

# Clinical Effectiveness Of Arthrocentesis In Improvement Of Mouth Opening - A Retrospective Study.

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**Abstract :** *Background* Intra-articular condition leading to disruption of the normal relationship of the articular disc to that of the articular eminence as well as the condyle is the main feature of internal derangement of the Temporomandibular joint . It may be seen during rest as well as during function . The chief complaints are of pain and limited mouth opening . Arthroscopy and arthrocentesis are the main types of treatments performed in order to treat internal derangements .  
**Materials and Methods** The study was designed as a retrospective study. A total of 22 patient records who had undergone arthrocentesis treatment were acquired by analysing the records of 86000 patients treated between June 2019 to March 2020 . Pearson correlation test was done to analyse the difference between the pre operative and postoperative mouth opening . The correlation between age and gender of the patient with the pre and the postoperative mouth opening was done using chi square test . SPSS version 20 software was used to carry out the statistics .

**Results** The mean and standard deviation values for pre and postoperative mouth opening were  $30.98 \pm 7.613$  and  $32.32 \pm 7.134$  respectively . After comparing the pre and postoperative mouth opening using Pearson's correlation test a statistically significant result was obtained . P value obtained after Pearson's correlation test was 0.015 . Additionally no significant difference was found after correlating age and gender with the pre and the postoperative mouth opening after applying Chi square test . P values were 0.197 and 0.436 when age was correlated with pre and postoperative mouth opening . P values for gender when correlated with pre and postoperative mouth opening were 0.445 and 0.470 respectively .  
**Conclusion :** Within the limitation of the study it can be concluded that there was a significant difference in the mouth opening after arthrocentesis procedure . There was no significant relation between the pre and the postoperative mouth opening with the age and the gender of the patient .

## 1. INTRODUCTION

Internal Derangement [ID] is one of the most commonly occurring forms of Temporomandibular joint disorders . Approximately 80% of all the temporomandibular joint disorders have some or the other form of internal derangement [1] . The disruption in the

relation between the articular disc and the eminence leads to various forms of internal derangements [2] . This type of deformity is seen in rest as well as during functional movement of the joint . Anchored disc phenomenon , painful click , closed lock and disc displacement with reduction are a few types of internal derangements seen in the patients suffering temporomandibular joint disorders . Reduced mouth opening , clicking , joint sounds and limited mouth opening are a few clinical symptoms seen in patients suffering from ID . Pharmacotherapy, TMJ splints and physical therapy are a few types of non surgical therapies that can be used to treat ID . Highly advanced or progressed cases may require surgical intervention [3] .

Arthrocentesis has very less complications and is minimally invasive. Basically the joint fluid is aspirated in this process . Two different needles are introduced in the upper joint space , the first needle aspirates the joint fluid whereas the second needle helps in lavage [4] . The lavage process helps in forcing apart the fossa from the disc and washes away the inflammatory mediators .Arthrocentesis is mainly used in cases of disc displacement without reduction . There have been many studies which show improved mouth opening and reduced pain after the process of arthrocentesis[5] , [6] , [7] , [8] . The first arthroscopic scan was done by Onishi in 1975 [9] . Sanders in 1986 introduced a much simpler technique for arthroscopic examination and lavage [10] . They have been many studies and clinical reports which suggest that arthrocentesis process has given good clinical results in terms of reducing temporomandibular joint pain and improving mouth opening [11] , [12] , [13] , [14] The procedure of arthrocentesis helps in restoring the translation of the joint as the adhesion between the disc and the condyle is reduced . Further lavage of the joint can be carried out through the cannula with the help of saline .

Previously our team had carried many studies which involved case reports [15] , surveys [16] , systematic reviews [17] , [17,18] , [19] , literature reviews [20] , [21] , [21,22] , [23] , In Vivo studies , [24] , [25] , [26] , In vitro studies [27] , [28] and retrospective studies [29] . Currently we are focusing on epidemiological studies and retrospective studies . The aim of this article was to evaluate how many patients suffering from reduced mouth opening and pain in the temporomandibular joint underwent arthrocentesis procedure and How much improvement was seen in the pre and post operative mouth opening .

## **2. MATERIALS AND METHODS**

This study was designed as a retrospective study. It was done in a university setup in the southern part of India. The ethical approval was received from the Ethical Research Committee, SIMATS, Chennai. The data extraction was done by reviewing the patient data bases of 86000 cases performed between June 2019 to March 2020 . Out of these, 22 cases had undergone arthrocentesis treatment due to TMJ complaints . The pre operative and the post operative mouth opening [ in mm ] was evaluated . Paired t test was done to compare the pre and the post-operative mouth opening . Following this Pearson's correlation test was done in order to evaluate the differences between in the pre and the port operative mouth opening. Chi-square test was done in order to evaluate the correlation between age and gender with that of pre and post operative mouth opening . The statistical tests were performed using SPSS version 20 software .

Dependent variables included patient having pain due to temporomandibular joint involvement , reduced mouth opening , age of the patient , gender of the patient , TMJ disc displacement without reduction .

Independent variables included cases having reduced mouth opening due to reasons other than temporomandibular joint involvement , patients suffering from Oral Submucous Fibrosis , patients having myofascial pain dysfunction syndrome .

### 3. RESULTS

The mean and standard deviation values for pre and postoperative mouth opening obtained by applying paired t test were  $30.98 \pm 7.613$  and  $32.32 \pm 7.134$  respectively [Table 1]. Patients of the younger and middle age groups mainly underwent arthrocentesis treatment [Figure 1]. Females predominantly underwent arthrocentesis treatment signifying that they were more prone to temporomandibular joint disorders [Figure 2]. After comparing the pre and postoperative mouth opening using Pearson correlation test a statistically significant result was obtained. P value obtained after Pearson's correlation test was 0.015, signifying that arthrocentesis was effective in improving mouth opening. Additionally no significant difference was found after correlating age and gender with the change in the mouth opening after applying Chi square test. P values were 0.381 and 0.658 when age and gender were correlated with the change in the mouth opening. (Figure 3,4)

### 4. DISCUSSION

Although this retrospective study has a small sample size the results finally obtained can be compared with the results of various other studies. Al-Belasy and Dolwick in their review on the success rate of arthrocentesis treatment showed that the maximum number of patients showed reduced pain and improved mouth opening after arthrocentesis treatment [30]. Similarly with the results obtained in the current study maximum patients showed improved mouth opening post operatively. Emshoff and Rudich in their study showed that arthrocentesis helped in reducing pain and improving mouth opening in patients suffering from chronic temporomandibular joint disorders [30,31]. Israel et al in his study showed that the young population had a better chance of improvement in the mouth opening and reduction in pain after arthrocentesis treatment as compared to the older population group [32]. In the current study no significant correlation could be found between age and improvement in the mouth of opening.

There were a few patients who did not respond to the therapy the reason behind it might be long-standing pathology without any treatment at the the opportune time which might have led to the progression of the disease causing to intra-articular adhesions, deformity in the disc and fibrosis Extensive adhesions might lead to lysis and release of the disc becomes very difficult in these patients directly affecting the treatment outcome [33]. Murakami et al in his study suggested that arthrocentesis and arthroscopy are effective in the treatment of locked temporomandibular joints but they concluded that arthrocentesis should be reserved only in cases of acute cases [34]. Goudot et al on the other hand found that arthroscopy was more effective in treating TMJ disorders as compared to arthrocentesis[35]. There are several risks that go hand in hand with arthrocentesis procedure, potential complications include damage to the facial and auriculotemporal nerve, tympanic membrane perforation and breach of the skull [36]. There is also the chance of development of swelling in the preauricular area while extravasation of fluid during arthrocentesis. No complications were encountered while performing arthrocentesis procedure in the patients included in this study. Limitations of the study include, reduced sample size due to limitation of available data. Study is limited geographically as it is institutional based hence it is not possible to generalise the results with respect to the entire Indian population. Only improvement in the mouth was evaluated. There are several new techniques that are being undertaken in order to treat tmj disorders. advanced methods of arthroscopy and also being developed to make the procedure much more convenient and less technique sensitive. Further Research should be encouraged in this

topic of interest to increase the awareness and knowledge about treatment of temporomandibular joint disorders.

## 5. CONCLUSION

Within the limitations of the study it can be concluded that there was a significant difference in the mouth opening after arthrocentesis procedure suggesting that arthrocentesis was very effective in improving the post-operative mouth opening. There was no significant relation between the pre and the postoperative mouth opening with the age and the gender of the patient.

## 6. ACKNOWLEDGEMENTS

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### Author contributions

Author 1 Harsh Kasabwala carried out the study by collecting the raw data handwriting the manuscript with the necessary statistical analysis. Author 2 DrSubhabrataMaiti and Author 3 DrKiran Kumar helped in guiding the study and supervised the statistics.

### Conflict of interest

There was no conflict of interest among the authors

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## LIST OF CHARTS AND TABLES

Table 1: Mean and standard deviation values of pre and postoperative mouth opening obtained after applying paired t test

Table 2: This table represents the association of age and gender with the change in the mouth opening after arthrocentesis treatment.

Figure 1: This bar graph represents the prevalence of patients having temporomandibular disorders and their requirement for arthrocentesis in different age groups.

Figure 2: This bar graph represents the frequency percentage of males and females undergoing arthrocentesis treatment.

Figure 3: This bar graph represents the association between gender of the patient with the change seen in the mouth opening.

Figure 4: This bar graph represents the association between age with change in mouth opening after arthrocentesis treatment.

**CHARTS AND TABLES**

Mouth opening	Mean	N	Std. Deviation
post op mouth opening	32.32	22	7.134
pre op mouth opening	30.98	22	7.613

Table 1: This table shows the mean and standard deviation values of pre and postoperative mouth opening obtained after applying paired t test. The mean and standard deviation values for post operative mouth opening are higher than that of the preoperative mouth opening. This suggests that the mouth opening of the patients improved after undergoing arthrocentesis treatment. There was a statistically insignificant association between the pre and the postoperative mouth opening of the patient after applying paired t test (Paired t test association 0.968)

ASSOCIATION TESTS PERFORMED	ASSOCIATION OF PREOPERATIVE WITH POSTOPERATIVE MOUTH OPENING	ASSOCIATION OF AGE WITH THE CHANGE IN THE MOUTH OPENING	ASSOCIATION OF GENDER WITH THE CHANGE IN THE MOUTH OPENING
Pearson correlation test value	0.015	0.293	0.013

Spearman correlation values	test	0.001	0.360	0.015
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Table 2: This table shows the Pearson and Spearman association values obtained when preoperative mouth opening and postoperative mouth opening were correlated, when age was correlated with the change in the mouth opening and when gender was correlated with the change in the mouth opening. All the values obtained were < 1 signifying that the association of age and gender with change in mouth opening along with the association between pre and post operative mouth opening was statistically insignificant.

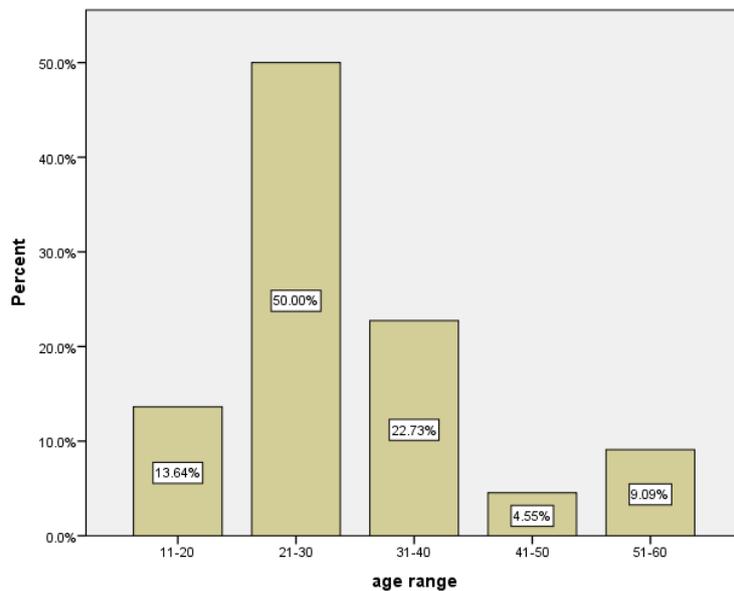


Figure 1: This bar graph represents the prevalence of patients having temporomandibular disorders and their requirement for arthrocentesis in different age groups. The X axis shows the different age ranges of patients undergoing arthrocentesis, the Y axis shows the percentage of occurrence. This signifies that patients undergoing arthrocentesis treatment were mainly in the younger or middle aged groups.

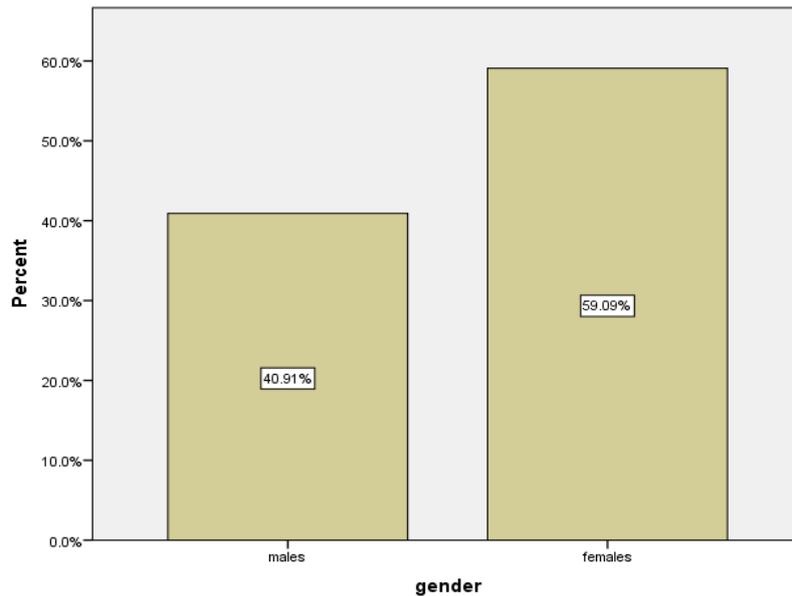


Figure 2: This bar graph represents the percentage of males and females undergoing arthrocentesis treatment. The x-axis shows the two different genders and the y axis shows the percentage of patients undergoing the treatment. Approximately 40.9 percentage of males and 50.09 percentage of females underwent arthrocentesis treatment. This suggests that females were more prone to temporomandibular joint disorders and required arthrocentesis treatment.

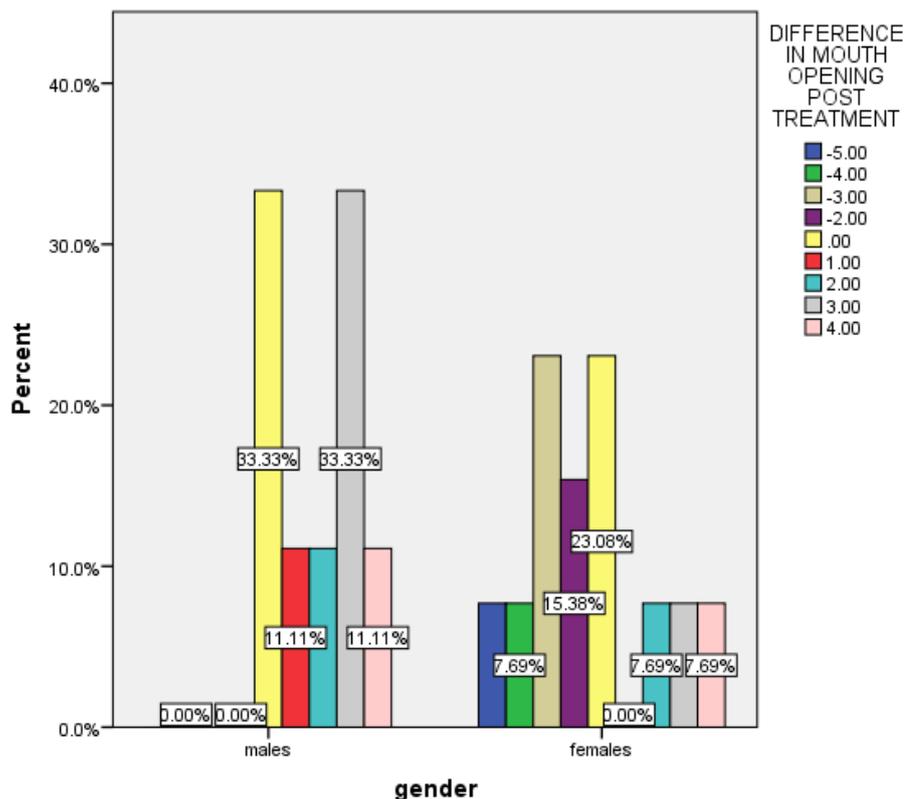


Figure 3: This bar graph represents the association between gender of the patient with the change seen in the mouth opening. The x-axis denotes the change in mouth opening shown by the patients of different genders and the y axis shows the percentage of change in mouth opening. The dark blue bars signify 5 mm reduction in mouth opening, the green bars signify

4 mm reduction in mouth opening, the beige coloured bars signify 3mm reduction in mouth opening, the purple colour bars signify 2mm reduction in mouth opening, the yellow colour bar signify no improvement in mouth opening, the red colour bars signify 1 mm increase in mouth opening, the sky blue coloured bars signify 2mm improvement in mouth opening, the grey colour bar signify 3mm improvement in mouth opening, the pink colour bars signify 4mm improvement in mouth opening. This figure depicts that 33.33% of males showed no difference in mouth opening. 11.11% of meals showed 1mm improvement in mouth opening. 33.33% of male showed 3mm improvement in mouth opening. 11.11% of male showed 4mm improvement in mouth opening. 7.69% of females showed 4 mm reduction in mouth opening. 15.38% of females showed 2 mm reduction in mouth opening. 23.08% of females showed no difference in mouth opening. 7.69% of females showed 2mm improvement in mouth opening. 7.69% of females showed 4mm improvement in mouth opening. 7.69% of females showed 3mm improvement in mouth opening. This signifies that males showed better improvement in mouth opening as compared to females. This shows that most of the fixed restorations provided to the patients were provided by undergraduate students. The association between age of the patient and the change in the mouth opening was not statistically significant. (Chi square association value - 0.381, Pearson's correlation test valve 0.015).

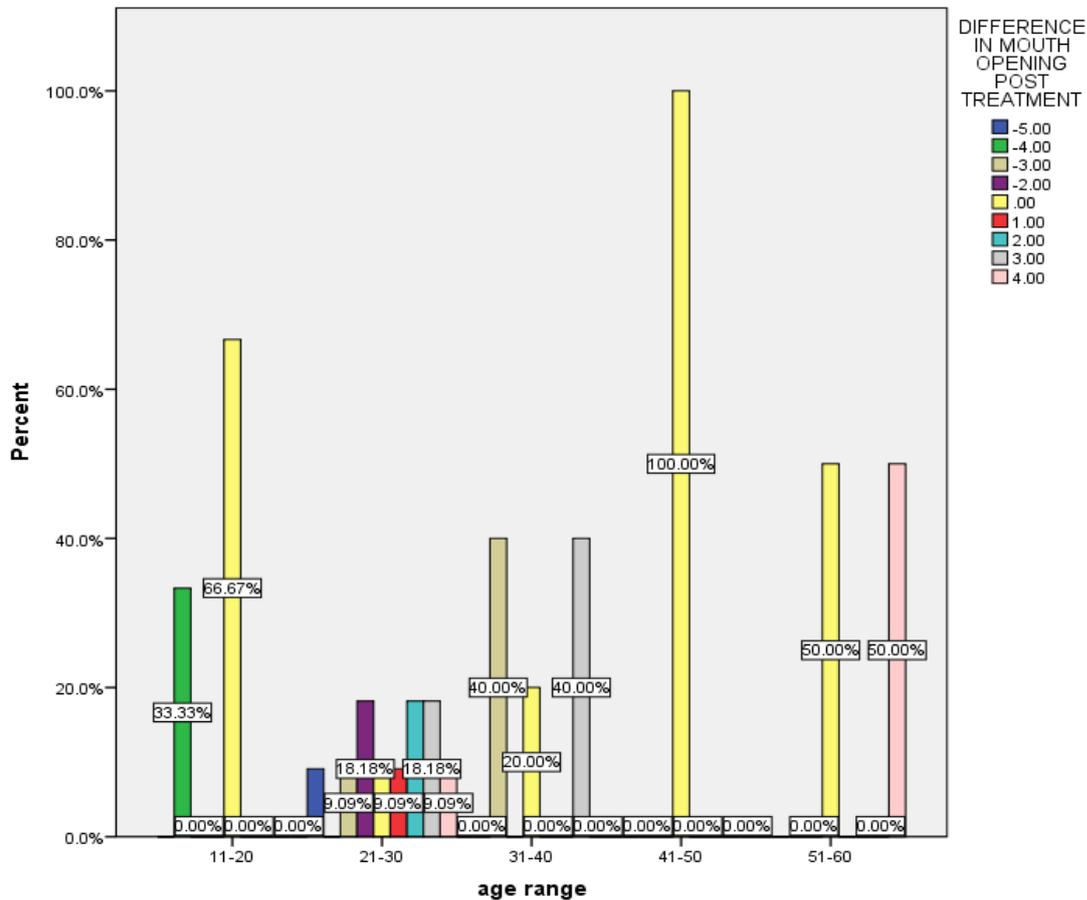


Figure 4: This bar graph represents the association between age with change in mouth opening after arthrocentesis treatment. The x-axis denotes the change in mouth opening shown by the patients of different age groups and the y axis shows the percentage of change in mouth opening. It is observed that 66.6% of individuals lying in the age group of 11 to 20

showed no difference in the mouth opening after arthrocentesis treatment. 33.3% of individuals lying in the age group of 11 to 20 showed 4 mm reduction in mouth opening, 18.2% of individuals lying in the age groups of 21 to 30 showed 2mm reduction in mouth opening, 9% of individuals lying in the age group of 21 to 30 showed 3mm reduction in mouth opening, 18.2% of individuals lying in the age group of 21 to 30 showed 2mm and 3 mm improvement in mouth opening respectively. 40% of individuals lying in the age group of 31 to 40 showed 3mm improvement in mouth opening. There was no improvement in mouth opening seen between the age groups of 41 to 50. 50% of the individuals lying in the age group of 51 to 60 showed 4mm improvement in mouth opening. The association between gender of the patient and the change in the mouth opening after arthrocentesis treatment was not statistically significant. (Chi square association value - 0.658, Pearson's correlation test value- 0.013).