Acupuncture in treatment of facial muscular pain

Anders Johansson, Bengt Wenneberg, Curt Wagersten and Torgny Haraldson

Department of Stomatognathic Physiology, Faculty of Odontology, University of Gothenberg, Gothenburg, Sweden

Johansson A, Wenneberg B, Wagersten C, Haraldson T. Acupuncture in treatment of facial muscular pain. Acta Odontol Scand 1991;49:153–158. Oslo. ISSN 0001–6357.

Forty-five individuals with long-standing facial pain or headache of muscular origin were randomly allocated into three groups. The first group was treated with acupuncture, the second group received an occlusal splint, and the third group served as controls. Both acupuncture and occlusal splint therapy significantly reduced subjective symptoms and clinical signs from the stomatognathic system. No differences between these two groups were found with regard to treatment effects. It is concluded that acupuncture is an alternative method to conventional stomatognathic treatment for individuals with craniomandibular disorders of muscular origin. □ *Clinical trial; craniomandibular disorders; headaches; masticatory muscles; occlusal splint*

Bengt Wenneberg, Department of Stomatognathic Physiology, Faculty of Odontology, University of Göteborg, P.O. Box 33070, S-400 33 Göteborg, Sweden

Acupuncture is an ancient method of treating illness and pain, which was originally used in traditional Chinese medicine. During the past few decades research has explained some of the basic fundamentals in the working mechanism of acupuncture. The 'gate control theory' and the endorphin systems are some of the physiologic mechanisms involved (1, 2). Animal and human studies have demonstrated the efficacy of the procedure (3–5). Acupuncture is therefore more widely accepted today. In 1984 the Swedish National Board of Health and Welfare stated that 'acupuncture is a scientifically proven treatment modality with reliable experience' (6). On the basis of the present scientific progress the indications for acupuncture are limited to the treatment of chronic pain and the induction of analgesia (5). Acupuncture, however, does not seem to be an alternative to chemical analgesic drugs (6, 7), owing to the slow and uncertain onset of analgesia. Studies evaluating acupuncture in the treatment of pain in the dental field are few and mostly lack controls (9–16).

Occlusal splint therapy has shown a high success rate, in both short- and long-term studies in the treatment of several craniomandibular disorders (CMD) (17). A pilot study using acupuncture in the treatment of patients with chronic facial pain resistant to conservative stomatognathic treatment (occlusal splints, occlusal adjustment, or physical exercises for the lower jaw) showed favorable results (16), especially in those patients with a suspected muscular origin of the pain.

The aim of the present study was to compare acupuncture and occlusal splint therapy with no treatment in individuals with headaches and/or facial pain due to muscle tension.

Patients and methods

Patient selection

Forty-five individuals were selected from a consecutive series of patients referred to the Department of Stomatognathic Physiology to match the following criteria: 1) a

history including signs and symptoms of CMD; 2) complaints of headache and/or facial pain; 3) clinical examination demonstrating tenderness to palpation in the masticatory muscles; 4) exclusion of individuals with psychologic/psychogenic factors, trauma, surgery, or systemic joint, muscle, or skin diseases influencing the symptoms; 5) exclusion of pathologic conditions in temporomandibular joints (TMJs), facial skeleton, or teeth by means of a panoramic radiographic examination in all participating individuals; 6) the presence of a complete or almost complete complement of natural teeth (single crowns were permitted); and 7) the absence of previous acupuncture or stomatognathic therapy for treatment of the disorder in the individuals selected.

Forty-five patients meeting the above criteria were randomly divided into three groups: acupuncture treatment (A group), occlusal splint therapy (B group), and control group (C group). Each group comprised 15 patients.

In the A and B groups the patients were examined before and 3 months after treatment. The C group was examined at the first visit and then reexamined after 2 months. The examiner was unaware of which group the patient belonged to.

The severity of the subjective symptoms was assessed by the patients and a subjective dysfunction score (SDS) was assigned as follows: 1) no pain; 2) mild pain; 3) moderate pain; 4) severe pain; and 5) very severe pain.

The subjective symptoms were also estimated in accordance with a 100-mm linear-measuring visual analogue scale (VAS). The beginning of the scale corresponded to 'no pain' and the end to 'very severe pain'; that is, the patients determined their position on the VAS corresponding to their present complaints. The SDS and VAS were assessed before treatment and at the follow-up in all three groups.

The subjective symptoms after treatment in groups A and B (3-month evaluation) and the changes of the symptoms in group C (2-month evaluation) were individually assessed in accordance with the following scale: impaired, unchanged, improved, or symptom-free.

Assessment of clinical signs

Clinical examination of the stomatognathic system was performed before treatment and at the follow-up in the two treatment groups and in the C group. Routine examination methods were used, including examination for tenderness to palpation of the TMJ and masticatory muscle regions, TMJ sounds, mandibular movement capacity, pain during mandibular movements, deviation of the mandible during opening of the mouth, and occlusal conditions including occlusal interferences (18). The severity of the clinical signs were estimated by means of the clinical dysfunction score (CDS) in accordance with Helkimo (19).

Acupuncture treatment

Acupuncture treatment was administered by a dentist experienced in acupuncture, with sterile stainless steel needles (0.2 × 15 mm and 0.3 × 50 mm, Seirin, Sonesta AB, Rönninge, Sweden) in the painful area (local points) and in a 'strongly reacting' site (distal point). Three to seven needles were used locally and one distally. The points used were those considered to be effective for treatment of headaches and/or facial pain (20, 21). The point used distally was 'large intestine 4 (Li 4)', also called Hegu. Manual stimulation was done with rotation and some lifting and thrusting of the needle. Each session had a duration of 30 min. Three stimulations were given in each session until the 'Qi-feeling', a sensation of deep muscle pain, heaviness, and tingling in the surrounding area, was felt. A total of six acupuncture treatment sessions were conducted.

Occlusal splint therapy

Splint therapy was performed with a maxillary full-coverage acrylic resin occlusal splint (22). The splints were adjusted to a stable occlusion in the retruded and the intercuspal position. Contact movements on the splints were smooth, unrestricted, free of nonworking-side interferences and single

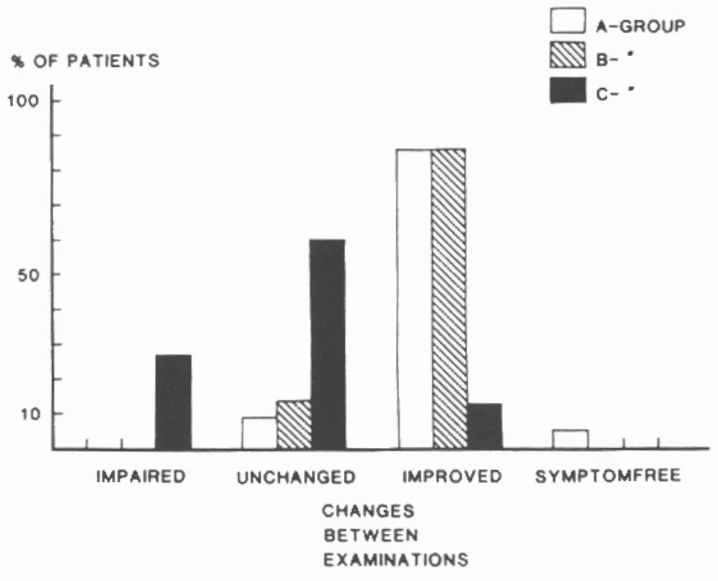

Fig. 1. Changes of facial pain and headache after treatment in three groups of patients with facial muscular pain. The A group received acupuncture; the B group received an occlusal splint; and the C group received no treatment.

contacts distal to the canines on the working side. Additional adjustments of the splints were made 2 weeks later.

Statistics

Differences in subjective and clinical variables between the initial examination and the follow-up were tested with the Wilcoxon matched-pairs signed-rank test (23). Differences between groups were tested with the Mann–Whitney U-test (23).

Results

Effects on subjective symptoms

At the first examination no statistically significant differences between the three groups were found with regard to the SDS, VAS, or duration of pain.

Ninety per cent of the individuals in the A group and 86% in the B group showed a subjective improvement after treatment. The improvement in the A and B groups was statistically significant compared with the C

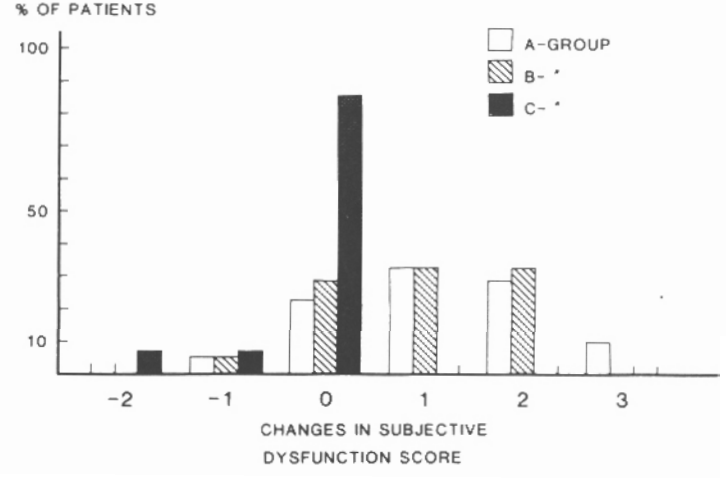

Fig. 2. Changes in subjective dysfunction score after treatment. Changes refer to a five-point scale used before and after treatment. Positive numbers mean a reduction (improvement) and graded numbers an increase (aggravation) of the score.

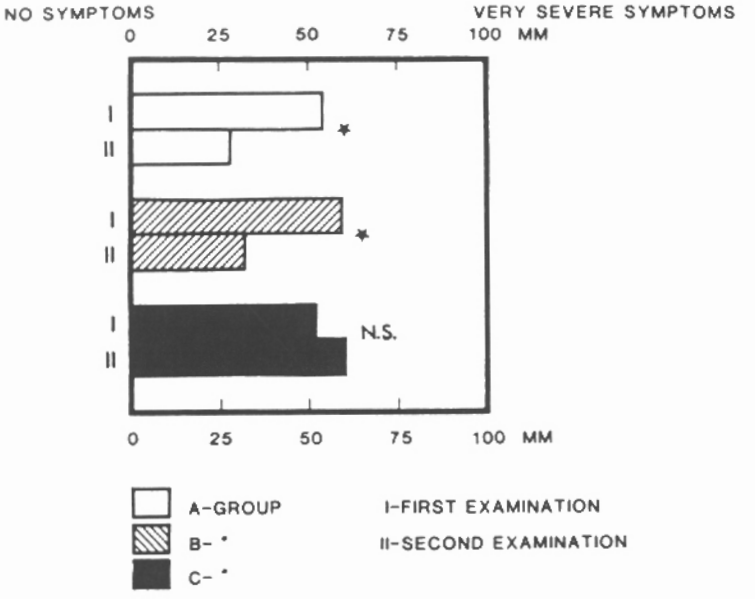

Fig. 3. Mean values (in millimeters) of patients' markings on visual analogue scales (VAS) before (first examination) and after (second examination) treatment. $^*p < 0.05$; N.S. = not significant.

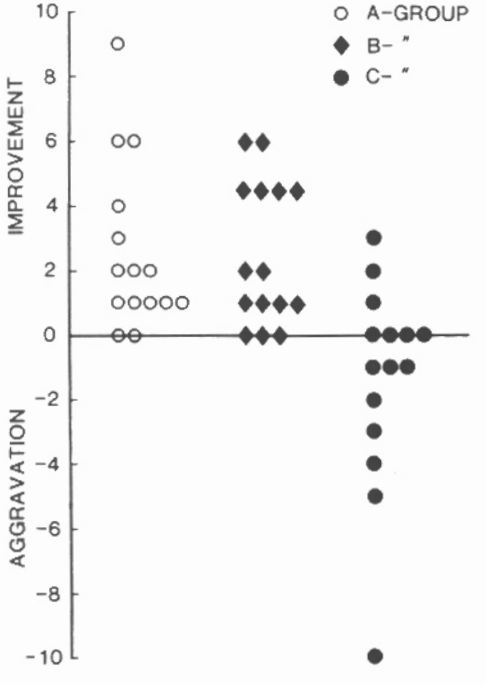

Fig. 4. Changes in clinical dysfunction score (graded 0 to 25) after treatment. Positive numbers mean a reduction (improvement) and graded numbers an increase (aggravation) of the score.

group ($p < 0.01$). No significant differences were found between the A and B groups (Fig. 1).

The SDS and the VAS showed statistically significant decreases in the scores in both A and B groups after treatment (Figs. 2 and 3) ($p < 0.05$). Among the patients in the C group there was an increase in both the SDS and VAS at the 2-month follow-up. These differences, however, were not statistically significant.

Both the A and B groups showed statistically and significantly lower values in SDS and VAS assessment than the C group at the follow-up ($p < 0.01$).

Effects on clinical signs

At the first examination no statistically significant differences between the three groups were found for any of the clinical variables investigated.

The A and B groups showed a statistically significant decrease in the CDS ($p < 0.01$) and in the number of masticatory muscles tender to palpation ($p < 0.05$) at the 3-month follow-up (Fig. 4). No statistically significant differences between the A and B

groups were found. The clinical signs in the C group showed an increase in the above variables at the 2-month evaluation. This increase, however, was not statistically significant.

Both the A and B groups had significantly lower CDS values than the C group at follow-up ($p < 0.01$).

Occlusal interferences were not correlated with symptoms and signs either at the initial examination or at the follow-up in any of the three groups.

Discussion

Treatment of pain is known to be influenced by many factors such as the origin, fluctuation, and duration of the pain, the placebo effect, and the therapist's ability. This study was randomized and involved an independent examiner without knowledge of which group the patient belonged to, an experienced therapist, and an untreated control group to minimize the influence of the above factors. A crossover design of the study would have been desirable but was ruled out because it is impossible to obtain reliable 'normalization periods' when treating patients with methods giving mainly symptomatic relief.

Stomatognathic treatment including splint therapy is known to be efficient for treatment of CMD due to muscle tension (22, 24). Similar results were seen in this study. Eighty-six per cent of the individuals receiving splint therapy were improved at the 3-month follow-up.

Acupuncture has not been reliably tested for treatment of muscular pain due to CMD previously. In this study, under controlled conditions, the results are similar to those of occlusal splint therapy at the 3-month evaluation.

The change in the control group demonstrated the expected normal pain fluctuations over time in an untreated group. The C group even showed aggravation of the subjective and clinical variables at the 2-month follow-up. The changes were, however, not statistically significant.

The clinical variables examined in both the A and B groups showed statistically significant decreases. The clinical dysfunction score and index and especially the number of muscles tender to palpation decreased—that is, the muscular tension was significantly reduced in both groups.

Occlusal splint therapy is thought to reduce muscular hyperactivity by peripheral changes, resulting in a different afferent impulse from the receptor organs in the chewing apparatus, leading to an efferent stimulus, which decreases the muscle tension or muscular hyperactivity (22, 24). The bite-rising effect of the splint has also been considered to decrease muscle tension (25).

Acupuncture is considered to have a more central inhibition of pain involving segmental block in the spinal cord, known as 'the gate control theory'. There is also a release of neuromodulators, such as endorphins and serotonin, which affect the pain sensitivity in the human body from a more general point of view (1–5).

The subjective assessment (SDS, VAS) and the decrease in the clinical signs (CDS, muscles tender to palpation) after treatment were similar in both the acupuncture and the occlusal splint groups, although these forms of treatment have different modes of action—both, however, resulting in decreased levels of facial pain and muscle hyperactivity.

The long-term effect of stomatognathic treatment including occlusal splint therapy is favorable (17). There are some indications that acupuncture has a good long-term effect in the treatment of headache (26). In this respect, the action is thought to depend on a semipermanent change in the metabolism and release of neuromodulators affecting the supraspinal control systems, which decreases the general pain sensitivity (5).

Individuals with chronic pain represent an intractable category. The patients in this study had a long history of pain (mean, 6.8 years). In spite of this history, the results of this 3-month follow-up study suggest that such cases should be managed with acupuncture. A long-term evaluation of the effects of acupuncture and occlusal splint therapy is also in progress, and the results will be published in due course.

The results of this study also have implications for the discussion of the etiology of CMD. The two examined treatment modalities have quite different ways of influencing the stomatognathic system, its sore muscles and pain, but with practically the same success rate as measured by the subjective and clinical variables. Occlusal factors were not correlated to symptoms and signs either at the initial examination or at the follow-up. The importance of the occlusion as an etiologic factor in developing CMD is thus obviously limited, and consequently, CMD should preferably be treated by means of reversible methods, as in the present study.

It may be concluded that acupuncture treatment is an alternative method to conventional stomatognathic treatment for individuals with CMD of muscular origin, especially in patients with difficulties in tolerating an occlusal splint, such as patients with severe gagging reflexes. There is, however, a need for long-term studies for a more complete evaluation of the effects of acupuncture treatment.

References

1. Melzack R, Wall PD. Pain mechanism: a new theory. Science 1965;150:971–9.
2. Terenius I, Wahlström A. Search for an endogenous ligand for the opiate receptor. Acta Physiol Scand 1975;94:74–81.
3. Mayer DJ, Price DD, Rafii A. Antagonism of acupuncture analgesia in man by the narcotic antagonist naloxone. Brain Res 1977;121:368–72.
4. Sjolund B, Terenius L, Eriksson M. Increased cerebrospinal fluid levels of endorphins after electroacupuncture. Acta Physiol Scand 1977;100:382–4.
5. Andersson SA, Carlsson C-A, Eriksson M. Akupunktur—från tro till vetenskap. Stockholm: Liber förlag, 1984.
6. Socialstyrelsens kunggörelse med föreskrifter och allmänna råd om akupunkturbehandling inom hälso- och sjukvården samt tandvården. SOSFS 1984:33.
7. Brandwein A, Corcos J. Acupuncture analgesia in dentistry. Am J Acupuncture 1975;3:241–7.
8. Brandwein A, Corcos J. Extraction of incisors under acupuncture anaesthesia. A standardized method. Am J Acupuncture 1975;3:352–4.
9. Jensen LB, Tallgren A, Troest T, Jensen SB. Effect of acupuncture on myogenic headache. Scand J Dent Res 1977;85:456–70.
10. Jensen LB, Melsen B, Jensen SB. Effect of acupuncture on headache measured by reduction in number of attacks and use of drugs. Scand J Dent Res 1979;85:373–80.
11. Jensen LB, Jensen SB. Effect of acupuncture on tension headache and urinary catecholamine excretion. Scand J Dent Res 1982;90:397–403.
12. Corcos J, Brandwein A. Treatment of temporomandibular joint pain by acupuncture. Am J Acupuncture 1976;4:157–160.
13. Raustia AU, Phjola RT, Virtanen KK. Acupuncture compared with stomatognathic treatment for TMJ dysfunction. I. A randomized study. J Prosthet Dent 1985;54:581–5.
14. Raustia AU, Phjola RT, Virtanen KK. Acupuncture compared with stomatognathic treatment for TMJ dysfunction. II. Components of the dysfunction index. J Prosthet Dent 1986;55:372–6.
15. List T, Helkimo M. Acupuncture in the treatment of patients with chronic facial pain and mandibular dysfunction. Swed Dent J 1987;11:83–92.
16. Johansson A, Wagersten C, Wenneberg B, Haraldson T, Carlsson GE. Akupunkturbehandling vid kronisk smärta i ansikte och huvud. Tandläkartidningen 1987;79:140–4.
17. Carlsson GE. Long-term effects of treatment of craniomandibular disorders. J Craniomand Pract 1985;3:338–41.
18. Krogh-Poulson WG. Management of the occlusion of the teeth. In: Schwartz L, Chayes CM, eds. Facial pain and mandibular dysfunction. Philadelphia: WB Saunders Co, 1969:251–8.
19. Helkimo M. Studies on function and dysfunction of the masticatory system. II. Index for anamnestic and clinical dysfunction and occlusal state. Swed Dent J 1974;67:101–21.
20. Mann F. Atlas of acupuncture-points relation to surface anatomy. London: William Heinemann Medical Books Ltd, 1972.
21. Chaitow L. Acupuncture treatment of pain. Oxford: Oxford University Press, 1976.
22. Clark GT. Interocclusal appliance therapy. In: Mohl ND, Zarb GA, Carlsson GE, Rugh JD, eds. A textbook of occlusion. Chicago: Quintessence Publishing Co, 1988:271–84.
23. Siegel S. Non-parametric statistics for the behavioural sciences. Tokyo: McGraw-Hill Book Co Inc, 1956:75–83, 116–27.
24. Dahlström L, Haraldson T. Bile plates and stabilization splints in mandibular dysfunction. Acta Odontol Scand 1985;43:109–14.
25. Manns A, Minalles R, Palazzi C. EMG bite force and elongation of the masseter muscle under isometric voluntary contractions and variations of vertical dimension. J Prosthet Dent 1979;42:674–82.
26. Chen GS. Long term effect of acupuncture therapy on headache. Am J Acupuncture 1978;6:23–31.

Received for publication 17 April 1990