Temporomandibular joint osteoarthrosis

Correlation of clinical and arthroscopic findings with degree of molar support

Anders Holmlund and Susanna Axelsson

Departments of Oral Surgery and Clinical Oral Physiology, Karolinska Institute, School of Dentistry, Huddinge, Sweden

Holmlund A, Axelsson S. Temporomandibular joint osteoarthrosis. Correlation of clinical and arthroscopic findings with degree of molar support. Acta Odontol Scand 1994;52:214–218. Oslo. ISSN 0001-6357.

The prevalence of temporomandibular joint (TMJ) osteoarthrosis and synovitis was compared in 60 patients with painful chronic locking of the TMJ. Thirty patients had reduced molar occlusion, and as controls, 30 age-matched fully dentate patients were examined. Assessment comprised clinical examination (crepitation), tomography (sclerosis and erosions), and arthroscopy (cartilage involvement) of the TMJ. Arthroscopic signs of osteoarthrosis and synovitis were frequent in both groups. The highest frequency of osteoarthrosis was diagnosed by arthroscopy. With regard to clinical signs and symptoms, tomographic signs of osteoarthrosis, and arthroscopic diagnoses, no statistical differences were found between fully dentate subjects and those with reduced molar occlusion. The results do not support the concept that prevention of TMJ osteoarthrosis is an indication for prosthetic replacement of lost molars. □ *Arthroscopy; dental occlusion; osteoarthrosis; radiography*

Anders Holmlund, Department of Oral Surgery, Karolinska Institutet, Box 4064, S-141 04 Huddinge, Sweden (fax: +46 8 7743875)

The association between loss of molar support and osteoarthrosis (OA) has been much debated in the temporomandibular joint (TMJ) literature.

An autopsy study of 115 cases showed a significant correlation between loss of molar support and macroscopic signs of OA at dissection (1). However, age distribution in groups with or without molar support was not ideal. In another autopsy study with a fairly even age distribution the frequency of TMJ OA was higher in edentulous than in dentate cases (2). The frequencies of occluding molar pairs were, however, not recorded. In a skull study loss of molar support correlated with OA (3). Recently, in another skull study the same first author also controlled for age and found a correlation with both tooth loss and OA (4). Age may therefore be as important as tooth loss. A limitation with skull studies is, however, that associated soft tissue changes cannot be documented. Epidemiologic studies have failed to demonstrate a correlation between TMJ dysfunction and loss of molar support (5–7). Furthermore, in another study of totally edentulous adults without dentures symptoms were infrequent and mild (8).

Overall, studies of patients with TMJ disorders indicate some relationship between signs of OA and loss of molar support. A comprehensive study of the effect of loss of molar support on the TMJ in 159 patients showed that in patients with loss of molar support the risk of joint disturbance was no greater than in those with intact occlusion (9). Later studies of different patient material have indicated a correlation between clinical (10) and radiographic (11–13) signs of TMJ OA and loss of molar support. In a previous arthroscopic study we found a weak correlation between arthroscopic diagnosis of TMJ OA and loss of molar occlusion (14). However, the influence of age was not

Table 1. Age distribution of the patient groups with full dentition and reduced molar occlusion

	Age group (years)			
	40–49	50–59	60–69	70–79
Full dentition Mean age, 55 years Range, 47–71 years	6	12	11	1
Reduced molar occlusion Mean age, 57 years Range, 43–74 years	4	10	14	2

investigated. The aim of this study was therefore to investigate further the association between dentition and joint status by comparing clinical and arthroscopic findings in age-matched subjects with or without intact molar occlusion.

Materials and methods

Inclusion criteria were clinical signs and symptoms of painful chronic locking of the TMJ (15) in patients, not improved by nonsurgical treatment for at least 3 months and with lack of or reduced molar occlusion. Over a period of 8 years 30 patients fulfilled the inclusion criteria. For comparison 30 age-matched patients with intact dentitions (third molars excluded) and painful chronic locking were included. Exclusion criteria were chronic arthritis, tumors, and major jaw deformity. Table 1 shows the age distribution for each group. The male to female ratios for the two groups were 6:24 (reduced molar occlusion group) and 4:26 (reference group). The number of occluding premolars and molars and distinctions between the subgroups of total loss of molar occlusion and partial loss of molar occlusion are shown in Table 2. The registrations were made in intercuspal position.

Before arthroscopy clinical examination was performed in accordance with established techniques (16, 17). Auscultation of joint sounds was evaluated by finger palpation and by stethoscope. Maximum opening, degree of protrusive movement, lateral

Table 2. Number of occluding posterior teeth in the patient groups with total and partial loss of molar occlusion

	No. of occluding pairs	
	Premolar	Molar
Total loss of molar occlusion, no. of patients		
6	0	0
1	1	0
7	2	0
5	3	0
Partial loss of molar occlusion, no. of patients		
2	4	0
1	2	1
1	3	1
1	4	1
1	0	2
3	3	2
2	4	2

and posterior joint soreness, and ipsilateral muscle (more than two muscles) soreness were registered. Additionally, corrected sagittal tomography was performed before arthroscopy (18). Radiographic criteria for OA were sclerosis of subchondral bone and erosions.

All arthroscopic examinations were performed with standard equipment and techniques (19). Unilateral examinations were performed, with the patients under local anesthesia. In all cases the superior compartment was examined with a 2.2-mm rod-

Table 3. Frequencies of clinical signs and symptoms and tomographic diagnoses of osteoarthrosis (OA) in the patient groups with full dentition and reduced molar occlusion

Clinical signs and symptoms	Full dentition (n = 30), no. (%)	Reduced molar occlusion (n = 30), no. (%)
Crepitation	17 (57)	20 (67)
Clicking	8 (27)	6 (20)
Joint soreness (lateral)	28 (93)	28 (93)
Joint soreness (posterior)	7 (23)	11 (37)
Muscle soreness*	19 (63)	14 (47)
Reduced max. opening	22 (73)	22 (73)
Reduced max. protrusion	16 (53)	22 (73)
OA at tomography	21 (70)	23 (77)

* More than two muscles on the ipsilateral side.

Table 4. Arthroscopic frequencies of osteoarthrosis (OA) and synovitis (SYN) in the patient groups with full dentition and reduced molar occlusion

Arthroscopic findings	Full dentition (n = 30), no. (%)	Reduced molar occlusion (n = 30), no. (%)
Osteoarthrosis	27 (90)	29 (97)
OA I	10 (37)	6 (21)
OA II	17 (63)	23 (79)
Synovitis	22 (73)	21 (70)
SYN I	15 (68)	16 (76)
SYN II	7 (32)	5 (24)

lens arthroscope (Karl Storz GmbH & Co., Tuttlingen, Germany).

Arthroscopic criteria of OA and synovitis (SYN) were classified as follows (20): OA I (slight): superficial fibrillation of fibrocartilage in a localized area; OA II (pronounced): one or more of the following features: pronounced fibrillation of fibrocartilage and disk, exposure of subchondral bone, disk perforation; SYN I (slight): capillary hyperemia and/or increased vascularity in a localized area; and SYN II (pronounced): three or more of the following features: capillary hyperemia, increased vascularity, fibrosis, villi, synovial hyperplasia.

Statistical analysis was performed with chi-square tests. Fisher's exact test was used when the expected frequencies were less than 5 (21).

Results

Table 3 shows the frequencies of clinical signs and symptoms and the tomographic diagnoses of OA in the two groups. Except for clicking and posterior joint soreness high frequencies were found. Statistically, no significant differences were found between groups.

A comparison of the findings presented in Table 3 was performed in two subgroups of the sample, patients with total loss of molar support (n = 19) and those with partial loss of molar occlusion (n = 11) (see Table 2). Except for clicking and tomographic diagnosis of OA, frequencies in the group with total loss of molar occlusion were slightly higher, but the differences were not statistically significant.

The arthroscopic findings are presented in Table 4. High frequencies of OA and SYN were found in both groups. OA was predominantly of grade II and SYN of grade I. A higher frequency of OA grade II was found in the group with reduced molar occlusion, but the difference was not statistically significant. Comparison of arthroscopic findings in patients with total loss of molar occlusion and those with partial loss of molar occlusion showed that OA grade-II changes were more frequent in patients with total loss of molar occlusion, but the difference was not statistically significant.

Discussion

There are always limitations in studies involving TMJ patients. One is the predominance of women. The male groups were too small for any conclusions to be drawn with regard to sex differences. On the other hand, the male to female ratio was in good agreement with similar studies involving arthroscopy (14, 20). The mean age was high in the patient group with reduced molar occlusion. Although it would have been interesting to compare the OA frequency in young individuals, this is obviously impractical in a Swedish patient material. The present material, although small, took 8 years to collect. Another limitation is that only patients with symptoms were included. On the other hand, the study was based only on patients with clinical signs and symptoms of painful chronic locking of the TMJ, representing the largest group of TMJ arthropathies referred for treatment. Furthermore, in recent studies, diagnosis of TMJ OA by arthroscopy has been shown to be highly accurate (22, 23) and probably unique in detecting an early phase of OA (22). Another limitation was that only unilateral joints were investigated, precluding arthroscopic correlation between ipsi- and contralateral molar occlusion. Arthroscopy is an invasive diagnostic and surgical method and as such requires proper indications. Furthermore, pain and locking are typically unilateral in patients with TMJ internal derangement, which is why only unilateral joints were examined.

Sclerosis and erosions were chosen as tomographic features of OA. Still, these features seem most reliable, although the importance of sclerosis especially for the temporal component has been questioned (24).

A correlation between TMJ crepitation and loss of molar occlusion has previously been found by Kopp (10). Although crepitation was somewhat more frequent in patients with reduced molar occlusion, no statistically significant difference was found in comparison with patients with full dentition. The frequency of OA was high in both the group with full dentition and the group with reduced molar occlusion. Comparison of diagnosis by clinical examination (crepitation), tomography, and arthroscopy showed that arthroscopy gave the highest diagnostic frequency. If arthroscopic early-phase OA (OA I) is excluded, the frequencies seem to correspond, in agreement with results in a previous study (22). Although OA-II changes were more frequently found in patients with reduced molar occlusion, the difference compared with fully dentate patients was not statistically significant. Our results thus support those in a recent study of a skull material (4).

The age-related increase in risk for OA may reflect the generally increased risk of disease associated with prolonged exposure to causal factors. Our results do not support the concept that reduced molar occlusion is an etiologic factor in TMJ OA. Prosthetic replacement of lost molars solely to prevent OA should not be a general principle in treatment planning. This does not imply that prosthetic replacements are contraindicated in individual cases, particularly when the patient is expected to benefit from the improvement in masticatory efficiency and general well-being.

References

1. Öberg T, Carlsson GE, Fajers CM. The temporomandibular joint. A morphologic study on a human autopsy material. Acta Odontol Scand 1971;29:349–84.
2. Axelsson S, Fitins D, Hellsing G, Holmlund A. Arthrotic changes and deviation in form of the temporomandibular joint—an autopsy study. Swed Dent J 1987;11:195–200.
3. Whittaker DK, Davies G, Brown M. Tooth loss, attrition and temporomandibular joint changes in a Romano-British population. J Oral Rehabil 1985;12:407–19.
4. Whittaker DK, Jones JW, Edwards PW, Molleson T. Studies on the temporomandibular joints of an 18th century London population (Spitalfields). J Oral Rehabil 1990;17:89–97.
5. Helkimo M. Studies on the function and dysfunction of the masticatory system. III. Analysis of anamnestic and clinical recordings of dysfunction with the aid of indices. Swed Dent J 1974;67:165–82.
6. Swanljung O, Rantanen T. Functional disorders of the masticatory system in southwest Finland. Community Dent Oral Epidemiol 1979;7:177–82.
7. Kirveskari P, Alanen P. Association between tooth loss and TMJ dysfunction. J Oral Rehabil 1985; 12:189–94.
8. Wilding RJC, Owen CP. The prevalence of temporomandibular joint dysfunction in edentulous nondenture wearing individuals. J Oral Rehabil 1987;14:175–82.
9. Boering G. Arthrosis deformans van het kaakgewricht [Thesis] (English summary). Groningen: Rijksuniversteit Groningen, Drukkerij Van Denderen, 1966:544–6.
10. Kopp S. Clinical findings in temporomandibular joint osteoarthrosis. Scand J Dent Res 1977;85:434–43.
11. Kopp S, Rockler B. Relationship between clinical

and radiographic findings in patients with mandibular pain and dysfunction. Acta Radiol [Diagn] (Stockh) 1979;20:465–77.
12. Hansson L-G, Hansson T, Petersson A. A comparison between clinical and radiologic findings in 259 temporomandibular joint patients. J Prosthet Dent 1983;50:89–94.
13. Rasmussen OC. Temporomandibular arthropathy. Clinical, radiologic, and therapeutic aspects, with emphasis on diagnosis. Int J Oral Surg 1983;12:365–97.
14. Holmlund A, Hellsing G, Axelsson S. The temporomandibular joint: a comparison of clinical and arthroscopic findings. J Prosthet Dent 1989;62:61–5.
15. Dolwick MF, Reid R, Sanders B, Rotskoff KS, Hall DH, Merrill RG, et al. 1984 criteria for TMJ meniscus surgery. Chicago: AAOMS ad Hoc Study Group on TMJ meniscus surgery, Section II: Diagnosis, 1984.
16. Agerberg G. Maximal mandibular movements in young men and women. Swed Dent J 1974;67:81–100.
17. Krogh-Poulsen WG. Klinisk undersögelse. In: Krogh-Poulsen WG, editor. Patofunction, bidfunction, bettfysiologi. Vol 2. 2nd ed. (in Danish). Copenhagen: Munksgaard, 1979:107–40.
18. Omnell K-Å. Radiology of the TMJ. In: Irby WB, editor. Current advances in oral surgery. Vol III. St Louis: CV Mosby, 1980:196–226.
19. Holmlund A. Diagnostic TMJ arthroscopy. Oral Surg Oral Diagn 1992;3:13–8.
20. Holmlund A, Gynther G, Reinholt FP. Rheumatoid arthritis and disk derangement of the temporomandibular joint. Oral Surg Oral Med Oral Pathol 1992;73:273–7.
21. Mehta CR, Patel NR, Gray R. On computing an exact confidence interval for the common odds ratio in several 2 × 2 contingency tables. JASA 1985;80:969–73.
22. Holmlund A, Hellsing G. Arthroscopy of the temporomandibular joint. A comparative study of arthroscopic and tomographic findings. Int J Oral Maxillofac Surg 1988;17:128–33.
23. Holmlund A. Diagnostic accuracy of temporomandibular joint arthroscopy. A comparison of findings during arthroscopy and arthrotomy. Oral Maxillofac Surg Clin North Am 1989;1:79–84.
24. Akerman S, Kopp S, Rohlin M. Macroscopic and microscopic appearance of radiologic findings in temporomandibular joints from elderly individuals. An autopsy study. Int J Oral Maxillofac Surg 1988:17:58–63.

Received for publication 6 October 1993
Accepted 20 December 1993