Temporomandibular joint disk displacement without reduction

Treatment with flat occlusal splint versus no treatment

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A flat occlusal splint has been extensively used in the treatment of patients with temporomandibular joint disk displacement without reduction, but no studies with untreated controls have assessed its effect. We randomly assigned 51 patients with temporomandibular joint pain and arthrographically verified disk displacement without reduction to be treated with a flat occlusal splint or to serve as untreated control subjects in a 12-month clinical trial. Pain symptoms disappeared in about one third of the patients in each group. Another third of the patients in the control group improved. Sixteen percent of the patients in the control group and 40% of the patients treated with a flat occlusal splint were worse at the end than at the beginning of the study. Joint pain and muscle tenderness decreased more frequently in the nontreatment controls than in the treatment group. A statistically significant benefit of a flat occlusal splint over nontreatment control subjects could not be identified in this study of patients with painful disk displacement without reduction. The use of a flat occlusal splint in this patient group should therefore be reconsidered.

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Temporomandibular joint (TMJ) disk displacement without reduction has been treated with surgery,1 anterior repositioning splint with or without manual repositioning,2 moist heat, soft diet, anti-inflammatory medication, transcutaneous electric nerve stimulation,3 and physical therapy.4 One of the most frequently used treatment modalities has been a flat occlusal splint. To the best of our knowledge, there are no studies with an untreated control group assessing the effect of this treatment.

To determine the value of a flat occlusal splint in the treatment of patients with disk displacement without reduction, we randomly assigned a series of patients with TMJ pain and arthrographically documented disk displacement without reduction to be treated with such a splint or to serve as an untreated control group. This study reports our results after 12 months.

MATERIAL AND METHODS

In this study 51 patients, 46 females and 5 males, participated. The mean age was 29 years (range 14 to 61 years). The criteria for including a patient in the study were (1) pain on chewing assessed by the patient as more than 50 on a 100 mm visual analog scale; (2) arthrographic evidence of disk displacement without reduction in one or both TMJs; (3) no previous TMJ treatment including any form of splint, or TMJ or orthognathic surgery; and (4) willingness to participate in this clinical trial. For the reader to understand the status of the patients, some initial clinical data are presented in Table I. All patients enrolled in the study completed the study.
Table I. Status of patients at beginning of study (n = 51)

<table>
<thead>
<tr>
<th></th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximal opening</td>
<td>32.5</td>
</tr>
<tr>
<td>Pain on chewing*</td>
<td>60</td>
</tr>
<tr>
<td>Pain on protrusion*</td>
<td>57</td>
</tr>
</tbody>
</table>

*Evaluated by patient by marking on a 100 visual analog scale.

An extensive clinical examination was performed as previously described. This included a total of 79 variables of the TMJs, muscles of mastication, range of mandibular movements, and dental occlusion. The clinical examination was performed by two of us (H.L., L.E.).

Arthrographic examination was performed as previously described by one of us (P.L.W.). The majority were performed as single-contrast lower compartment transcranial arthograms with spot films and videofluoroscopy. In cases where these single-contrast arthograms were not completely conclusive, the arthrographic examination was extended to a dual-space, double-contrast arthrotomographic examination. The joints were arthrographically classified as normal, disk displacement with reduction, or disk displacement without reduction, according to previously described criteria. We did not differentiate sideways or rotational displacement from anterior displacement, and all displacements of the disk were categorized as either displacement with or without reduction.

After arthrographic examination the patients that fulfilled the inclusion criteria were randomized to be treated with a flat occlusal splint or to serve as untreated control subjects. All patients were informed about their condition, and all were provided with pain medication according to their need.

The flat occlusal splints (Fig. 1) were fabricated and adjusted to maximal contact in centric occlusion, centric relation and working contacts on sideways movement, and symmetric frontal contacts on anterior movements of the mandible. The splints did not have any balancing contacts. The patients were instructed to wear the splints only at night. The patients were seen in the clinic 1 week later for possible further adjustments of the splints. Further follow-up was made at 6 and 12 months. Both the patients treated with splints and those in the control group were seen at the same intervals.

A complete recording of clinical status was performed at the beginning of the study and 12 months later. The initial examination was done at least 2 weeks after the arthrographic examination. At the 12-month follow-up each patient was classified as pain-free, improved, unchanged, or worse according to the criteria in Table II.

The change of status in the two groups was compared for each of the variables with Fisher's Ex-
Table IV. Changes in pain at maximal mouth opening during 12-month trial (n = 42*)

<table>
<thead>
<tr>
<th>Change in pain at maximal mouth opening</th>
<th>Flat occlusal splint</th>
<th>No treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Better</td>
<td>4</td>
<td>19</td>
</tr>
<tr>
<td>Unchanged or worse†</td>
<td>14</td>
<td>5</td>
</tr>
</tbody>
</table>

Two-tailed Fisher’s Exact Test: p < 0.001.
*The remaining nine patients were free of pain at maximal mouth opening at both the beginning of the study and the 12-month follow-up.
†Two patients in the treatment group and one patient in the control group worsened during the 12-month clinical trial.

Table V. Changes in pain at protrusion during a 12-month trial (n = 50*)

<table>
<thead>
<tr>
<th>Change in pain at protrusion</th>
<th>Flat occlusal splint</th>
<th>No treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Better</td>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>Unchanged or worse†</td>
<td>11</td>
<td>5</td>
</tr>
</tbody>
</table>

Two-tailed Fisher’s Exact Test: p < 0.02.
*The remaining 21 patients were free of pain at protrusion both at the beginning of the study and at the 12-month follow-up.
†Three patients in the treatment group and two patients in the control group worsened during the 12-month clinical trial.

Table VI. Changes in pain in affected joint on movements toward other side during 12-month trial (n = 32*)

<table>
<thead>
<tr>
<th>Change in pain in affected joint on movements toward other side</th>
<th>Flat occlusal splint</th>
<th>No treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Better</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>Unchanged or worse†</td>
<td>12</td>
<td>6</td>
</tr>
</tbody>
</table>

Two-tailed Fisher’s Exact Test: p < 0.005.
*The remaining 19 patients were free of pain in the affected joint on movements toward the other side both at the beginning of the study and at 12-month follow-up.
†Four patients in the treatment group and two patients in the control group worsened during the 12-month clinical trial.

Table VII. Changes in palpatory tenderness of masseter muscle during 12-month trial (n = 43*)

<table>
<thead>
<tr>
<th>Palpatory tenderness in masseter muscle</th>
<th>Flat occlusal splint</th>
<th>No treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Better</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Unchanged or worse†</td>
<td>18</td>
<td>12</td>
</tr>
</tbody>
</table>

Two-tailed Fisher’s Exact Test: p < 0.05.
*The remaining eight patients were free of palpatory tenderness in the masseter muscle both at the beginning of the study and at the 12-month follow-up.
†Four patients in the treatment group and three patients in the control group worsened during the 12-month clinical trial.

RESULTS

At the 12-month follow-up about one third of the patients in both the treatment and control groups were pain free (Table III). Another third of the patients in the control group were improved. Sixteen percent of the patients in the control group and 40% of the patients treated with splints were worse than at the beginning of the study (Table III). Patient status for the 79 variables was recorded at the beginning and at the end of the 12-month period. The changes in status in the treatment group were compared with those in the control group. Only four of the 79 variables showed changes that were statistically significant (Tables IV to VII). Pain on maximal mouth opening (Table IV), pain on protrusion (Table V), and pain on sideways movement toward the nonaffected side (Table VI) improved more frequently in the nontreatment control subjects than in the patients treated with a flat occlusal splint. Palpatory tenderness in the masseter muscles (Table VII) also improved more frequently in the nontreatment control subjects than in the patients treated with splints. For the remaining 75 variables recorded, the changes that occurred during the 12 months of this study were not statistically significant when the two groups were compared.

DISCUSSION

The results of this study suggest that about one third of patients with painful disk displacement without reduction improve so that pain at rest, during chewing, and on protrusion disappears during a 12-month period (Table III). In this respect no statistically significant difference was found between treatment with a flat occlusal splint versus no treatment. In addition, 36% of the patients in the control group improved after 1 year without treatment. This indicates that more aggressive treatment modalities should not be used in the initial phase of painful disk displacement without reduction. Instead, counseling and adequate pain medication seems to be a reasonable treatment approach. A favorable natural course of osteoarthrosis of the TMJ has also been reported by several authors.12-19

The comparison between the two groups revealed, with the exception of pain, only a few statistically
significant differences, because only 4 of the 79 variables showed a \( p \) value less than 0.05. In these instances the improvement appeared to be more frequent in the nontreatment control subjects than in the patients treated with a flat occlusal splint. The difference between the two groups, however, should be interpreted with caution because the difference was only identified in 4 of 79 variables. In our interpretation the main finding of the study is, instead, that a statistically significant benefit from the use of a nocturnal flat occlusal splint in patients with painful disk displacement without reduction could not be proved. Our results are valid for this specific patient group, and this type of splint could still be effective in treatment of patients with other diseases and disorders.

When the two groups in Tables IV to VII were compared, we included only those patients who had specific symptoms either at the beginning or at the end of the study. Patients who did not have the symptoms either at the beginning or at the end of the study were excluded from these tables, because including patients that did not have the specific symptom would have only diluted the material.

In conclusion, a statistically significant benefit from a nocturnal flat occlusal splint over no treatment could not be identified in this study of patients with painful disk displacement without reduction. The use of a nocturnal flat occlusal splint in this specific patient group should therefore be reconsidered.

REFERENCES


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