

Joint Space Analysis in Temporomandibular Joint Osteoarthritis and Occlusal Changes

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Background and Aims:

This pilot study aimed to evaluate changes in joint space (JS) using cone-beam computed tomography (CBCT) images of patients diagnosed with temporomandibular joint (TMJ) osteoarthritis (OA) and to determine the association between occlusal changes and JS.

Methods:

CBCT images were used to measure the anterior, superior, and posterior JSs of the sagittal plane. The differences in JS values over time and between groups were compared. The percentage change in the anteroposterior position of the mandibular condyle between groups was also analyzed.

Results:

Thirty-four subjects (mean age=43.91±20.13), comprising eight males (23.5%) and 26 females (76.5%), were divided into 18 patients with no change in occlusion (NCO) and 16 patients with a change in occlusion (CO) during TMJ OA. The JS measurements of the study subjects showed a decrease in anterior joint space (AJS) values over time. There was no difference in JS measurements between the groups at T1 and T2. AJS values measured at T1 were lower in the CO group than in the NCO group, but the difference was not statistically significant. In both groups, a posterior position of the mandibular condyle was initially observed with high frequency. However, there is a statistically significant difference in CBCT images taken after occlusal changes, with an increased frequency of condyles observed in the anterior or central positions.



Fig. 1. Joint space measured in the sagittal plane of a cone-beam computed tomography image of the temporomandibular joint. AJS, anterior joint space; SJS, superior joint space; PJS, posterior joint space.

JS measurements	T1			T2			Difference in measurements between time (T1-T2)	P-value ^b
	NCO (N=36)	CO (N=32)	P-value ^a	NCO (N=36)	CO (N=32)	P-value ^a		
AJS (mm)	3.09±1.14	2.60±0.93	0.054	2.82±1.32	2.51±0.96	0.276	0.19±0.73	0.036*
SJS (mm)	3.11±0.86	3.19±1.15	0.737	3.28±1.22	3.24±0.89	0.893	-0.12±0.97	0.318
PJS (mm)	2.05±0.62	2.29±1.13	0.256	2.23±1.00	2.42±0.93	0.421	-0.16±0.95	0.175

Table 1. Comparison of AJS, SJS, and PJS for the entire study population across time and between groups at each time
JS, joint space; AJS, anterior joint space; SJS, superior joint space; PJS, posterior joint space; NCO, no change in occlusion; CO, change in occlusion; T1, initial assessment; T2, one-year follow-up. Values are presented as mean±standard deviation.
^aIndependent t-test; ^bPaired t-test.
*p<0.05, paired t-test.

APP	NCO (N=36)			CO (N=32)		
	T1	T2	P-value	T1	T2	P-value
anterior	10(27.8)	7(19.4)		8(25)	12(37.5)	
center	6(16.7)	6(16.7)	0.718	2(6.3)	8(25)	0.025*
posterior	20(55.6)	23(53.5)		22(68.8)	12(37.5)	

Table 2. Frequency distribution of the APP of the condyle by group and time
APP, anteroposterior position; NCO, no change in occlusion; CO, change in occlusion; T1, initial assessment; T2, one-year follow-up. Values are presented as number (%).
*p<0.05, chi-square test.

Conclusions:

In conclusion, AJS decreased over time in TMJ OA, and the mandibular condyle became more anteriorly positioned with occlusal changes. Therefore, clinicians should diligently monitor mandibular condyle morphology and JS using CBCT, along with the patient's clinical symptoms, to treat and control TMJ OA effectively.