

A Comparative Study to Assess, the Diagnostic Quality of High Resolution Ultrasonography Versus Magnetic Resonance Imaging in Temporomandibular Joint Disorder Patients, in Open Mouth and Closed Mouth Positions

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ABSTRACT

Background: To evaluate the diagnostic efficacy of High-Resolution Ultrasonography as compared to Magnetic Resonance Imaging for the evaluation of symptomatic & non-symptomatic Temporomandibular Joint in open and closed mouth positions.

Materials & Method: This is a prospective study 6 individual (12 joints) with click, crepitation & pain in 9 joints & a control group of 2 normal joints of one individual were concluded in this study. One among the 6 patients with a symptom-free joint was included in this study as a control.

Results: In the present study, 7 joints diagnosed an anterior disc displacement with reduction 28.5% revealed displaced disc & 28.5% mildly anteriorly displaced disc 42.8% were not visible in the closed position. In open mouth view, all the reduced discs were visible.

Conclusion: The results of the current study imply that it is difficult to detect the actual disc position and a clear anatomical relation and structure of the disc in high-resolution ultrasonography in closed mouth view in disc disorders but open in mouth view It looks promising to detect the disc position. It's difficult to diagnose arthritic changes of TMJ in ultrasonography. However, further studies, including more patients, should be carried out to support and make available the widespread use of ultrasonography in the diagnosis of temporomandibular disorders and classification may be helpful for future studies.

Keywords: Temporomandibular Joint, High-Resolution Ultrasonography, Disc displacement, Magnetic Resonance Imaging.

INTRODUCTION

Temporomandibular joints disorders is a common disorder presenting with varied symptoms and clinical joint dysfunction¹. Temporomandibular joints (TMJ) disc anterior displacement is the most

prevalent cause of Temporomandibular disease²⁻⁶. While MRI stands as the golden standard for radiographic diagnosis of TMJ disorder, it is expensive, time-consuming and often may require

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sedation. As patients are subjected to frequent imaging evaluation, an alternative imaging modality like High-Resolution Ultrasonography has proven to be less costly, less time consuming and does not require sedation⁷.

In the last 23 years, since the study by Emshoff et al.⁸, comparing HR-USg to MRI imaging, intense has grown on using this modality to evaluate Temporomandibular joint.

MATERIALS AND METHODS

The study population consisted of 6 patients (12 joints), who reported to the O.P.D. of Dept. of OMFS, SDCH, Chennai with pain and clicking sound in unilateral/bilateral temporomandibular joints. One of the six patients included in the study was asymptomatic and served as the control.

After allocation of the 6 patients (12 joints), all the 12 joints were studied in high-resolution Ultrasonography and MRI in 24 positions (i.e. Open mouth position and closed mouth position).

RESULTS

In the present study 7 joints were diagnosed as having anterior disc displacement with reduction and out of which the ultrasonography revealed the displaced disc in 2 joints (28.5%) in closed-mouth position, 2 mildly anteriorly displaced disc(28.5%) showed false-negative results in closed mouth view and another 3 displaced discs (42.8%) were not visible in closed-mouth position (Fig.1-A) may be due to an anteromedial displacement of the disc (7). In open mouth view, all the reduced discs were visible over the condylar region in ultrasonography. In all the 3 normal joints discs were visible both in closed and open mouth view, but the anatomical disc structure and positions were not as clear as compared to magnetic resonance imaging (Fig.1-B).

In the present study in ultrasonography in 2 arthritic joints, the degenerated discs and eroded condyles were not. Visible in the right side in both closed and opened mouth positions. In the left side only eroded condylar head was visualized in closed mouth view, and the condylar head was faintly visualized in open-mouth view. The magnetic resonance imaging in these arthritic temporomandibular joint showed eroded condylar

head and degenerated discs without displacement, in close & open mouth positions ((Fig.2-A & 2-B).

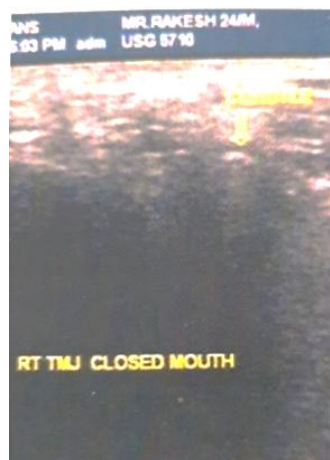


Fig 1a: USG Rt. Closed mouth.



Fig 1b: USG Rt. Open mouth.

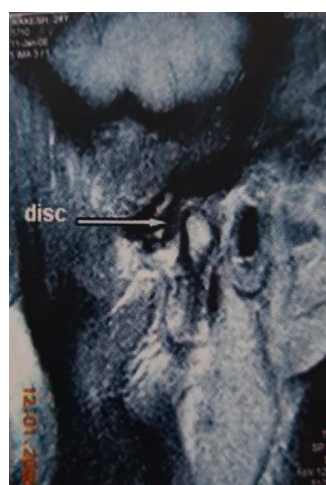


Fig 2a: MRI Rt. Closed mouth.

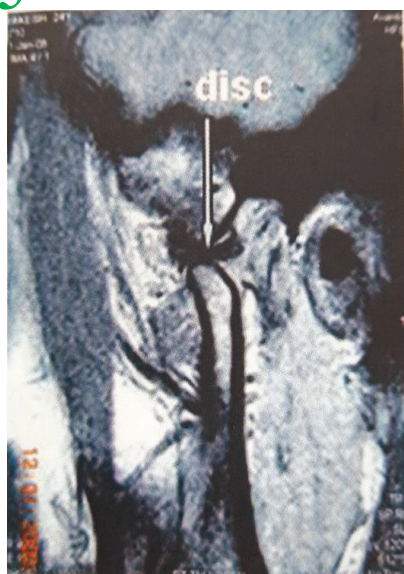


Fig 2b: MRI Rt. Open mouth.

Table 1a: Ultrasonographic finding of the discs.

Patients	Closed mouth		Open mouth view	
	Left side	Right side	Left side	Right side
1	V	V	V	V
2	NV	NV	V	V
3	NV	V	V	V
4	NV	NV	NV	NV
5	DD	DD	V	V
6	V	V	V	V

V-Visualized, NV – Not Visualized, DD-Displaced Disc

Table 1b: Magnetic resonance imaging finding of the discs.

Patients	Closed mouth		Open mouth view	
	Left side	Right side	Left side	Right side
1	N	N	N	N
2	DD	DD	RD	RD
3	DD	N	RD	N
4	AD	AD	AD	AD
5	DD	DD	RD	RD
6	AD	AD	RD	RD

N-Normal Disc, DD-Displaced Disc, RD-Reduced Disc, AD-Attrited Disc.

DISCUSSION

The history and physical evaluation are insufficient for the diagnosis of TMJ disorders, raising the need

for imaging studies⁹⁻¹². Panoramic radiography, CT, arthrography and MRI have been used for depicting TMJ disorders. Sonography is a low cost, non-invasive, quick, safe and widely available dynamic technique for depicting joint soft tissue¹³.

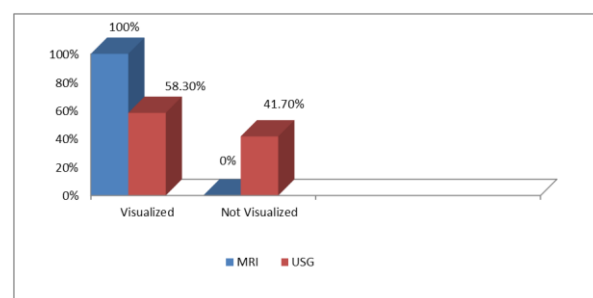
Table 2a: Comparison of disc visualization in closed mouth USG with MRI.

			MOUTH CLOSED		Total
			Visualized	Not Visualized	
GROUP	MRI	Count % of within GROUP	12 100.0%	0 .0%	12 100.0%
	USG	Count % of within GROUP	07 100.0%	5 41.7%	12 100.0%
Total		Count % of within GROUP	19 79.2%	5 20.8%	24 100.0%

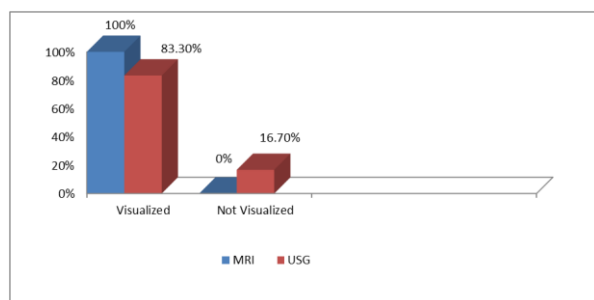
Table 2b: Comparison of disc visualization in open mouth USG with MRI.

			MOUTH OPEN		Total
			Visualized	Not Visualized	
GROUP	MRI	Count % of within GROUP	12 100.0%	0 .0%	12 100.0%
	USG	Count % of within GROUP	07 83.3%	5 16.7%	12 100.0%
Total		Count % of within GROUP	19 91.7%	5 8.3%	24 100.0%

Graph 1a: Comparison of disc visualization USG with MRI in closed mouth.



Graph 1b: Comparison of disc visualization USG with MRI in open mouth.



In closed mouth view out of 12 discs 7 discs (58.3%) were visualized and 5 discs (41.7%) were not visualized with a significant p-value of .012 in comparison to magnetic resonance imaging¹⁴. In open mouth view out of 12 discs 10 discs (83.3%) were visualized and 2 arthritic discs (16.7%) were not visualized in comparison to magnetic resonance imaging, which revealed all the disc positions clearly. Among this one case of bilateral mild anterior disc displacement with reduction showed false negative value. According to studies, ultrasonography proved to be accurate in detecting normal disc position and the presence of abnormalities in a disc-condyle relationship but, not so useful for the distinction between disc displacement with and without reduction¹⁵. In the present study, 7 joints were diagnosed as having anterior disc displacement with reduction and out of which the ultrasonography revealed the displaced disc in 2 joints (28.5%) in closed-mouth position, 2 mildly anteriorly displaced disc. (28.5%) in showed. False-negative results in closed mouth view and another 3 displaced discs (42.8%) were not visible in closed-mouth position might be due to an anteromedial displacement of the disc. In this study in 3 normal joints, the disc position was visualized in closed and open mouth position. It was poor in detecting condylar abnormalities, as suggested by studies underlining the poor use of ultrasonography in evaluating bone structures in other joints because of phenomena related to the deflection of ultrasounds when they intercept osseous tissues. In this study, a case of TMJ arthritis did not show the disc in the open mouth as well as closed mouth position¹⁶.

Ultrasonographic investigation of temporomandibular disorders requires a lot of experience, and the documentation is difficult, so the responsibility for an open surgery should lie

completely with the surgeons. One possibility would be to perform an ultrasound investigation first, and if there are some unclear symptoms or signs remaining then perform a magnetic resonance imaging investigation with a special focus on these items¹⁷.

CONCLUSION

The results of the current study imply that it is difficult to detect the actual disc position and a clear anatomical relation and structure of the disc in high-resolution ultrasonography in closed mouth view in disc disorders but open in mouth view It looks promising to detect the disc position. It's difficult to diagnose arthritic changes of TMJ in ultrasonography.

However, further studies, including more patients, should be carried out to support and make available the widespread use of ultrasonography in the diagnosis of temporomandibular disorders and classification may be helpful for future studies.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

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