Anamnestic Findings in Patients with Temporomandibular Joint Disease

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Since Costen described a syndrome that involved temporomandibular joint (TMJ) symptoms and neurologic as well as otolaryngologic problems, there has been much confusion about the terminology of etiology of temporomandibular joint diseases. Today, TMJ diseases are generally referred to as craniomandibular disorders (CMD) and their etiology is considered to be multifactorial. It is evident that females are predisposed to CMD. This seems to be due to endocrine factors and to the generally weaker structure of the female skeleton. Harinstein et al stress that there is a correlation between CMD and generalized joint hypermobility. Our own examinations have shown that more women exhibit increased flexibility of the joints than men. The role of occlusion in CMD pathogenesis has been discussed controversially and emotionally in the literature. Many authors consider, as first described by Costen, that the posterior bite collapse, which may be due to tooth loss, abrasion, or iatrogenic/prosthetic causes, is a decisive mechanism for development of a compression joint with CM pain symptoms. According to Ricketts, congenital deep bite results in a functional bite collapse and increased tenderness of the masticatory muscles. Contrary to Ricketts, Pullinger et al observed no correlation between deep bite and CMD. Diedrichs and Bockholt even found that the incidence of CMD increases with the number of teeth present in the posterior supporting zone because there is a higher probability of myoarthropathies. Slavicek and Pullinger et al stated that the Class II/1 occlusion can cause condylar dislocation, leading to CMD. Posterior prematurities as well as balance and hyperbalance contacts are regarded as the cause of a disturbed occlusion and articulation that may result in CMD. Wedel and Roberts, on the other hand, raised doubts about the role of occlusion in CMD etiology, as they found no correlation between the occlusal status and TMJ symptoms. Slavicek and Kulmer and Hoffmann stated that orthopedic/orthodontic treatment—particularly anterior or displacement of the mandible following activator treatment and excessive use of a high-pull headgear—can be considered a frequent iatrogenic cause of condylar malpositioning and subsequent CMD. Heiser and Koller, on the other hand, did not observe any degradation of the stomatognatic system following mandibular headgear treatment. Parafunction is considered to play an important role in the development of TMJ disorders. Sixty to eighty percent of the patients examined showed bruxism. According to Beyron, occlusal interferences may trigger bruxism, and canine guidance reduces the risk of bruxism. However, in the opinion of Seligman et al, bruxism is a centrally induced phenomenon, common to all human subjects, that is not influenced by local factors. Parafunctions result in excessive strain of the joint structures, which is due to the pressure generated during parafunction and, secondarily, to cranial displacement of the condyle caused by loss of vertical dimension due to abrasion of the posterior teeth.

The pathogenesis of dysfunction syndromes is closely connected with stress. Stress results in an increase in the tonus of skeletal muscles, particularly of the masticatory muscles. Moreover, TMJ patients respond more frequently to stress-inducing events than do healthy subjects. The increased muscle tonus is often relieved via the teeth (bruxism).
Isometric muscular action causes further increase in muscle tonus, resulting in a vicious circle. This prolonged muscular action can lead to increased tenderness and hypertrophy of the masticatory muscles or even masseter hypertrophy. Rugh and Ohrbach distinguish between nocturnal bruxism and parafunctions that become manifest during the day. The former is mainly caused by stress, whereas the latter are acquired behavior patterns. McCall et al. have found that TMJ patients have a specific personality structure: they show limited self-confidence, a higher level of aggression, and they often suffer from depression. Moreover, they are introverted and show neurotic tendencies such as phobias, sleep disturbances, hysterical behavior, and aggression. They are not capable of expressing their aggression, and instead reduce aggressive impulses via parafunctions.

Traumatic events that destroy TMJ integrity can cause CMD and also lead to a disturbance of growth during childhood. TMJ injuries can be caused by forceps delivery. Posttraumatic CMD was observed following injuries of the vertebral column - particularly of the cervical spine. TMJ involvement in rheumatic arthritis or transmission of an inflammation of the middle ear via the often very thin separating layer between TMJ and inner ear has also been reported.

It can be assumed that the factors causing CMD manifestation are as variable and diverse as the genetic material, the dietary and living habits, and the extent of psychologic stress affecting the human beings. The present study assessed the etiologic factors leading to CMD manifestation in a Central European population.

Materials and Methods

Ninety patients were chosen at random among all patients of the TMJ Clinic of the School of Dentistry of the University of Vienna, Austria. All patients underwent thorough clinical and instrumental functional analyses. The general medical history was assessed. The dental histories and the occlusal index were assessed. Furthermore, the patients were asked to fill out an additional questionnaire that was aimed at assessing possible causes of TMJ problems. This questionnaire included questions concerning the patient's age, profession, sex, birth trauma such as a forceps delivery, previous inflammations of the middle ear, trauma of the vertebral column - particularly of the cervical spine, previous insufflation anesthesia, problems with other joints, stress at work and/or private stress, habits such as bruxism and nail biting. Moreover, the general flexibility of the ligaments was assessed by using the Beighton index. The occlusal class was evaluated according to Angle's classification. Questions of the occlusal index that were related to the TMJ were evaluated separately. The mean value, standard deviation, and median were calculated. As far as all other data are concerned, the distribution in the total patient population as well as in men and women was calculated in percentages.

Both the occlusal index and the findings of the specific questionnaire - except for the Beighton index, the occlusal class according to Angle, age, and sex - are subjective data.

Results

Symptomatology

Seventy percent of the patients came to the TMJ clinic because they were suffering from TMJ clicking with/without pain in the temporoauricular region. The remaining 30% stated that pain was their main problem. The mean occlusal index (OI) of all patients was 2.07, showing a standard deviation of 0.55 and a median of 2. The female patients showed a mean OI of 2.09 ± 0.55 and a median of 2. The maximum
and minimum OI were 3.2 and 0.25 respectively. In the male patients, a mean OI of 1.96 ± 0.53 and a median of 2 were found. The maximum and minimum values were 3 and 1 respectively. When evaluating only those questions that specifically referred to the TMJ, a mean value of 2.17 ± 0.61 and a median of 2 were found (women 2.18 ± 0.62, median 2; men 2.14 ± 0.6, median 2.15).

Statistics

Ninety patients were examined. All patients were Caucasian.

Age: The age of the patients ranged between 13 and 71 years (women 13 to 67 years; men 15 to 71 years). The mean age was 31.86 years (women 32.81 years; men 28.65 years).

Sex: 70 patients (76.7%) were women; 20 (23.3%) were men.

Working position: 63 (70%) patients were working in a sedentary position (64% of the women and 90% of the men); 27 (30%) of the patients were working in a standing position (36% of the women and 10% of the men).

Stress: 49 (54%) of the patients stated that they were suffering from stress at work and/or private stress (51% of the women and 65% of the men); 41 (46%) patients answered this question in the negative (49% of the women and 35% of the men).

Parafunctions: 43% of the patients (46% of the women and 35% of the men) answered the question concerning habits such as bruxism, lip and nail biting, in the affirmative; 57% of them stated that they did not have any such habits (54% of the women and 65% of the men). These answers were confirmed by additional examinations of the fingernails and by examining the teeth for wear facets.

Psychologic problems: 7 (10%) female patients stated that they were suffering from psychologic problems.

Trauma: 18 (20%) patients stated that they had once suffered a trauma in the head and neck region, the TMJ having been affected in two cases (24% of the women and 5% of the men).

Insufflation anesthesia: 12 (17%) female patients had been subject to insufflation anesthesia (ISA) more than three times; 58 (65%) patients (63% of the women and 70% of the men) had been anesthetized by using ISA either once, twice, or three times; 20 (22%) patients (20% of the women and 30% of the men) stated that they had never been subject to ISA.

Forceps delivery: The medical histories of two (3%) female patients showed that forceps delivery was a possible perinatal TMJ trauma.

Flexibility of the general ligaments: According to the Beighton index, the flexibility of the general ligaments was considered hypomobile in 8 (11%) female patients, normal in 52 (58%) patients (50% of the women and 85% of the men), and hypermobile in 24 (27%) patients (30% of the women and 15% of the men). In 6 (9%) female patients, the Beighton index could not be clearly assessed.

Inflammation of the middle ear: The medical histories of 24 (27%) patients (26% of the women and 30% of the men) showed that these patients had suffered from an inflammation of the middle ear either once or several times.

Rheumatic diseases: 12 patients (13%) reported a chronic rheumatic disease (17% of the women and 0% of the men).

Orthodontic treatment: 35 (39%) patients stated that they had undergone orthodontic treatment (41% of the women and 30% of the men).

Occlusal type: 40% of the patients (42% of the women and 33% of the men) belonged to Class I of Angle's classification; 14% (15% of the women and 11% of the men) showed Class II/1, whereas 11% (9% of the women and 17% of the men) belonged to Class II/2; 6% (5% of the women and 11% of the men) were grouped in Class III. A crossbite in the posterior region was found in 12% (11% of the women and 17% of the men), while 5% (6% of the women and 0% of the men) had an anterior open bite. Asymmetric occlusion with Class I on one side and Class II on the other was found in 7% (9% of the women and 0% of the men). Asymmetric occlusion with a combination of Classes I and III was observed in 2% (0% of the women and 11% of the men). A maxillary complete denture with residual dentition in the mandibular anterior region was found in 2% (3% of the women and 0% of the men).

Side on which the patient sleeps: no statements.
Discussion

Clicking or, more rarely, frictional noises proved to be the main reason that the patients came to our TMJ clinic. These sounds are not always associated with pain; sometimes the patients feel so disturbed by clicking during yawning and especially during eating that they suffer massively and have a strong wish for treatment.

As in other studies, \textsuperscript{3, 6, 8, 9, 13, 16, 17, 24, 25} 70\% of the patients were women. This seems to be due to the fact that women generally show a weaker structure of the tissues and general ligaments than men.\textsuperscript{10, 13} In keeping with other studies, the mean age of the patients was approximately 30 years.\textsuperscript{17, 25}

Seventy percent of the patients were working in an office in a sedentary position. Due to the mostly casual way of sitting at the desk with an arched back, raised shoulders, and the neck flexed ventrally, the autochthonous muscles as well as the diagastric muscle and hypoglossus muscles can become tense, leading to an increase in tenseness of the masticatory muscles.

Myogenic symptoms of the craniomandibular system can be the result of this condition. The same process can also be activated in reverse order: malocclusion and occlusal interferences, particularly in combination with parafunctions (43\% of the patients affirmed that they had parafunctional habits), can cause an increase in masticatory muscle tenseness that may trigger the mechanism described previously, leading to tenseness of the back muscles with false posture.\textsuperscript{4}

The occurrence of parafunctions is closely related to the degree of emotional stress affecting the patient. Bruxism is a mechanism to reduce stress. Fifty-three percent of the patients stated that they were suffering from unfavorable stress (distress) at work and/or in their spare time. Only 10\% of the female patients and none of the male patients stated that they were suffering from psychologic problems. This small percentage, as compared to the 53\% of affirmative answers with regard to stress, seems to be due to the fact that stress is considered as something positive in the western civilization. Psychologic problems, on the other hand, are regarded as stigma so that most patients are not prepared to talk about these problems with their dentists.

Two thirds of the patients had been subject to insufflation anesthesia either once or twice. Hyperextension of the head and simultaneous wide opening of the mouth can often result in transitory TMJ problems.

In combination with other pathogenic factors, particularly if the patient shows hypermobile ligaments (assessment of the Beighton index revealed hypermobility of the ligaments in 30\% of the patients), this may also lead to permanent TMJ disease. While 20\% of the patients stated that they had once suffered a trauma in the head and neck region, mostly in car accidents, only 2\% said that their TMJ had been affected as well. This discrepancy is due to the fact that patients suffering from TMJ injuries are generally treated and followed up at special departments of surgical clinics.

Forty of the patients had undergone orthodontic treatment during their childhood or youth. TMJ diseases can develop due to too strong application of a headgear, which can directly damage the condyles. Also, a forward shift of the mandible due to activator treatment can result in iatrogenic disorders of the craniomandibular system.

Malocclusion is an etiologic factor of TMJ disorders that has often been described in the literature. Forty of the patients examined in the present study showed Class I occlusion. We also found an extremely high percentage of Class II/2 (10.84\%) and Class III (6\%) malocclusions (see Table 1) as compared to the values observed in a healthy Austrian population (only 2.7\% and 1.8\% respectively).\textsuperscript{39} Class II/2 occlusion often results in anterior disk dislocation. These patients exhibit a very steep articular eminence, the articular disk being positioned caudally to protect the condyle ventrally. Mandibular movement is inhibited due to the extremely steep maxillary anterior region, or functional movements show a retrusive component to avoid the anterior teeth during mastication or speech. The combination of retrusive mandibular movement and the ventral position of the disk can thus lead to TMJ internal derangement.

The results of the present study largely correspond to scientific results obtained in the USA and in
Table 1: Distribution of Angle Classes within the group of patients examined

<table>
<thead>
<tr>
<th>Angle Class</th>
<th>Total (%)</th>
<th>Women (%)</th>
<th>Men (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>39.76</td>
<td>41.54</td>
<td>33.33</td>
</tr>
<tr>
<td>II/1</td>
<td>14.46</td>
<td>15.38</td>
<td>11.11</td>
</tr>
<tr>
<td>II/2</td>
<td>10.84</td>
<td>9.23</td>
<td>16.67</td>
</tr>
<tr>
<td>III</td>
<td>6.02</td>
<td>4.62</td>
<td>11.11</td>
</tr>
<tr>
<td>Crossbite</td>
<td>12.05</td>
<td>10.77</td>
<td>16.67</td>
</tr>
<tr>
<td>Open bite</td>
<td>4.82</td>
<td>6.15</td>
<td>0</td>
</tr>
<tr>
<td>Mixed 1/2*</td>
<td>7.23</td>
<td>9.23</td>
<td>0</td>
</tr>
<tr>
<td>Mixed 1/3*</td>
<td>2.41</td>
<td>0</td>
<td>11.11</td>
</tr>
<tr>
<td>Max. edent.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mand. resid. teeth</td>
<td>2.41</td>
<td>3.08</td>
<td>0</td>
</tr>
</tbody>
</table>

* The patients showed Class I occlusion on one side and Class II or III occlusion on the other side.

Scandinavia. The pathogenesis of TMJ disease has shown to be related to predisposing factors that are closely connected with the western way of life. In many cases, treatment will thus only be successful when taking into account the psychologic stress affecting the patient.

References


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