examiner feels a considerable resistance to raising of the skinfold. The resistance has been attributed to pathological adhesion of the skin to deeper structures. Our hypothesis is that the resistance felt may be due to muscular contraction in response to pain.

PURPOSE

The purpose of this study is to determine by measurement, (1) the difference of adherence to deeper structures in subjects *with* and *without* skinfold tenderness and (2) in subjects with *relaxed* and *contracted* underlying muscles.

METHOD OF MEASUREMENT

A bell-shaped chamber with an opening of 3 cm and connected to a hand vacuum pump (Fig. 2) is placed over the skin area to be tested and a skinfold is raised into the chamber by producing a vacuum. The degree of negative pressure which ranges from 0 to 50 cm of mercury is read off the pressure gauge. A dial micrometer gauge, whose stem is in contact with the skin, permits one to read the upward displacement up to 2.5 cm. The raising of the skinfold was painless even for patients with severe skinfold tenderness. Tests were done in the upper dorsal area. The edge of the chamber opening is placed 2 cm to the right or left of the spinous process of D-4 (Fig. 3).

Phase I: Comparison of subjects with and without skinfold tenderness

Nine subjects were tested to the right and left of D-4 before and after treatment, for a total of 36 tests. Before treatment, the skinfold tenderness was severe and adhe-

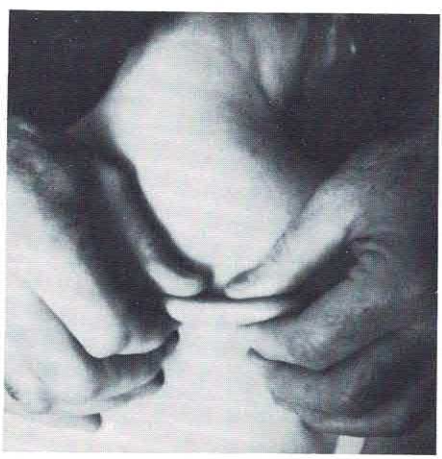

Fig. 1. Test for skinfold tenderness.

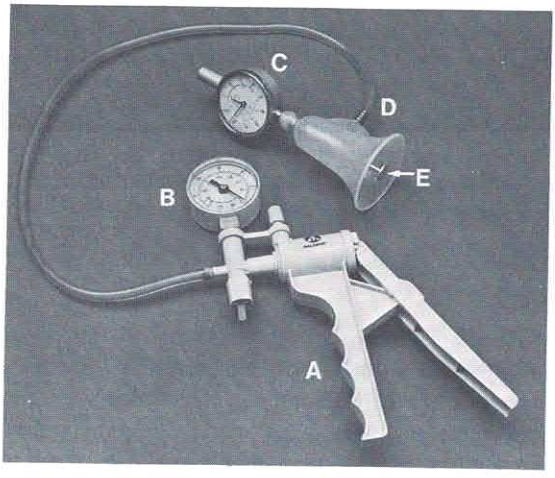

Fig. 2. Apparatus for measurement of skin mobility. (A) Hand vacuum pump. (B) Pressure gauge. (C) Dial micrometer gauge. (D) Chamber. (E) Stem of micrometer gauge.

sion of the skin was noted. After treatment by skin rolling massage, the skinfold tenderness ranged from moderate to zero, and the skin felt loose to the examiner.

Results

The skin displacement was recorded for a vacuum of 10, 20, 30 and 40 cm of mercury. A typical finding is recorded in Fig. 4.

It can be seen that after disappearance of skinfold tenderness there has been no increase in skin mobility, but rather an apparent decrease. This finding was similar for all nine subjects.

Phase II: Comparison of skin mobility with relaxed and contracted muscles

Six subjects were studied by the standard procedure with the vacuum bell applied to the right of D-4, first with the right arm relaxed, then with the right arm abducted, holding a five pound bar bell (Fig. 3).

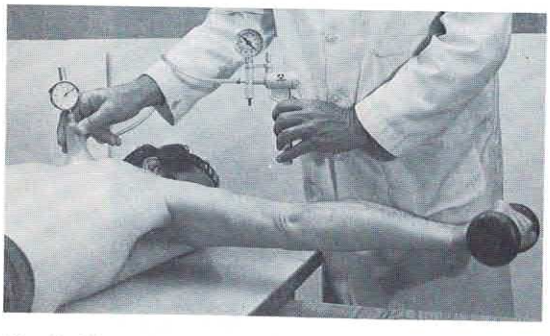

Fig. 3. Measurement of skin mobility with contracted muscles.

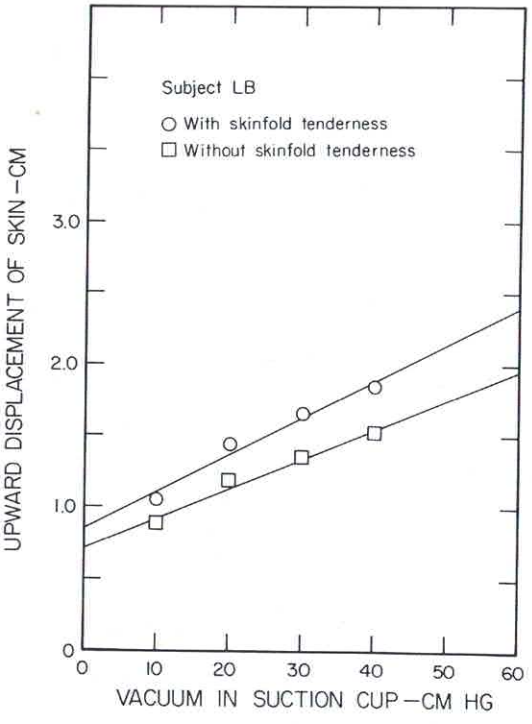

Fig. 4. Graph of skin displacement as function of negative pressure with skinfold tenderness and without skinfold tenderness.

Results

The skin displacement was recorded for a vacuum of 10, 20, 30 and 40 cm of mercury. A typical finding is reported in Fig. 5.

It can be seen that the skin displacement is reduced by nearly 50% in the case of muscular contraction.

Statistical treatment of data

The data for each subject were graphed with the upward displacement of skin on the vertical axis and the level of vacuum in the suction chamber on the horizontal axis. A straight line was fitted to the data by the least squares procedure. Examples are shown in Fig. 4 and Fig. 5.

The average intercept with the y-axis of the lines obtained on nine subjects before treatment was 1.35 cm with a standard deviation of 0.23 cm. The average slope of these lines was 0.024 cm/mmHg (SD = 0.0043 cm/mmHg). After treatment, the average intercept was 1.37 cm (SD = 0.19 cm) and the average slope was 0.021 cm/mmHg (SD = 0.0038 cm/mmHg). These statistics show that the presence or absence of skinfold tenderness is independent of skin mobility measured by this suction chamber method. For the six subjects in the weight lifting study the average intercept when the arm was at rest was 1.26 cm (SD = 0.21 cm), and the average slope was 0.023 cm/mmHg (SD = 0.004 cm/mmHg). When lifting the weight the average intercept was 0.65 cm (SD = 0.48 cm) and the average slope was 0.025 cm/mmHg (SD = 0.008

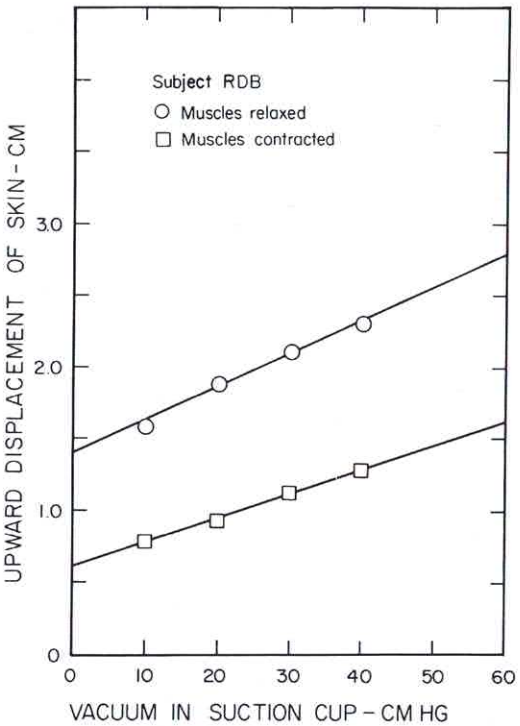

Fig. 5. Graph of skin displacement as function of negative pressure with relaxed muscles and contracted muscles.

cm/mmHg). This reduction in intercept due to holding the weight is significant at the 95% confidence level, but the slope is not significantly different from the no-weight data.

DISCUSSION

1. From these data, it appears that there is no pathological adherence present in patients who have skinfold tenderness. It seems most likely that the pain produced by the manual examination causes reflex muscular contraction, which in turn gives the examiner the impression of greater adherence.

2. The fact that an elevation of the skin by vacuum to 2.5 cm causes no pain, would indicate that the pain is not produced by elevating the skin, but by compressing the skin. Thus, the finding of skinfold tenderness is no different from that of tender points where pressure of the skin causes discomfort. This explains why tender points and skinfold tenderness are usually found in the same subject.

3. This study also reinforces the theory that in the Fibrositis-Panniculosis Syndrome there is no structural pathology and that it is a disorder of pain perception.

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