

Treatment of reciprocal clicking of the temporomandibular joint using a mandibular repositioning splint and occlusal adjustment

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Abstract

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A follow-up study was performed on 12 subjects with unilateral and six subjects with bilateral reciprocal clicking and symptoms of mandibular dysfunction. After a treatment period of about three months with a repositioning appliance, occlusal adjustment was carried out and the patients were examined every six months. The results after 2.5 years showed that clicking had disappeared in 47% of the patients (50% of the treated joints) and that all the patients were free of symptoms.

Key words: Temporomandibular joint syndrome — Occlusal equilibration

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In recent years temporomandibular joint clicking, and reciprocal clicking in particular, has received much attention. This change in smooth gliding has proved, at least in some cases, to be due to reduction of the mandibular disc from an anteriorly displaced position at closure to a normal position during opening (10). The displaced disc has been treated successfully with an occlusal repositioning appliance (1, 7). Information available on the long-term efficacy of this treatment, however, is scarce and very little has been written about the practical problems involved. There are no data permitting evaluation of factors possibly influencing the treatment results.

We therefore decided to carry out a follow-up study on a selected patient group treated with a repositioning splint for reciprocal clicking and symptoms of mandibular dysfunction.

SUBJECTS AND METHODS

Eighteen subjects were selected for this study from patients referred to or seeking treatment for their

TMJ problems from the Institute of Dentistry, University of Turku, Turku, Finland. The male/female ratio was 4/14 and the mean age 29 (range 15—49) (Table 1). In six of the patients both sides were involved. The diagnosis of internal derangement was based on medical history and clinical examination. All the patients had a history of clicking and subjective symptoms such as stiffness, tiredness and pain in the jaws and the region around the condyle. Occasional locking was reported by five patients. When asked about it, the patients had great difficulty in determining the length of the pretreatment clicking period. The position of the mandible when opening click occurred was determined by measuring the interincisal distance. The position of the closing click was noted by retruding the mandible from a protruded position with the anterior teeth in light contact. Because exact, reproducible measurements of the horizontal interincisal distance when the retrusive click occurred were difficult to obtain, these calculations were excluded from the study. The clicking sound during

TABLE 1. Descriptive data on the subjects and treatment

Patient number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Age (years)	36	15	16	49	35	38	16	22	30	17	34	29	17	36	22	33	35	35
Sex	F	F	F	F	F	F	F	M	F	M	F	M	M	F	F	F	F	F
Joints involved	1	1	2	1	2	1	1	1	2	1	1	1	1	2	2	2	1	1
Loudness of opening click (L = loud, S = soft)	S	L	L/L	S	S/L	L	S	L	L/S	L	L	L	L	S/S	L/L	S/S	L	L
Number of months of anterior splint therapy	1.5	4	4	3	2	1.5	2	3	2	3	4	1.5	2	1.5	4	4	4	2
Number of months of follow-up	30	25	34	24	32	30	24	25	25	30	33	21	23	24	24	12	31	33
State of clicking after 1 year	-	-	-/-	+ +/+	-	-	-	-	-/-	+	-	-	-	+/+	-/-	-/-	-	-
State of clicking at last examination (- no clicking) (+ clicking persists)	-	-	-/-	+ +/+	-	-	-	-	-/-	+	-	-	-	+/+	-/-	-	-	-

both opening and retrusion was registered as distinct, audible with stethoscope or palpable, *i.e.* no sound, only a sudden jerk which could be felt towards the end of mandibular retrusion. In the results the latter two groups were combined and labeled "soft". Deviations from the midline during opening and closing movements were registered.

The clinical examination revealed palpatory tenderness of masticatory muscles in all patients. One patient showed joint tenderness posteriorly.

The treatment involved a mandibular repositioning appliance which moved the mandible into a non-click position with the least possible opening and forward shift (4). This was achieved through the incorporation of guiding inclines which allowed the antagonist teeth to occlude with the appliance only in this therapeutic position. Otherwise the splint resembled the customary stabilization splint with canine guidance and centric stops for opposing supporting cusps. The patients were instructed to wear the appliance 24 hours a day and to remove it only for cleaning and brushing the teeth.

After one week the patients were seen for a check up of the splint and evaluation of the symptoms. After another two weeks they were seen for a second check up, and after four to five weeks the situation was reevaluated. If unrestricted movements without clicking were noted, the splint was adjusted once or twice to a more retruded position in relation to the upper jaw. This procedure aimed at returning the condyles to or as near as possible to the hinge position without clicking. The splint was then kept for an additional two weeks, after which occlusal adjustment aiming at elimination of the slide in centric as

well as elimination of balancing, working and protrusive interferences were carried out. The adjustment was done gradually at intervals of a few days to one week with the splint still in continuous use. After the occlusal therapy the patients were followed up twice a year for a period of about 2.5 years (24—34 months, Table 1) and necessary corrections to the occlusion were made. The splint was worn at night for at least six months after completion of the occlusal adjustment.

When manipulation of the mandible into the retruded position provoked clicking again after splint therapy, the occlusion was adjusted to a position where clicking did not occur. In one case light-cured composite material (Aurafil®) was used to increase the number of contacts and to produce a stable occlusion.

When clicking still persisted after treatment with the appliance, occlusal adjustment was performed as described above. The χ^2 test and Student's *t*-test were used for statistical calculations.

RESULTS

Subjective symptoms

As an overall finding we noted that the subjective symptoms often abated quickly once the repositioning appliance had been fitted. During the follow-up period a few subjects developed new symptoms, such as pain and tiredness of the jaw. The appliance was then introduced for night-time use again, and the symptoms usually diminished within a couple of weeks. At the final evaluation all subjects were free from pain and managing well.

TABLE 2. Result of treatment after one and 2.5 yr

	Subjects		Joints	
	1 year	2.5 year	1 year	2.5 year
No clicking	11 (61.1%)	8 (47.1%)	15 (62.5%)	11 (50%)
Clicking persists	7 (38.9%)	9 (52.9%)	9 (37.5%)	11 (50%)
Total	18 (100%)	17 (100%)	24 (100%)	22 (100%)

Clicking

One year follow-up. One year after the termination of the repositioning splint therapy (1.5—4 months, Table 1) clicking was absent in 15 (62.5%) out of the initially 24 clicking joints (Table 2). However, of these 15 joints, clicking appeared in four when the jaw was manipulated into the retruded position. In these cases the occlusion was adjusted into the intercuspal position.

2.5 year follow-up. After about 2.5 years clicking was absent in eight subjects, and all but one still had a stable occlusion and good articulation (Table 2). A relapse in three joints had occurred after the one year evaluation. One of these was in a subject with both sides involved. One patient showed improvement; clicking had disappeared and the occlusion was still good and needed very little adjustment. In two patients one joint was treated successfully but clicking continued in the other (Table 1).

One subject with both sides involved had moved to another town and could not be traced.

Intensity of clicking sound

Twelve of the 15 joints that had ceased to click at the one year reexamination had originally shown a loud and distinct clicking sound. The same was true of three joints out of the nine in which clicking persisted. The situation was essentially the same at the 2.5 year reexamination (Table 1). The difference between the successful and unsuccessful group was not statistically significant.

Position of opening click

The mean interincisal distance when the opening click occurred was 31.64 mm in the successful group ($n = 11$, $SD = 10.39$) and 25 mm in the group where clicking persisted ($n = 11$, $SD = 12.57$). The difference between the successful and unsuccessful group was not statistically significant.

DISCUSSION

The present report is based on several assumptions that may or may not turn out to be true. The reliability of clinical diagnosis without radiographs can be questioned. However, controversy exists as to the value of ordinary radiographs in the diagnosis of a dislocated disc (9, 15). Even the use of arthrotopography leaves some uncertainty about the existence of disc displacement with reduction, and this method has been recommended mainly when surgical intervention is planned (4). To rule out other pathological conditions only orthopantomograms were taken in the present study. The decision not to use more radiography was based on the low probability of any change in the treatment plan resulting from eventual radiographic findings, and on the fact that none of the patients were candidates for joint surgery.

The lack of a control group with conventional splint therapy is due to the retrospective nature of the study and to the previously poor results of such treatment. This has been corroborated in some recent studies (2, 3). There is thus reason to believe that the repositioning appliance had the intended effect in the successful cases. The significance of disc repositioning in the long run is difficult to determine. In one study (13), the long-term results appeared excellent even though clicking was frequent at the beginning, and no repositioning appliances had been used.

The mechanism by which the repositioning splint therapy works has not been established. It has been suggested that if the disc and the condyle are kept properly aligned, the posterior soft tissue attachment of the disc may "heal" (4). It may therefore be important to use the splint long enough and for 24 hours a day. In this study the splint was used for an average of three months. Clicking often tended to persist in subjects who for some reason used the splint for a shorter time (Table 1).

Etiological factors proposed for internal derangement of this type include trauma occlusal discrepancies, muscle incoordination and hyperactivity (1, 7, 11, 12). Apart from eliminating clicking the goal of our treatment was, therefore, to stabilize the occlusion. Our impression was that the treatment is reasonably simple, and repositioning the disc in the short term is successful in about 50% of the cases. The success rate is comparable with that reported by *Claré* (1). However, difficulties may arise after splint therapy, if the occlusion is left unstable. None of our patients required extensive dental rehabilitation: occlusal adjustment was usually sufficient to stabilize their occlusion. The results are encouraging if we keep in mind that even the subjects in whom clicking persisted had no other subjective symptoms.

We were unable to find reports on prognostic criteria. In our study interincisal distance in the clicking position and loudness of the clicking sound were evaluated. The difference in interincisal distance in the clicking position between successful and unsuccessful cases was insignificant. However, it was still our impression that patients with very late opening clicks and early retrusive clicks are difficult to treat, as shown before (4).

All except one in the successful group had loud, distinct clicking sounds, while in the unsuccessful group only five had a distinct sound initially. The loud clicking may well be indicative of the early stage of a process that ultimately leads to total detachment of the disc, as described by *Juniper* (11). It may also indicate a normal biconcave form of the disc. The posterior band of the disc would still be fairly intact in a patient with only the posterior at-

tachment of the disc torn. Displacement and especially reduction of such a disc would cause a loud click. Treatment at this stage, before the attachment to the poles of the condyle are torn and before the form of the disc has been deformed, is likely to have a relatively good prognosis. The fact that only five of the patients had had occasional locking and only one had joint pain when palpated posteriorly might suggest that the disc attachment may have been only partially torn in most of our patients.

In conclusion, repositioning of the disc by combining a mandibular splint and occlusal adjustment seems possible in temporomandibular joints with reciprocal, preferably loud, clicking and with the treatment periods used in this study. Early intervention is warranted if the condition is progressive, leading to increasing tissue damage and joint symptoms, as suggested by some authors (6, 14). However, for lack of longitudinal follow-up studies it is premature to say whether or not painless reciprocal clicking should always be treated. The majority of these patients may never develop serious joint problems. Our decision to attempt treatment if the patient so desired was based on the low risks of the treatment and on our findings that some of these patients might develop serious problems in the long run.

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Lyhennelmä

LE BELL, Y., KIRVESKARI, P.: *Seurantatutkimus repositiokiskolla hoidetuista diskusdislokaatiotapauksista*

Tutkimukseen valittiin 18 potilasta, joilla oli toistuva diskusdislokaatio I. resiprookkinen naksaus (6 potilaalla molemmipuolinen) ja purentaelimen dysfunktio-oireita. Diagnoosi tehtiin kliinisen tutkimuksen perusteella. Potilaita hoidettiin repositiokiskolla, jota käytettiin jatkuvasti keskimäärin 3 kuukauden ajan. Tämän jälkeen pyrittiin puren-

ta stabiloimaan selektiivisellä hionnalla. Seurantatutkimukset tehtiin puolivuositain. Tarpeen vaatiessa hiontaa tarkistettiin.

2,5 vuoden seurannan jälkeen noin puolessa tapauksista naksuminen oli hävinnyt ja potilaat olivat täysin oireettomia. Alkutilanteessa kova ja terävä naksumisääni on luultavasti ennusteen kannalta edullisempi kuin hiljainen ääni.