

## THE NEEDLE EFFECT IN THE RELIEF OF MYOFASCIAL PAIN

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### SUMMARY

In reviewing techniques for therapeutic local anaesthesia of pain spots, it appeared that the common denominator was puncture by the needle and not the anaesthetic employed. The present study examines short- and long-term effects of dry needling in the treatment of chronic myofascial pain. 241 patients and 312 pain sites were treated by needling. When the most painful spot was touched by the needle, immediate analgesia without hypesthesia was observed in 86.8% of cases. Permanent relief of tenderness in the needled structure was obtained for 92 structures; relief for several months in 58; for several weeks in 63; and for several days in 32 out of 288 pain sites followed up.

The effectiveness of treatment was related to the intensity of pain produced at the trigger zone, and to the precision with which the site of maximal tenderness was located by the needle. The immediate analgesia produced by needling the pain spot has been called the "needle effect".

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### INTRODUCTION

The analgesic effect of acupuncture has become the object of intensive research. Other types of painful stimulation such as electrical pulses applied through needles or surface electrodes [9,10] have been compared to classical acupuncture. Two different approaches appear logical: (1) to examine how these painful stimuli may best be applied, and (2) to determine the sites at which they are most effective.

Melzack [9] showed that brief, intense electrical stimuli were highly effective in controlling some forms of severe, chronic pain. Chia et al. [2] compared classical acupuncture and tender area needling. They obtained similar results with the two methods and concluded that it was necessary to ensure maximal input to the central nervous system. Travell and Rinzler [11] had previously observed that myofascial pain was sometimes abolished

by needling, and Melzack et al. [10] found a substantial correlation between classical acupuncture points and the trigger areas described by Travell and Rinzler.

Dry needling has been an exception in medicine; for relief of most types of focal pain, infiltration with local anaesthetics remains the rule [3]. However, infiltration of pain foci and trigger points as well as of nerves and nerve roots is widely used not only to obtain short-term relief of pain but to achieve lasting therapeutic effects. Although the local anaesthetic agents used for infiltration produce anaesthesia for only a few hours, the therapeutic effect which follows may be prolonged or even permanent. This is all the more astonishing as various types of anaesthetic have virtually the same effect, and the quantity and concentration of solution injected do not seem to be critical [7]. Hackett [4] and Barbor [1] obtained relief of ligamentous pain by injecting sclerosing solutions at the insertions of ligaments. Even subcutaneous injection of air or gas has been effective [7].

In our own clinical work, we became aware that infiltration was most effective if we were able to locate precisely the most painful spot. Furthermore, using the method of Hackett [4] and Barbor [1], if we penetrated exactly the insertion of a painful ligament, it appeared that mechanical irritation with the needle was sufficient and no sclerosing solution was necessary. We thus gradually realised that in large part our therapeutic results were due neither to the anaesthetic nor to the sclerosing solution, but to needling per se, provided this was done at the point of maximum pain. In practice, this point can be recognized simply by observing the patient's behaviour while probing with the needle. A pronounced and irrepressible pain reaction is always seen when such a point is touched. The striking phenomenon which usually follows has been termed the "needle effect" (NE): immediate complete analgesia of the pain spot, without hypesthesia.

This study describes our recent experience with dry needling in the treatment of myofascial pain. Therapeutic effects are assessed by the following criteria: (1) presence or absence of NE, (2) duration of pain relief, and (3) improvement in function.

## MATERIALS AND METHODS

The study group consisted of 241 patients (81 male, 160 female) treated during 1975 and 1976 for a variety of painful myofascial and vertebrogenic disorders; the age range was 12–71 years.

All patients were treated by dry needling, the treatment frequently being applied to more than one structure. The needles used were in general the smallest and finest capable of reaching the structure involved. It was thus possible to use acupuncture needles, for example, at the posterior arch of the atlas. For more deeply situated structures such as the sacroiliac ligaments, we chose needles of the type employed for lumbar puncture; these were sufficiently long to reach the structure yet stiff enough to prevent deformation by the tissues. This type of needle was also used to penetrate scars, because



**Fig. 1. Palpation of the posterior arch of the atlas.**

the pain spots were often situated in particularly dense parts of the scar, where acupuncture needles would be useless.

Sites of maximum pain were located in various ways. Both physician and patient palpated the painful region and any nearby muscle spasm was noted.



**Fig. 2. Position of the needle on the posterior arch of the atlas.**

This was demonstrated particularly well on the posterior arch of the atlas. Pain spots there were palpated with the patient supine, the head flexed and supported by the examiner (Fig. 1). When this structure was painful, muscle spasm of the obliquus capitis inferior could always be felt. The needle was inserted laterally until the transverse process was detected, and then advanced in a posteromedial direction along the posterior arch of the atlas to the site of maximal pain, as evidenced by the patient's response. At this point, the needle was left in place (Fig. 2) and palpation of the posterior arch was repeated to ensure that muscle spasm had subsided. If there was still spasm, the position of the needle was altered to achieve the typical reaction. When the correct spot was reached, spasm was noted to be greatly diminished.

In some instances, pain spots and muscle spasm were not evident by palpation. Ligament pain was detected by manoeuvres to produce tension in ligaments. These were then needled at their points of insertion. In appropriate cases, straight leg-raising was performed before and after needling of a painful skin fold between the toes; evidence of success at this site was a disappearance or reduction of Lasègue's sign.

TABLE I

## STRUCTURES TREATED AND IMMEDIATE EFFECT OF DRY NEEDLING

The Huneke phenomenon refers to subsidence of seemingly unrelated symptoms after needling of a scar, as described in the text.

| Needling site            | Effect    |                   |           |       |
|--------------------------|-----------|-------------------|-----------|-------|
|                          | Analgesia | Huneke phenomenon | No effect | Total |
| Posterior arch of C1     | 55        | —                 | 6         | 61    |
| Scars                    | 33        | 22                | 2         | 35    |
| Pelvic ligaments         | 23        | —                 | 3         | 26    |
| Ribs                     | 18        | —                 | 4         | 22    |
| Spinous process of axis  | 16        | —                 | 3         | 19    |
| Other spinous processes  | 18        | —                 | 4         | 22    |
| Levator scapulae         | 16        | —                 | 3         | 19    |
| Ischial tuberosity       | 13        | —                 | 1         | 14    |
| Interdigital fold        | 11        | —                 | 3         | 14    |
| Head of fibula           | 10        | —                 | 1         | 11    |
| Biceps tendon            | 10        | —                 | 0         | 10    |
| Rotator insertions       | 7         | —                 | 0         | 7     |
| Collateral knee ligament | 6         | —                 | 0         | 6     |
| Trapezius muscle         | 5         | —                 | 1         | 6     |
| Acromioclavicular joint  | 4         | —                 | 2         | 6     |
| Radial epicondyle        | 3         | —                 | 2         | 5     |
| Miscellaneous            | 23        | —                 | 6         | 29    |
|                          | 271       | 22                | 41        | 312   |

## RESULTS

The needle effect — immediate analgesia — was obtained in 271 out of 312 painful structures, or 86.8%. The structures treated are shown in Table I. In subsequent follow-up of 288 needled structures, we have obtained a permanent result (insofar as the pain spot or structure is concerned) in 92 structures; relief for several months in 58; for several weeks in 63; and for several days in 32. In 43 cases there was no relief at all. In 10 of the cases where needling gave an unsatisfactory result, hydrocortisone was injected locally. It proved to be effective in 8.

Other therapy (manipulation, traction, remedial exercise, pharmacotherapy) was given to 244 patients at the time of the study. Needling was considered to be the most important single method of treatment in 75 cases, useful in 149 and of no significance in 20 despite subsidence of the pain spot.

## DISCUSSION

Our experience is in full agreement with that of Ghia et al. [2] in that the input produced by stimulation appears to be a critical factor. Intensity of the painful stimulus seems indeed to be crucial for producing the NE.

Comparing the NE with local anaesthesia, the former produces only analgesia, but no hypesthesia. During infiltration, the local anaesthetic spreads and therefore one cannot ascertain whether he has touched the pain spot exactly. After dry needling, on the other hand, the NE is good evidence of success. If it is not obtained, one can immediately correct the position of the needle. Another advantage is that there is no need to fear an anaphylactic reaction if the patient feels unwell after needling, as is often the case following any injection or needle puncture.

Our technique has one feature in common with the therapeutic application of local anaesthetics and such forms of segmental (reflex) therapy [8] as manipulation: after immediate relief, a reactivation of pain may occur several hours later or the following day. This usually lasts for 1 or 2 days, and only then is the full therapeutic effect observed.

When our table of pain spots and trigger zones is compared with those of Travell and Rinzler [11] or Hansen and Schliack [5], or with the periosteal points of Vogler and Krauss [12], it is obvious that there are very many such points and that they have sometimes been chosen arbitrarily, there being no accepted standard. Our own rationale is as follows.

### *(1) Posterior arch of atlas*

The posterior arch of the atlas may be the most important single trigger zone in headaches of cervical origin. The fact that it lies hidden between the occipital bone and the spinous process of the axis, and can only be examined by the technique which we have described, may explain why it has previously escaped attention. In our opinion, most of the pain spots on the occip-

ital squama, which have been considered to be pressure points of the occipital nerve, are in fact referred pain from the posterior arch of the atlas or less frequently from the lateral aspect of the spinous process of the axis.

## **(2) Pelvic ligaments**

The importance of the pelvic ligaments has been stressed by Hackett [4] and Barbor [1]. The points of insertion of these ligaments are not accessible to palpation. One can, however, elicit pain by stretching the ligaments and by needling their insertions.

## **(3) Rib, periosteum**

The periosteum of the ribs is a frequent source of pain, particularly near the costal angle, in the axillary line, in the mammillary line, and at the sternocostal junctions. This is presumably due to overactivity or spasm of the pectoral muscles, as in pseudo-angina.

## **(4) Spinous processes and scapula**

The frequent occurrence of pain around the cervical spinous processes — especially that of C2 — is probably related to their significant supportive role as sites of insertion of the upper cervical muscles. For similar reasons, the insertion of the levator scapulae muscle at the upper border of the scapula is an important pain spot.

## **(5) Ischial tuberosity**

The ischial tuberosity is again an important muscle insertion point and hence a frequent site of pain.

## **(6) Interdigital fold**

The interdigital fold is an important trigger zone in radicular syndromes. Its infiltration is often effective provided there is a zone of hyperalgesia.

## **(7) Head of fibula**

Pain spots at the head of the fibula are often related to painful cramping of the leg, a frequent complaint in patients recovering from acute radicular syndromes.

Many pain spots are located in structures of the musculoskeletal system which bear considerable stress; if there is faulty function, as is the rule in vertebrogenic lesions, pain may be the result of mechanical overstrain. Therefore pain spots are not haphazard but can usually be deduced from careful pathophysiological analysis of the case in question.

Some explanation appears to be necessary for the results in the second largest group consisting of scars with pain spots. The importance of procaine infiltration of old scars was originally noted by Huneke [6], who made the observation that after scar infiltration, symptoms which had no apparent connection with the scar sometimes disappeared. Therefore in dealing with symptoms for which there is no obvious explanation, we look for scars and

examine them for pain spots. Whenever such a spot is located, one can palpate increased resistance to folding or movement. If one infiltrates or simply needles the painful area within the scar, two distinct effects are seen: (1) the resistance within the scar disappears and the scar is no longer painful on folding or movement, and (2) symptoms such as headache or radicular pain, having no apparent connection with the scar, also subside. This latter effect, or "Sekundenphänomen" [6], will be referred to as the *Huneke phenomenon*.

In our group of 35 treated scars, analgesia of the scar alone was obtained in 11; analgesia and the Huneke phenomenon in 22; and no effect in 2 (see Table I). A brief case history will serve to illustrate this phenomenon.

The patient was a 46-year-old male technician who complained of pain radiating down his left leg, aggravated by coughing and sneezing. He had been suffering from recurrent bouts of low back pain and sciatica since 1959, and had become acutely worse in May of 1976. When he came to us in August of that year, he was walking with the aid of canes.

On examination, there was severe sciatic scoliosis, with pelvic tilt and marked lumbar kyphosis. Lasègue's sign was positive at 20° on the left. There was hypesthesia in the L5 distribution, with weakness of the extensor hallucis longus and extensor digitorum brevis. An attempt at mobilisation of the L4—5 segment failed. An old scar was present in the left lumbar region, due to suppuration in childhood; this was very tender to palpation. Needling of the scar was exceedingly painful. Immediately afterward, however, the scoliosis was gone and straight leg raising could be performed to 60°. One week later, the patient was markedly improved and walking without canes, but Lasègue's sign was again present at 30° on the left.

An epidurogram was performed with 60% Conray, revealing massive disc herniation at the L4—5 interspace. Epidural Mesocaine was given at the same time. On September 20th, the patient was symptom-free. There was no longer any weakness, and the remainder of the neurological examination was normal.

This raises a difficult question regarding therapeutic results. The fact that needling is usually only a single, phasic episode in the course of treatment of chronic musculoskeletal disorders makes it difficult to assess long-term effects. From our point of view, the most important aim of therapy is to achieve normal function of muscles and joints. Thus, we treat joint dysfunction by manipulation, and weakness by remedial exercises. If pain still remains, needling can be very effective. When normal function has indeed been achieved, we frequently ensure a permanent result by a single needling procedure. If, however, a significant disorder of function remains, mechanical strain will soon cause relapse. The relief given, whether permanent or only short-term, is determined not only by the effectiveness of needling but by the stage of the disease at which needling is performed. It may happen that needling as such is successful, i.e. that the pain spot we have tested is no longer painful, but that the symptoms persist, which implies that the pain spot was of minor significance. To treat patients exclusively by needling for statistical purposes cannot be justified, because by merely relieving pain, permanent improvement in function is rarely achieved.

In conclusion, dry needling is highly effective in the therapy of chronic myofascial pain. Immediate analgesia without hypesthesia (the needle effect)

can be produced by needling precisely the most painful spot. It is further suggested that the long-term therapeutic effect which has been previously ascribed to local anaesthetics may in fact be due to needling.

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