Patients referred to a specialist clinic because of suspected temporomandibular disorders: a survey of 3194 patients in respect of diagnoses, treatments, and treatment outcome

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The aims were to study the patient population at a temporomandibular disorders (TMD) specialist clinic over time, and to try to find variables of importance for treatment outcome. The material consisted of 3194 consecutive patients who were referred to the clinic and underwent a clinical examination during the period 1995–2002. A number of patient and treatment-related variables that had been collected in an electronic database were analyzed retrospectively. The age and sex distribution of the present patient material was in line with several previous investigations of TMD patients. The mean age of both men and women was 42 years, and there was a large preponderance of women. A vast majority of the patients responded positively, and in few visits, on traditional conservative treatment methods. In line with previous studies, no strong predictors for treatment outcome were found. However, the diagnoses of disk displacement without reduction, arthritis in TMJs, and myalgia in masticatory muscles were predictors for a significant improvement, while the diagnosis orofacial pain of unspecified origin predicted a poorer prognosis. □ *Clinical; prediction; TMD; treatment outcome*

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Temporomandibular disorders (TMD), a major cause of non-dental pain in the orofacial region, is a collective term embracing a number of clinical problems that involve the masticatory musculature, the TMJ and associated structures, or both (1). A deeper understanding of the etiology and pathophysiology of these conditions is still lacking.

Over the years, a great number of studies on TMD patient populations have been carried out, almost all reporting an overrepresentation of women (70–90%), and of persons 20–50 years of age (2–10). Many hypotheses regarding the female predominance have been discussed (11) but the question remains mainly unanswered.

Epidemiological studies have shown that signs and symptoms of TMD are also common in children and adolescents (12). The prevalence, however, is lower than in adults, and the symptoms are mostly occasional and of mild character. From childhood to young adulthood, the prevalence of TMD increases on a group basis, levels out in middle age, and decreases in older individuals (13). The last-mentioned has been found in both cross-sectional and longitudinal investigations, where severe dysfunction in older age was rare (7, 14).

TMD is presently viewed as a cluster of miscellaneous disorders with common symptoms, i.e. dysfunction of the masticatory system and/or pain in the face. TMDs are often associated with diverse problems from the area of the face, head, and neck/shoulder, and can lead patients to seek care from a range of different health providers. The large majority of patients with TMD have their first contact with a primary care physician or with a general dentist (15). Patients often see several dental and/or medical providers and undergo a variety of diagnostic tests and receive a variety of diagnoses before coming to a TMD clinic (8). TMD patients have also been reported to have greater health-care costs, and to be greater utilizers of the health-care system (16), with a preponderance for women (9), compared to non-TMD subjects.

Efforts have been made to establish a more broadly accepted diagnostic classification system for TMD. However, it has been argued that limited knowledge of the cause and natural progression of these disorders hampers such a classification (17). Despite these limitations, clinical materials have reported on a wide range of diagnoses and diagnostic subgroups, the most prevalent being internal derangement, myalgia, arthritis, osteoarthrosis, headaches, and other forms of orofacial pain (3, 18, 19).

It has been stated that TMDs are fluctuating over time, remitting and self-limiting conditions. In longitudinal epidemiological studies examining the fluctuation of TMD the fluctuation observed over a 2-year period was not large (20), but a substantial fluctuation of both reported symptoms (21) and clinical signs has been demonstrated over a 20-year period (13). A progression to severe pain and dysfunction was found to be extremely rare. On the other hand, it has been shown that untreated TMD patients do not improve spontaneously, while treated patients report significant improvement (10, 22–26).

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Investigations on clinical populations have reported on structure of patient materials and treatment characteristics, e.g. source of referral, socio-cultural factors, gender, age, length and severity of symptoms, severity of clinical signs, diagnoses given, number of visits, treatment time, treatment methods, and treatment effect (2–7, 18, 19, 22, 27–31). The results are not always consistent, and comparisons between studies are difficult because of differences in the populations studied, diagnostic classifications, treatment approaches, and research methodology.

According to several investigations, the majority of TMD patients achieve good relief of symptoms with conservative therapy (3, 4, 18, 29, 31, 32). Long-term follow-up studies have shown that the vast majority of patients have few or no symptoms after treatment (28, 33, 34). These results support the opinion that conservative TMD treatment has a favorable prognosis, and that the risk of symptom recurrence is low. The most commonly used treatment modalities (counselling, modification of daytime parafunctional behavior, interocclusal appliances, selective occlusal adjustment, medication, and physical therapy) have documented good effect in reducing symptoms and signs of TMD, often when used in combination, on a case by case basis (1, 35).

Some patients, though, remain without any improvement despite efforts and clinical time consumed. It has been shown that 10% of TMD patients account for >40% of the costs for the whole TMD group (9). It ought thus to be helpful for the clinician to be able to identify responders and non-responders to a specific therapy so that the most optimal treatment can be selected to the individual patient for the best treatment outcome. Many studies have examined characteristics such as gender, age, socio-demographic issues, diagnostic subgroup, as factors that may correlate, or predispose, to either treatment success or failure (6, 18, 23, 31, 32, 34, 36–39). Others have focused on psychosocial factors as more relevant in patient response to therapy. Some of these (5, 40–42) found a relation between different psychological parameters and treatment outcome, while others (37) failed to find any association.

The aims of the present retrospective investigation were to study the patient population at a specialist TMD clinic over time, as well as to assess possible associations between factors related to patient characteristics, diagnoses, treatments, and treatment outcome.

Materials and methods

Patients

The study refers to data for consecutive patients examined at the Department of Stomatognathic Physiology, The Institute for Postgraduate Dental Education, Jönköping, Sweden during the period 1995–2002. The department functions as a referral and care center for health providers within the county of Jönköping, which has about 330,000 inhabitants. Most referrals come from private and public general dental practitioners, specialist dentists, as well as family doctors and medical specialists. During the 8-year period, 3630 patients were referred to the department, and, of these, 3194 presented for a clinical evaluation and were all included in the study.

Before clinical examination, the patients were required to complete a questionnaire providing information on their socio-demographic situation, general health status, past and present symptoms, as well as a subjective assessment of pain and/or discomfort (henceforth called *complaints*) according to a verbal scale. This is a 5-grade scale with steps: 1 = no or insignificant complaints, 2 = mild complaints, 3 = moderate complaints, 4 = fairly severe complaints, 5 = very severe complaints.

At the first visit, a specialist in TMD or a specially TMD trained dentist examined all patients in accordance with the clinical routines at the department (43). Radiographic examinations were taken when judged to be necessary. A Swedish version of the International Classification of Diseases, 9th Revision (ICD-9) was used as a diagnostic classification system (44). Each patient was given one or more diagnoses consistent with ICD-9. In some cases, however, it was not possible to label a diagnosis according to ICD-9.

All patients were given thorough information about their symptoms, the tentative diagnosis, and possible etiological factors. When a TMD was judged to be present, the normally benign character of the disorder was stressed. Patients were also urged to be observant of possible oral parafunctions in the daytime, and to try to avoid them. Commonly used treatment methods were interocclusal appliances, therapeutic jaw exercises, selective occlusal adjustment, pharmacological agents, i.e. NSAID, analgesics, and muscle relaxants, intra-articular and intramuscular injections, other physical therapies, and acupuncture. A combination of treatment methods was applied to the majority of patients. After the completion of treatment, patients were again asked to rate any remaining complaints according to the same verbal scale as before treatment.

Methods

All information about the patients was selected retrospectively from an electronic database. Information obtained regarded gender, age, diagnosis or diagnoses given, treatment modalities applied, number of visits, and assessment of complaints before and after treatment. Based on the scale assessments, a variable for treatment outcome could be measured for each patient. The outcome was expressed dichotomously as overall improvement or no improvement of initial complaints. Patients who evaluated their complaints lower after treatment compared to prior to treatment, viz. that the scale point after treatment was at least one step lower than before treatment, were regarded as improved. Patients who rated their symptoms

as the same or higher than the initial scale point were regarded as not improved.

Descriptive analyses were performed on the following variables for each year separately, and for the total eight-year period as a whole: age, gender, diagnoses, treatments, number of visits, and complaint assessment before treatment. To make further analyses possible, the many different diagnoses were combined to a smaller number of diagnostic groups. Rare diagnoses and those not primarily related to TMD, i.e. psychiatric disorders, disorders of salivary glands, congenital syndromes, periodontitis, and pericoronitis, were excluded from the analyses. In most cases, bruxism and malocclusions were not the main diagnoses and were thus excluded. When analysing the different therapeutic interventions, referrals to, or consultations with, other therapists, modification and readjustment of interocclusal appliances, and follow-up without induction of any new treatment were excluded. The subjects were also divided into 4 age groups; ≤20, 21–40, 41–60, and >60 years.

Statistical analysis

All statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS, Release 11.5.1). To test whether there were associations between the study variables, the chi-square (χ^2) test for contingency tables or Fisher's exact test was used.

Finally, logistic regression analyses were applied in order to investigate possible explanatory association between the study variables and the treatment outcome. P values <0.05 were considered as a statistically significant difference.

Results

Twenty-eight percent of the patients had been referred to the clinic by physicians, mostly general practitioners and specialists in ENT and rheumatology, respectively. Of the remaining patients, 56% came from general dental practitioners in public and private practice (32% and 24%, respectively). Another 13% were referred from other dental specialists, mostly oral surgeons and prosthodontists. A few percent came to the clinic from paramedics, mostly physiotherapists.

Of the 3194 subjects examined, 74% were females and 26% were males. Mean age for both genders was 42 years (range 9–90 years). The age distribution is shown in Fig. 1. Four-hundred-and-seventy-three patients were excluded from the analysis of diagnoses, either because it was not possible to label a diagnosis according to ICD-9, or because they received rare diagnoses not included in the analyses. In the remaining 2721 patients, a total of 4464 diagnoses were registered in the database (Table 1). The most common diagnosis was disk displacement (29%) (with (18%) or without (11%) reduction), followed by tension-type headache (19%), myo-arthralgia (18%), arthritis (14%), myalgia (11%), osteoarthrosis (OA) in TMJs (10%), orofacial pain of unspecified origin (6%), henceforth called *orofacial pain*, and rheumatic disease (RA) affecting the TMJs (4%). Twenty-one percent of the patients were given the diagnosis bruxism, and in another 8% some kind of malocclusion was diagnosed. The two last-mentioned diagnoses were only rarely main diagnoses.

A significant association was found between the variable gender and the diagnoses myo-arthralgia ($P < 0.001$) and disk displacement with reduction ($P < 0.001$). In relative terms, there were more females than males with myo-arthralgia, while disk displacement with reduction was the more common diagnosis among males. The variable age groups were also associated with some of the diagnoses: disk displacement with and without reduction ($P < 0.001$), orofacial pain ($P < 0.05$), myo-arthralgia ($P < 0.001$), tension-type headache ($P < 0.001$), and OA ($P < 0.001$). Proportionally, disk displacement diagnoses were more common in patients <21 years, while orofacial pain was a less common diagnosis among these patients. Myo-arthralgia and tension-type headache were diagnosed more often in the age group 21–40 years, and OA in TMJs was a more common diagnosis among patients >60 years.

Symptom degree before treatment was found to be associated with gender ($P < 0.05$). Only a few patients had no or insignificant complaints initially, and this rating was made proportionally more often by men. Age group, too, was associated with symptom severity ($P < 0.05$); subjects younger than 21 years of age relatively more often rated their initial symptoms as mild or lower. The diagnoses orofacial pain ($P < 0.05$), disk displacement without reduction ($P < 0.05$), RA ($P < 0.05$), OA ($P < 0.05$), and disk displacement with reduction ($P < 0.001$) were significantly associated with the initial symptom degree. From a comparative point of view, fairly severe or very severe complaints were more common among patients with orofacial pain and disk displacement without reduction; patients with RA and OA in the TMJs more often presented with moderate complaints, while mild complaints were often reported by patients with disk displacement with reduction.

In 2594 patients, 4984 registrations of performed treatments had been made (mean 1.9/patient, Table 2). Three out of 4 patients had been instructed to perform therapeutic jaw exercises, and 1450 (56%) had received some kind of interocclusal appliance. Ninety-one percent of the appliances were made of hard acrylic, the commonest type being the Michigan occlusal splint (45). To a varying extent, selective occlusal adjustment had been performed in 765 cases (29%), and 319 (12%) had been prescribed some kind of drug, mostly analgesics or NSAID.

Number of visits to the clinic varied between 1 and 49 (mean 4.2). A total of 988 patients (31%) had only one visit to the clinic. The vast majority (66%) had up to 4 visits, and fewer than 10% needed >8 visits (Fig. 2). Gender was

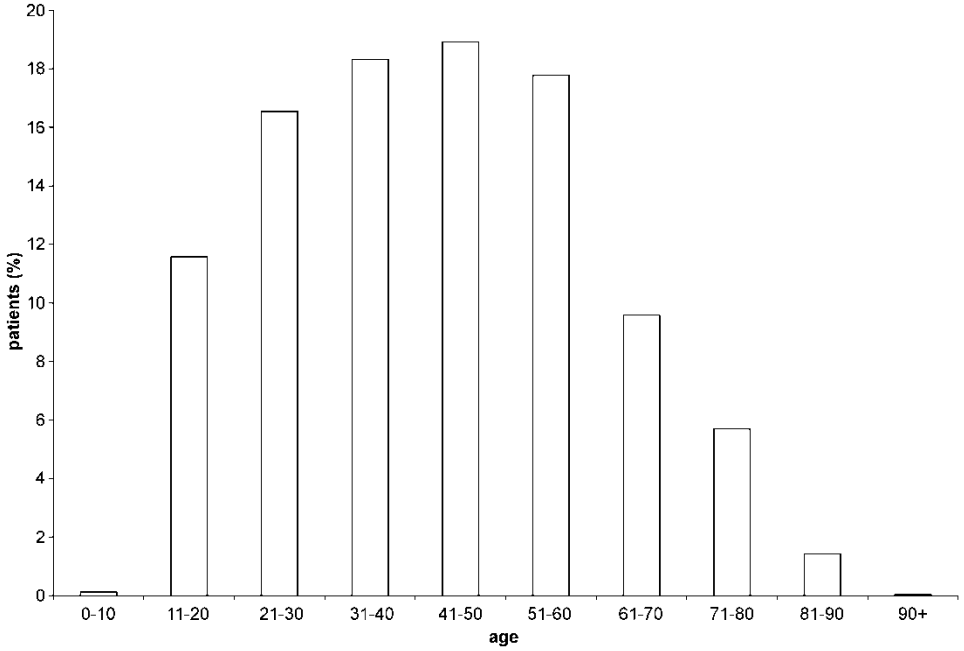

Fig. 1. Age distribution as a percentage of 3194 patients examined for suspected temporomandibular disorders (TMD) during an 8-year period.

found to be significantly associated with number of visits ($P < 0.001$); a higher proportion of women than men visited the clinic >8 times. Patient age was also related to number of visits ($P < 0.001$); comparatively fewer patients >60 years had >8 visits. Some diagnoses were also found to associate with number of visits: myo-arthralgia ($P < 0.001$), myalgia ($P < 0.01$), disk displacement without reduction ($P < 0.01$), disk displacement with reduction ($P < 0.01$), RA ($P < 0.05$), OA ($P < 0.05$). In relative terms, patients with the diagnoses myo-arthralgia and myalgia had 5–8 visits more often; those diagnosed with disk displacement without reduction or RA affecting the TMJs had >8 visits more often, while patients with disk displacement with reduction had 4 visits or less more often, and among those with OA in the TMJs in excess of 8 visits was more uncommon. Furthermore, the initial symptom degree was related to the number of visits ($P < 0.001$). It was found that patients who initially rated their subjective complaints as fairly severe or very severe more often needed >8 visits than those who rated them as moderate or lower.

Table 1. Distribution of 4464 registered diagnoses in 2721 patients

Diagnosis	No. of patients	% of patients
Disk displacement*	776	29
Tension-type headache	524	19
Myalgia + arthralgia	501	18
Arthritis	383	14
Myalgia	294	11
Osteoarthrosis	272	10
Orofacial pain	161	6
Rheumatic disease	113	4
Bruxism	565	21
Malocclusion	207	8
Other diagnoses†	668	25

* Disk displacement with reduction: 481 patients (62%). Disk displacement without reduction: 295 patients (38%).
† Other diagnoses: TMJ sounds (unspecified), TMJ ankylosis, TMJ luxation, tinnitus, vertigo, non-tension-type headache, whiplash associated disorders, neurogenic disorders, jaw fracture, no pathological findings, etc.

In 1732 out of the 2206 patients (79%) who had visited the clinic on more than one occasion, notes on the degree of complaints had been made at both the first and the last visit. More than half of the patients rated their initial complaints as fairly severe or very severe (Fig. 3). After treatment, 85% of the patients reported an improvement, and 3 out of 4 rated their residual complaints as mild or lower (Fig. 3).

The variable improvement was significantly associated with patient's gender ($P < 0.05$) and with symptom severity before treatment ($P < 0.001$). Proportionally, more women than men reported improvement, and those patients who initially rated their complaints as fairly severe or very severe more often reported improvement than those who rated them as moderate or lower. No relation was found between age, diagnosis, or number of visits and the dichotomous variable improvement/no improvement.

Changes between years and over time

The number of referrals per year was constant during the

Table 2. Distribution of 4984 different treatment interventions performed in 2594 TMD patients

Treatment	No. of patients	% of patients
Jaw exercises	1927	74
Interocclusal appliances	1450	56
Occlusal adjustment	765	29
Pharmacological therapy	319	12
Other treatments*	523	20

* Other treatments: intra-articular and intramuscular injections, physical therapies, acupuncture, biofeedback, other occlusal treatments, only counselling and reassurance.

8-year period covered by the investigation (mean 454 referrals/year, range 415–504). None of the variables source of referral, gender and age distribution, diagnoses, treatment modalities, initial degree of complaints, number of visits, or treatment outcome showed any variations of relevance between years or over time.

Logistic regression analysis

When testing for any explanatory association between the study variables and treatment outcome, defining improvement as a difference of at least one scale point on complaint assessment after treatment, not one single variable turned out to be of significance. However, if improvement was defined as at least a two-step change on the scale, three diagnoses, namely disk displacement without reduction, arthritis, and myalgia, were all significantly associated with favorable treatment outcome (odds ratio 2.06, 1.88, 1.80, respectively; confidence interval [CI]: 1.47–2.89, 1.37–2.59, 1.21–2.69, respectively), and one diagnosis, orofacial pain, was correlated with a negative one (odds ratio 0.61, CI 0.39–0.96).

Discussion

The field of stomatognathic physiology/TMD has been an independent topic of the core curriculum at dental faculties in Sweden since 1948. The first TMD clinics outside the faculties were established in the late 1970s and early 1980s, and today specialist resources are available in two-thirds of the 21 counties in Sweden. However, not until 1993 was stomatognathic physiology/TMD accepted and recognized as an independent odontological speciality in Sweden. The specialist training covers 3 years and follows a strict protocol established by the Swedish National Board of Health and Welfare (46). So far, there have been only a few reports published describing the patient profile, treatment panorama, and treatment outcome from specialist TMD clinics in the Swedish counties (3, 19, 39, 47, 48), and with few exceptions (19, 39) they cover only smaller cohorts and shorter periods of time. We thus believe it worthwhile to present the results from a specialist clinic for a longer time period, in this case 8 years.

Out of the 3630 patients referred to the clinic during the 8-year period, 436 (12.0%) never presented for clinical examination. The possible reasons are several. It is likely that some of the subjects were not interested in coming to

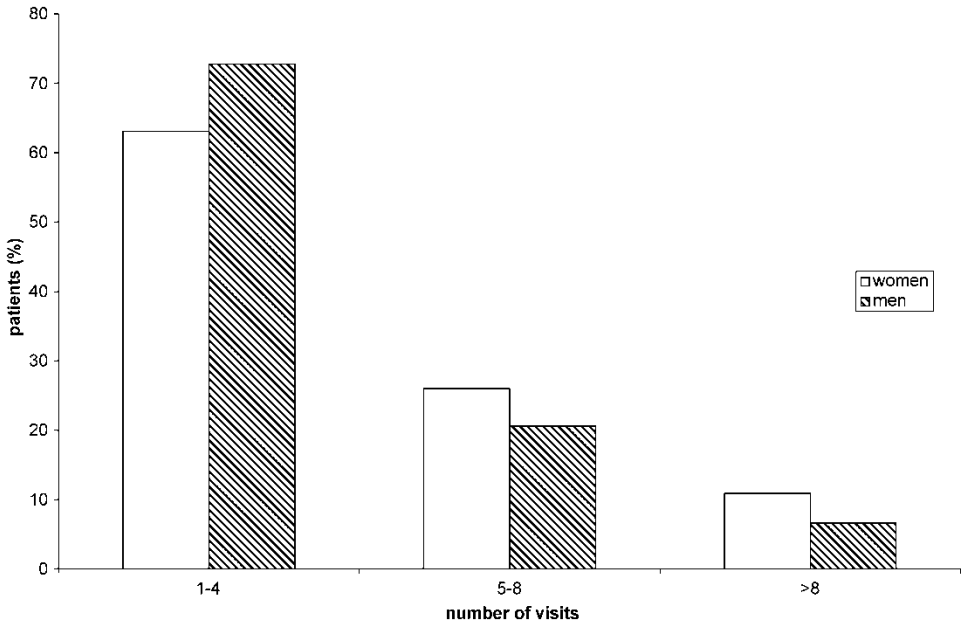

Fig. 2. Number of visits for 3194 TMD patients to complete their treatment.

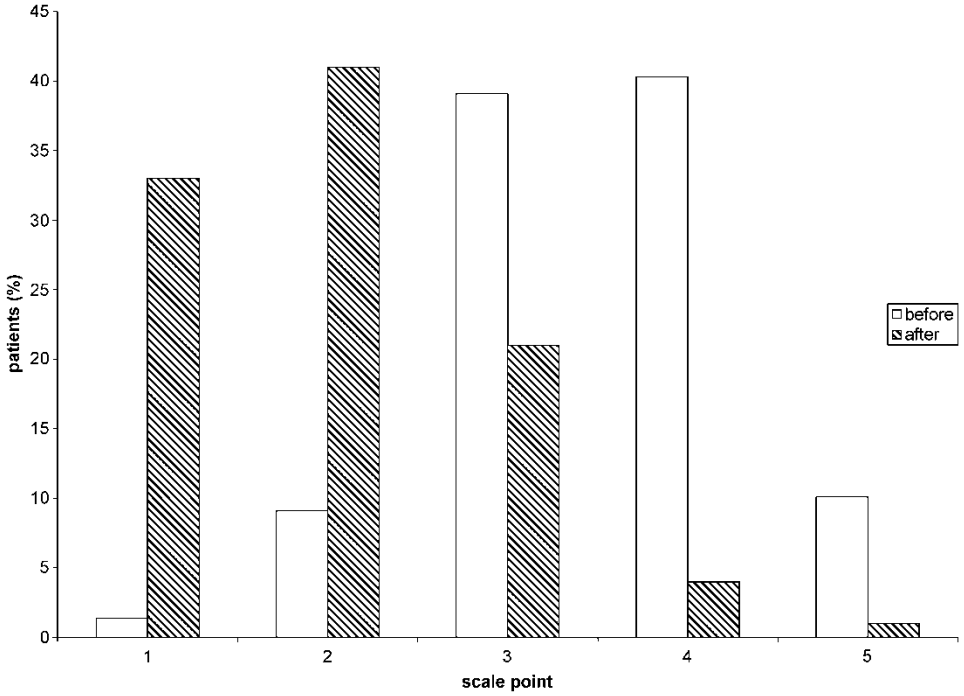

Fig. 3. Rating of subjective complaints before and after treatment according to a 5-point scale (1 = no or insignificant, 2 = mild, 3 = moderate, 4 = fairly severe, 5 = very severe).

the clinic, that some had recovered spontaneously, and that in the interim some had received help elsewhere. The proportion of dropouts is in close agreement with that reported by others (19, 39).

Another 988 patients, 31% of those examined, had paid only one visit to the clinic, and in many of these cases no TMD was revealed at the clinical examination. Some patients were satisfied having received an explanation about their complaints and did not request any treatment. In some cases, treatment was performed, but it was judged that there was no need for a clinical follow-up. Other patients rejected the treatment suggested.

In 21% of those patients who had more than one visit to the clinic, a grading of their complaints before and/or after treatment was missing in the database. This was partly due to the fact that many patients found it difficult to label their complaints according to the 5-grade scale used, and partly due to missed registrations. When analysed, the missing information was evenly distributed between gender, different age groups, and diagnostic groups. It is therefore unlikely that this dropout has influenced the results.

Twenty-eight percent of patients were referred by physicians, which is almost twice as high as that found in earlier patient materials (3, 8, 47) but in fairly good agreement with a recent report (48). The increased proportion of referrals from physicians is probably a reflection of a greater awareness among physicians that dentists can be a resource in the treatment of tension-type headache and orofacial pain conditions related to the function of the masticatory system.

As stated at the start of this article, numerous studies have shown that there is a large preponderance for women in clinical TMD materials, and that the majority of patients are around 40 years of age. The present patients did not differ in this respect, where 74% were women and the mean age for both genders was 42 years. The mean age is higher than that reported by others (5, 7, 8, 10), but close to that reported from another large clinical sample (9). It is likely that the average age in our study has been influenced by the fact that a number of children and adolescents in the area are treated for their TMD problems at paedodontic clinics.

Comparisons of the distribution of different diagnoses with other investigations are difficult, since different classification systems have been used in different investigations. In the present investigation, most patients could be labeled a diagnosis from ICD-9. Disk displacement with or without reduction, tension-type headache, myalgia, arthritis, and a combination of myalgia and arthralgia were the most common diagnoses used. In another study, where the same diagnostic classification system was used (19), only half of the patients could be given 'strict' TMD diagnoses, but, among those, the distribution of the diagnoses resembles the present material. However, and despite the different classification systems, there was also good agreement with other patient materials from university clinics (2, 27, 49) and from TMD clinics outside

the university (3, 10, 47, 48); an exception was headache, which was much more common in the present patient material. One probable explanation is that the other studies only presented the main diagnoses, while tension-type headache is a common subdiagnosis (19). When compared to a clinical material of children and young adults (18), the distribution of diagnoses was also fairly equal, with the exception of disk displacement with reduction, which was much more common in children and young adults.

The most commonly used treatment modalities for TMD in Sweden have been interocclusal appliances, jaw exercises, and selective occlusal adjustment (35). The figures presented for their use have ranged between 47% and 71% for appliances, 19% and 48% for jaw exercises, and 18% and 59% for selective occlusal adjustment (2, 3, 18, 27, 39, 47, 49). The differences between different clinics are, of course, a reflection of different traditions, as well as of diverging opinions about the indications and efficacy of the treatments.

In a recent literature review, Kreiner et al. (50) concluded that the use of interocclusal appliances in managing localized masticatory myalgia, arthralgia, or both, is sufficiently supported by evidence. In our material, 56% of the patients had received some kind of interocclusal appliance at the clinic. However, a larger proportion of the patients had received this as a part of their treatment, since many of them already had an appliance when they came to the clinic. These patients were given additive treatments, and their existing appliances were re-adjusted or modified when needed.

The use of jaw exercises as a treatment modality was much more common in the present material (74%) compared to other patient materials. This treatment is sometimes used as a single therapy, but more often as a complementary one. It is cost-effective and has been shown to be effective in reducing both signs and symptoms of TMD (51), and in our opinion merits a prominent place in the therapeutic arsenal for TMD.

The importance of occlusal factors for the development of TMD is today seriously in question (52, 53). It might therefore seem odd that a fairly large proportion of the patients in the present material (29%), as well as in other Swedish TMD materials, received occlusal adjustment as a part of their treatment. It is important to realize, however, that occlusion cannot be ruled out as a predisposing, initiating and/or perpetuating factor in the individual patient. Furthermore, the Scandinavian concept of performing selective occlusal adjustment should not be compared with different schools advocating occlusal equilibration (54). The Scandinavian concept is to eliminate gross occlusal interferences and specific symptom-provoking contacts, with the goal of getting a more harmonious and comfortable occlusion (55). In our opinion, this kind of occlusal adjustment is an important part of TMD treatment.

Irrespective of the treatment or treatment combinations used in treating TMD patients, a vast majority of patients will respond positively in respect of both clinical signs and subjective symptoms, and most need only a few visits. The present patient material did not differ in these respects; 85% reported an improvement after treatment and less than 10% needed more than 8 visits. The average number of 4.2 visits concurs with that reported by McCreary et al. (5) and Skeppar & Nilner (18), but is lower than given in some other studies (4, 6). The number of visits needed has been correlated to the severity of symptoms at first visit (2, 18, 27) as well as to age, where younger patients needed fewer visits compared to older (27).

A number of correlations between different diagnoses and other registered variables were found. As in a previous report (2), gender differences were found with some diagnoses. For example, the diagnosis of myo-arthralgia was more common in women, while that of disk displacement with reduction was, somewhat surprisingly, more common in men than in women. Surprisingly, since this diagnosis has previously been reported to be more prevalent among women than among men (19, 56, 57), and is thought to be related to general joint laxity, a condition that is found more often in women than in men (58). Disk displacement with reduction, as well as disk displacement without reduction, was more common than other diagnoses in younger patients, which corroborates previous reports (6, 18, 30). Patients with disk displacement with reduction more often described their complaints as minor and more often completed their treatment within four visits. On the other hand, those with disk displacement without reduction more often rated their complaints as fairly severe or very severe and more frequently needed >8 visits to complete treatment. This illustrates that disk displacement without reduction is a more severe condition, and, as previously shown (30), more resistant to treatment, compared to disk displacement with reduction.

Patients with the diagnoses OA and RA more often rated their complaints to be moderate compared to patients with other diagnoses, and, in line with a previous report (6), those with OA were more often >60 years of age. Patients with RA more often needed >8 visits, while those with OA and actually, patients in the oldest age group, independent of diagnosis, more often needed <8 visits to complete treatment. These findings were expected since OA is an age-dependent, non-inflammatory condition, and RA is a general disease, which makes it more refractory to treatment, and where more severe pain in other joints may overshadow the pain in the TMJs.

Patients with myalgia and myo-arthralgia more often needed 5–8 visits to complete treatment, whereas the mean number of visits to the clinic for all patients was 4.2. The need for more visits to complete treatment for these diagnoses, compared to other diagnoses, has been reported previously (3). One hypothetical explanation is that myalgia takes time to develop and, likewise, takes time to suppress.

In agreement with previous reports (29), orofacial pain was uncommon in young patients, and those who had this diagnosis more often rated their complaints as fairly severe

or very severe. Orofacial pain was the only diagnosis that predisposed to a poor treatment outcome. One explanation might be the severity of the pain, but this is contradicted by the finding that the whole group of patients who rated their symptoms as fairly severe or very severe, irrespective of diagnosis, reported improvement more often than those with moderate complaints or less. A more likely explanation for the poorer prognosis might be that orofacial pain is a less distinct diagnosis compared to the other TMD diagnoses. There is a greater risk that orofacial pain, with etiologic background other than functional disturbances in the masticatory system, can be misinterpreted as a TMD.

In the present study, a verbal 5-grade scale was used for subjective symptom assessment. This scale has been shown to have good precision and sensitivity when grading TMD pain (59, 60). Overall, men more often than women, and patients in the youngest age group, graded their symptoms as minor. The gender difference found is in accordance with other clinical TMD materials (2, 7, 22). That women, more often than men, needed >8 visits might be a reflection of gender differences in the degree of initial symptoms. Besides, it was to be expected that patients with more severe initial symptoms needed more visits. This latter finding corroborates previous studies (2, 18, 27).

As stated in the introductory paragraphs of this article, many previous investigations have failed to find any strong predictors for treatment outcome, as was the case in this present investigation. Of all the variables tested with the logistic regression analysis, none was found to be a predictor when improvement was defined as a positive change of at least one point on the scale used. The present study also failed to find any bearing of gender on treatment outcome, which concurs with previous studies (34, 36). Likewise, outcome was unrelated to patient age, which is in line with some studies (31, 34) but in contrast to others (23, 36) finding younger patients to have a better treatment outcome compared to older patients. However, when improvement was defined as at least a two-step change on the scale, three diagnoses turned out to be predictors of a positive treatment outcome, and one of a negative one. Patients with the diagnoses disk displacement without reduction, arthritis and myalgia had a 2.06, 1.88, 1.80 greater chance, respectively, of improving two steps compared to patients with other diagnoses, while those with the diagnosis orofacial pain had a 1.63 greater risk of not being improved. Successful treatment results and favorable long-term prognosis for internal derangement, OA, and myalgia have also been reported earlier (33).

It has previously been claimed that initial TMD diagnoses are not predictive of treatment outcome (4, 32). Others, however, have reported that specific diagnoses have influenced the outcome of TMD treatment, but when comparing with our results, the picture is not conclusive. For instance, in contrast to our finding, Skeppar & Nilner (18) found that among patients who did not improve after treatment, the diagnosis disk displacement (with and without reduction) was the most common, while others (6, 24) concluded that intracapsular TMJ dysfunction improved more than patients with myogenous TMD.

A possible interpretation is that the complex pattern, and the diverging results, can be explained by factors unrelated to specific diagnoses, such as differences in coping strategies and illness behavior (42). Other, not diagnosis-related, factors, such as health locus of control and major life events, have also been shown to be of importance for the outcome of TMD treatment (36).

Inconsistency in outcome results may also be partly explained by the different methods used for assessment of the treatment outcome. Some investigations have used patient's evaluation of treatment result, some have used the clinician's subjective assessment, some merely clinical signs, and some a combination of these methods. We have used a measurement of outcome based solely on the patient's experience of current symptoms before and after treatment. This method ensures a minor involvement of memory recall. Furthermore, we have determined and analyzed different degrees of improvement, which may imply different clinical significance.

The number of referrals, source of referral, gender and age distribution, diagnoses, treatment modalities, initial degree of complaints, number of visits, or treatment outcome, showed no clinically relevant variation between years, or over time, for the 8 years covered by the investigation. During this period, the same two senior consultants worked at the clinic, and a total of five different dentists received TMD specialist training. Inter-examiner reliability was ensured during the years through repeated calibration of the examiners. The stability of the patient material over time in respect of gender and age distribution, diagnostic panorama, and severity of initial complaints was expected. The interpretation of the finding that there was no change in number, or source, of referrals during the 8-year period is that the need for specialist TMD treatment in the region has reached a steady state. Furthermore, the clinic, established in 1979, is known among physicians and dentists in the area. The stability of the treatment panorama and treatment outcome reflects that a successful treatment concept has been developed, and maintained, at the clinic.

To conclude, the present patient material was stable from year to year over the 8-year period covered by the investigation. It was in good agreement with other previously published results from specialist clinics in respect of age and sex distribution, diagnoses and treatment panorama, as well as treatment outcome. Several patient and treatment characteristics were found to associate with each other. In line with previous investigations, no strong predictors for treatment outcome were found. However, the diagnoses disk displacement without reduction, arthritis, and myalgia were predictors of a significant improvement, while the diagnosis orofacial pain predicted a poorer prognosis.

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