PHYSICAL THERAPY

Long-Term Outcome After Treatment of Temporomandibular Joint Osteoarthritis with Exercise and Manual Therapy


ABSTRACT: In a previous study, exercise and manual therapy demonstrated a 90% success rate in patients with osteoarthritis of the temporomandibular joints in the short-term. The aim of this follow-up study was to assess the long-term effect of these treatment modalities. Seventeen patients were evaluated. All patients suffered from osteoarthritis of the temporomandibular joints with pain in the temporomandibular joint at baseline and were treated successfully in a prior short-term study. The parameters were pain at rest and at chewing, impairment in daily life, and mouth opening. At follow-up, 11 patients (65%) experienced no pain and 13 patients (76%) had no pain at rest (Fisher's Exact Test: p < 0.02). Thirteen patients (76%) had a normal incisal edge clearance, and ten patients (59%) felt no impairment due to the disease (Fisher's Exact Test: p = 0.01). Thirteen patients (76%), who had been treated once successfully, have not needed treatment within the three years after cessation of their therapy. Exercise therapy is an effective tool to treat osteoarthritis of the temporomandibular joints.

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Patients with craniomandibular disorders (CMD) often present with symptoms of pain in the temporomandibular joint and masticatory muscles, impaired mouth opening, and joint noises. In spite of similar symptoms, different pathologies can be the cause. These include myofascial pain dysfunction syndrome without pathological changes to the joint, internal derangement with and without reduction of the disk, and temporomandibular joint (TMJ) osteoarthritis (OA). The latter is thought to be an endstage of internal derangement and is a very common disorder with a prevalence of up to 85% in the elderly population.

Exercise therapy is shown to reduce impairment and pain and to improve the functional activity in OA of the knee. In OA of the hip, it can postpone the need for hip replacement operations by approximately four years. Additionally, short-term results of a randomized trial using a physiotherapy program consisting of ultrasound manual techniques and active exercises reported a significant reduction of pain and an improvement of mobility and functional ability in TMJ OA. Recent papers have also shown its effectiveness in craniomandibular disorders.
This was the basis for a previous investigation of the short-term efficacy of exercise and manual therapy in TMJ OA. Twenty patients participated in this study. All of them had radiological signs of osteoarthritis of the TMJ, and experienced pain in the temporomandibular region for at least three months. At the six-month therapy follow-up, 85% of the patients experienced an improvement to their pain, and 80% of patients reported an improvement in jaw function. Forty-five percent of the patients felt no pain and another 30% had no pain during rest. Thirty-five percent of the patients were not impaired by the disease. Thus 85% of the patients were treated effectively and needed no further therapy. This result was superior to studies using splints or arthroscopic surgery.

The aim of this study was to investigate whether the short-term success rate of exercise and manual therapy in the treatment of OA of the TMJ was maintained in the long term.

Materials and Methods

In this study all patients who had been treated successfully in the previously mentioned study were contacted three years following the cessation of their treatment. Apart from exercise therapy, the successfully treated patients had received no other treatments for their CMD.

Outcome Measures
1. Pain at rest was measured with a 100-mm-long visual analog scale (VAS).
2. Maximal pain experienced during the last two days with a 100-mm-long VAS.
3. Impairment: Patients were instructed to rate their overall experienced impairment in daily life activities (chewing, speaking, yawning) with a 100-mm-long VAS.
4. Incisal edge clearance in mm (mouth opening). Patients were asked to open their mouth as wide as possible. Then the distance between the first right incisal edge of the upper and lower jaw was measured with a slide gauge in mm.
5. Perceived improvement of jaw pain in contrast to the condition at base-line examination on a seven point scale (excellent, distinct, moderate improvement, equal, moderate, distinct, severe deterioration).
6. Perceived improvement of jaw function (chewing, speaking, yawning) in contrast to the condition at base line examination on a seven point scale (excellent, distinct, moderate improvement, equal, moderate, distinct, severe deterioration).

Exercise Therapy
All patients were treated by an experienced, specially trained physical therapist. Each exercise therapy session lasted 30 minutes and included massage of painful muscles, muscle-stretching, gentle isometric tension exercises against resistance, guided opening and closing movements, manual joint distraction, disk/condyle mobilization, correction of body posture according to the principles described by Peterson Kendall, and relaxation techniques. The latter consisted of deep breathing and contrasting muscle tension and muscle relaxation exercises. Exercises were intended to reduce muscle spasm, alter the jaw closure pattern, and improve coordination of the muscles of mastication.

Additionally, patients learned a physical training program for self-administration, including some of the above-mentioned exercises for the stomatognathic system, training of body posture, and relaxation techniques.

Statistical Methods

Descriptive data were analyzed by the Fisher's Exact Test (perceived improvement of jaw pain, jaw function, number of patients with no pain, no impairment, and no restricted mouth opening). A Wilcoxon-Test was used to determine differences of longitudinal changes of numerical data (pain during rest, pain during stress, impairment, and incisal edge clearance).

Results

Seventeen out of the 20 patients who entered into the previously reported short-term evaluation were successfully treated. Fourteen patients were contacted three years after cessation of treatment. Three patients were contacted earlier: One patient’s pain recurred within eleven months, another patient’s within two months, and a third patient after 2.5 years. All three were once again treated with exercise therapy. Outcome measures at the time of the relapse of symptoms (before the onset of a second therapy series) of these patients were included in the statistical analysis. Thus the data of 17 patients (two men, 15 women, mean age 46.8 years, range 20-71) were evaluated. The average duration of symptoms before treatment was 2.9 (range 1-10) years. Patients were treated at an average of eleven (range 5-18) times.

Table 1 shows the data of the 17 patients before treatment, immediately after treatment, and at follow-up. All patients had experienced severe pain on chewing before treatment, and ten (59%) patients had constant pain. Mouth opening (<35mm incisal edge clearance) was impaired in ten (59%) patients.
Table 1
Median (25-75% Quartile) Incisal Edge Clearance, Pain During Rest and During Chewing, Impairment,*
Number of Patients with Reduced Incisal Edge Clearance, No Pain During Rest, No Pain During Chewing, and No Impairment**

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>After treatment</th>
<th>Three years follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incisal edge clearance</td>
<td>34.00(22.00-40.50)</td>
<td>39.00(33.00-42.50)*</td>
<td>41.0(34.50-45.50)</td>
</tr>
<tr>
<td>Reduced incisal clearance</td>
<td>10</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Pain during rest</td>
<td>35.00(25.00-50.25)</td>
<td>3.00(0.00-21.50)*</td>
<td>0.00(0.00-6.21)</td>
</tr>
<tr>
<td>No pain during rest</td>
<td>7</td>
<td>7</td>
<td>13</td>
</tr>
<tr>
<td>Pain during chewing</td>
<td>72.00(61.75-83.25)</td>
<td>25.00(5.50-43.25)*</td>
<td>0.00(0.00-45.50)</td>
</tr>
<tr>
<td>No pain during chewing</td>
<td>3</td>
<td>3</td>
<td>10^</td>
</tr>
<tr>
<td>Impairment</td>
<td>78.00(71.75-86.75)</td>
<td>30.00(21.00-38.75)*</td>
<td>0.00(0.00-46.00)</td>
</tr>
<tr>
<td>No impairment</td>
<td>0</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

*The Wilcoxon Test was used to identify differences between baseline and after treatment investigation and between after treatment investigation and follow-up. **Differences between base-line and after treatment investigation and between after treatment investigation and follow-up were identified by the Fisher's Exact Test.

Wilcoxon Test: Z=-3.35; P=.001
Wilcoxon Test: Z=-3.18; P=.001
Wilcoxon Test: Z=-3.6; P<.001
Chi-square Fisher's Exact Test; p=.013
Wilcoxon Test: Z=-3.58; P=.001
Chi-square: Fisher's Exact Test; p=.01

After-Treatment Evaluation

Pain was reduced significantly after treatment (pain at rest: Wilcoxon Test: Z=-3.2; P=.001; pain at stress: Wilcoxon Test: Z=-3.6; P<.001) (Figure 1, Table 1). Three patients experienced no pain, and eight patients felt no pain during rest (Table 1). Eighty-two percent of the patients reported an excellent or distinct improvement to their pain, and there was no deterioration (Figure 2).

Impairment reduced significantly (Wilcoxon Test: Z=-3.6; P<.001) (Figure 1, Table 1). Two patients felt no impairment immediately after treatment (Table 1). Eighty-two percent of the patients reported an excellent or distinct improvement in jaw function and no deterioration occurred (Figure 3).

Therapy improved incisal edge clearance significantly, (Wilcoxon Test: Z=-3.4; P=.001) (Table 1, Figure 1). Only six patients had a restricted mouth opening in contrast to ten before treatment.

Follow-up Evaluation at Three Years

Further improvements in pain rating were noted in contrast to the after treatment evaluation, (Table 1, Figure 1). Eleven (65%) patients experienced no pain (Chi-square: Fisher's Exact Test: p=.013), and 13 (77%) patients felt no pain during rest (Table 1). Ten (59%) patients experienced an excellent, and another four (24%) patients, a distinct improvement of pain, no deterioration occurred (Figure 2).

There was a tendency to a reduction in impairment VAS scores (Table 1, Figure 3). Ten patients felt no impairment (Chi-square: Fisher's Exact Test; p=.01), (Table 1). Fifteen patients experienced an improvement of jaw function (Figure 3). Incisal edge clearance also improved (Table 1, Figure 3). Only four patients still experienced a restricted mouth opening (Table 1).

At follow-up, four out of the successfully treated 17 patients were in need of treatment. Each of the four due to recurrence of pain. All patients were treated again with physiotherapy. Seventy-six percent of the previous successfully treated patients have needed no treatment three years after their therapy ended.

Discussion

This study intended to evaluate the long-term success rate of TMJ OA patients; therefore only the previous successfully treated patients who had no need of treatment following the first trial were included in the study. Those patients who had not responded to physical therapy were put on splint therapy which would render further analysis in their cases inconclusive.

The most impairing symptom in this patient sample was pain. Although most of the patients had an impaired mouth opening and experienced joint noises for several years, they needed no treatment. Only the occurrence of severe pain forced them to search for help. This finding
Figure 1
Influence of treatment on median (25% and 75% quartile) VAS ratings of pain at rest, pain at stress, and impairment, as well as on incisal edge clearance: A Wilcoxon Test was used to identify significant changes between baseline and after treatment investigation and between after treatment investigation and follow-up. * Wilcoxon Test: Z=−3.35; P<0.001; † Wilcoxon Test: Z=−3.18; P<0.001; ‡ Wilcoxon Test: Z=−3.0; P<0.001; † Wilcoxon Test: Z=−3.59; P<0.001

collides with reports that most people with clinically detectable dysfunction are not impaired by this dysfunction and are not in need of treatment.13

We used VAS pain ratings as the primary target parameter and not a dysfunction index.14-15 The VAS is easy to use and has shown its reliability.16 The two cited indices have serious shortcomings: The craniomandibular index17 strongly involves muscle pa-
enced no pain. Unfortunately, the results of this study cannot be compared with other studies, since there is insufficient literature on the treatment of TMJ OA.

Most reports on treatment of TMJ OA are case reports. Others are only short time results. Further improvement of symptoms could be due to the regularly continued home exercise program or the relaxation techniques learned by the patients. A self-limitation of the disease is possible, although other reports found that the stage which is primarily characterized by pain and movement restriction lasts about one to two years on average, but if left untreated, it can become chronic.

Treatment focused not only on direct therapy of the TMJ (active and passive jaw movement exercises, manual joint distraction, disk/condyle mobilization), but also on correction of body posture and relaxation techniques. This has been recommended by several authors; since there exists a close interrelationship between the cervical spine and the craniomandibular system.

Conclusion

The long-term results of this study are promising. Thirteen patients (76%), who had been treated once successfully, were still in no need of treatment three years after cessation of their therapy. The combination of exercise and manual therapy, correction of body posture, and relaxation techniques seem to be useful in the treatment of TMJ OA.

References


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