

The versatility of surgical lower repositioning of condyle in the treatment of Internal Derangement of Temporomandibular Joint.

¹Dr. Tauseef Fazal, MDS, Department of Oral and Maxillofacial Surgery, Mithila Minority Dental College & Hospital, Darbhanga, BIHAR.

²Dr. Zaid Ali Khan, MDS, Department of Oral and Maxillofacial Surgery, Mithila Minority Dental College & Hospital, Darbhanga, BIHAR.

³Dr. Samreen Fatma, MDS, Department of Oral and Maxillofacial Surgery, Mithila Minority Dental College & Hospital, Darbhanga, BIHAR.

⁴Dr. Amit Kumar Singh, PGT, Department of Oral and Maxillofacial Surgery, Mithila Minority Dental College & Hospital, Darbhanga, BIHAR.

Corresponding Author: Dr. Zaid Ali Khan, MDS, Department of Oral and Maxillofacial Surgery, Mithila Minority Dental College & Hospital, Darbhanga, BIHAR.

Citation of this Article: Dr. Tauseef Fazal, Dr. Zaid Ali Khan, Dr. Samreen Fatma, Dr. Amit Kumar Singh,“ The versatility of surgical lower repositioning of condyle in the treatment of Internal Derangement of Temporomandibular Joint.”, IJDSIR- August - 2020, Vol. – 3, Issue -4, P. No. 253 – 260.

Copyright: © 2020, Dr. Zaid Ali Khan, et al. This is an open access journal and article distributed under the terms of the creative commons attribution noncommercial License. Which allows others to remix, tweak, and build upon the work non commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

The purpose of this study was to determine, if the surgical lower repositioning of condyle is effective in the management of the patient with TMJ internal derangement without disc displacement associated with TMJ pain and dysfunction. The treatment outcome is evaluated by producing more functional articular disk-condyle relationship by inferior repositioning of the condyle. Total of 20 patients diagnosed with internal derangement associated with TMJ pain and dysfunction met the inclusion criteria in which 12 patients had left TMJ internal derangement and 8 patients had right TMJ internal derangement. Thorough history, maximal

mouth opening, clinical dysfunction, and pain indices were used to determine the frequency and severity of Temporomandibular joint dysfunction. Considerable improvement in TMJ pain and interincisal opening were noted in the entire patient. At the end of minimum follow up of one year the pain on visual analogue scale is noted 0 and means interincisal opening 34.0mm. Post-operatively normal occlusion noted in all patients. Surgical treatment of lower repositioning of condyle in the treatment of TMJ internal derangement is beneficiary and resulted in improved Temporomandibular joint function and resolution of symptoms.

Keywords: Articular Disc; Condylotomy; Inter-incisal mouth Opening; Occlusion.

Introduction

The Temporomandibular Joint (TMJ) is one of the most complex joint of our body where the mandible articulates with the cranium. The joint is also termed as a Ginglymoarthrodial joint as it provides for both the hinging as well as gliding movements. Separating the two bones is the Articular Disc that serves as a non-ossified bone which permits the complex movements of the joint. Sometimes the increased masticatory load leads to increased intra articular pressure thereby resulting in TM disorders such as Internal Derangement, characterized by dysfunction involving the condyle-disk relationship. Internal derangement of the Temporomandibular Joint (TMJ) may be defined as a disruption within the internal aspects of the TMJ in which there is a displacement of the disc from its normal functional relationship with the mandibular condyle and the articular portion of the temporal bone[1]. Hey Davis in 1814 was the first person to describe Internal derangement as localized mechanical fault interfering with the smooth action of a joint[2]. TMJ Internal derangement is considered to be a basic mechanism in the pathogenesis of TMJ dysfunction. Two types of derangements of the condyle-disk complex are commonly identified in sagittal section of the magnetic resonance imaging (MRI): anterior disk displacement with reduction and anterior disk displacement without reduction. Patients with TMJ internal derangement often complain of limited function and pain additional to the clicking. The pain is the result of the condyle articulating against the bilaminar zone. This zone is not designed to function as an articular area because it contain blood vessels and nerves and pain is felt as the condyle presses against it[3]. Internal derangement requiring clinical attention can be further defined as a condition that

produces pain and significant limited range of motion. For purpose of this discussion internal derangement is classified according to the Wilkes System [4]. 1) Early reducing disc displacement. 2) Late reducing disc displacement 3) Non reducing disc displacement- acute. 4) Non reducing disc displacement- chronic .5) Non reducing disc displacement—chronic with osteoarthritis. Usually the treatment begins with conservative, nonsurgical therapies first, with surgery left as the last option. The majority of patients can be successfully treated by non-surgical therapies and surgical interventions may be required for only a small part of population (Ingawalé and Goswami, 2009) [5]. Humphrey was the first person to introduce the surgical management of TMJ in the year 1856 and since then numerous invasive approach came into existence to correct Internal derangement like disc repositioning procedures, ramus osteotomy, condylotomy etc. In our study we operated 20 patients with Internal Derangement by the surgical lower repositioning of condyle with satisfactory results.

Materials And Methods

Twenty patients who reported to the Department of Oral and Maxillofacial Surgery, Mithila Minority Dental College & Hospital, Darbhanga, Bihar, with the chief complain of pain and limited mouth opening and were diagnosed with Internal Derangement of TMJ having Anterior Disc displacement without reduction were included in the study.

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical Standards.

Informed consent was obtained from all individual participants included in the study. Patients who had some underlying systemic illness which contraindicated

for the surgery, having Internal Derangement of TMJ with Osteoarthritis, recurrent cases and who refused to give the consent were excluded from the study.

Extra-orally inspection was carried out to look for Facial deformity, Scar mark, Chin deviation and Facial nerve function. Intra-orally inspection was done for deviation of midline, mouth opening (from incisal edge of maxillary central incisor to incisal edge of mandibular central incisor), mid incisor shifting, side to side movement, Occlusion, missing teeth, faulty restorations, faulty prosthesis etc. Both affected and non-affected side TMJ was examined for mouth opening and diminished movements. Both joints were palpated at rest as well as during function. Chin deviation was measured on mouth opening and at rest. Other clinical parameters like joint tenderness and clicking sounds were also evaluated. All the patients were examined using Magnetic Resonance Imaging (MRI) and hence the diagnosis of TMJ internal derangement was confirmed. MRI imaging provides an important modality for the evaluation of TMJ internal derangements because it is noninvasive and accurate. Furthermore, MR imaging provides a method in which bilateral examinations can be readily performed.

Under general anesthesia naso-endotracheal intubation was done. Using no.15 blade Reteomandibular incision was given and thereafter layer dissection was done to expose the sub condylar region as well as sigmoid notch. Preoperatively maxillomandibular fixation was done using Erich Arch bars. Following exposure, condyle was cut at subcondylar level (Figure 6) with the help of oscillating saw and 1-2 mm of gap was created followed by fixation of proximal & distal segments using 2mm thickness four hole with gap mini plate (Figure 7). The wound was closed in layers and sutures were removed on the seventh postoperative day. The

patients were kept on soft diet for 1 week post-operatively.

Assessment of patients was done at the end of one month, six months and twelve months post- operatively under the following parameters: Pain (0-10 on V A S), Inter- incisal mouth opening (mm), Occlusion- Normal / Deranged, Facial nerve function and Patient Satisfaction.

Statistical Analysis

The data was entered into the excel sheet. The data was analysed using SPSS (Statistical Package for Social Sciences) 20.0 version. The data was analysed for probability distribution using Kolmogorov Smirnov test, the p value<0.05 indicated that the data was not normally distributed thus non-parametric test of significance were applied. The descriptive statistics were performed and values were presented as median and inter-quartile range. The comparison of continuous variables such as pain and maximum mouth opening was done using Friedman test. The p value<0.05 was considered statistically significant. Confidence interval was set at 95%.

Results

A total of 20 patients with internal derangement without disc displacement who met the inclusion criteria were included in the study. Out of 20 patients, 13 patients were female and 7 patients were male. The mean age of patient was 42.9 years, ranging from 24 to 65 years. With regard to the site involved, 12 patients had left TMJ internal derangement whereas 8 patients had right TMJ internal derangement.

The study included 20 subjects with the mean age of 42.9±14.88517 (median=43.0 years, Inter- quartile range=29.0-57.5 years). The male:female ratio of study subjects was 7:13 (Figure 1).

The median pain score at the beginning of treatment was 8.0. A gradual statistically significant (p

value<0.05) decrease in median pain score was recorded at further visits of the patients. After 6 months the pain was relieved and median score decreased to 0.0 (Table 1) (Figure 2).

The maximum mouth opening of the patients was found to increase significantly after the treatment (p value<0.05). The median of maximum mouth opening was 18.0 pre-operatively, which increased gradually to 34.0 by the completion of one year post-operatively (Table 1) (Figure 3).

Pair-wise comparison was done using post hoc analysis. The post hoc analysis revealed that the mean sign rank of pain score was significantly less after 1 month as compared to pre-operatively. Similarly the mean sign rank of pain score was significantly less after 6 months as compared to after 1 month (Table 2).

The post hoc analysis revealed that the mean sign rank of maximum mouth opening was significantly greater after 1 month as compared to pre-operatively. Similarly the mean sign rank of pain score was significantly greater after 6 months as compared to after 1 month and further significant increase was observed in mean sign rank of maximum mouth opening at 12 months as compared to after 6 months (Table 2).

The percentage of patients satisfied with the treatment increased from 85% to 100% from 1 month postoperatively to 12 months post-operatively. Although the difference was statistically non-significant (p value>0.05) (Table 3).

The occlusion of the patients was normal before and after the treatment. The facial nerve function was also normal before and after the treatment.

Discussion

Oro-facial pain including TMDs is a common problem that if miss diagnosed or improperly treated, may lead to chronic pain and major personal crises for the patient.

The potential complexity of these disorders can make traditional assessment and management of patient difficult. The variability of pain within and among individuals in terms of description, severity, location, and progression, which is frequently coupled with behavioral or psychosocial factors, may lead to diagnostic confusion in the clinician. Furthermore, symptoms such as tinnitus, parasthesia and sensitive teeth which are occasionally associated with oro-facial pain also lead to misdiagnosis. Thus the frequently overlapping signs and symptoms exhibited by oro-facial pain patient can be confusing, often resulting in multiple or vague diagnoses instead of a more specific differential diagnosis.

Several possible contributory factors such as bruxism, postural habits, or emotional factors may also complicate patient evaluation and if neglected can lead to inadequate or transient treatment outcome. If oro-facial pain continues without resolution, emotional and psychosocial problems such as depression, anxiety and lifestyle disturbances may also occur. Failure to consider each of these factors during the diagnostic process can lead to incorrect diagnoses, inadequate treatment regimens and development of a pain syndrome.

Internal derangement of TMJ is one of the important cause of TMJ pain dysfunction .There are various nonsurgical and surgical procedures and methods for treatment of pain and dysfunction due to Internal derangement of TMJ.

Karsten K.H.Gundlach 1990 [6] reported higher prevalence of internal derangement in females. In our study out of 20 patients who were diagnosed with Internal derangement, 13 were females and 7 were males.

In our study the diagnosis of the internal derangement (Disc displacement) was confirmed by MRI study. Roberto E, Sanchez-Woodworth [7] also showed the role of MRI in the evaluation of internal derangement of TMJ.

Andre L.F. Costa et al [8] also concluded that Temporomandibular Joint MRI could be helpful for diagnostic classification and treatment follow up.

Roman M. Kowalchuk [9] et al also developed a scoring system for TMJ internal derangement based on MRI to predict disease severity and likelihood of invasive treatment.

L. George Upton [10] reported that condylotomy is superior to the traditional disc repositioning procedures in outcome such as reduction in pain, clicking, catching, and locking as well as muscle pain however development of malocclusion is the major criticism directed towards condylotomy. In our study we did disc repositioning procedure in 20 patients with internal derangement, with no sign of malocclusion seen post operatively in any of the case.

Robert V. Walker, Sabah Kalamchi [11] did a study on 50 patients who underwent corrective surgery for TMJ internal derangement. The corrective surgical technique consisted of removing 2-4 mm of the top of the condyle, freeing of the displaced disc, and securely suturing it atop the condylar stump and to the lateral capsule. The patient's signs and symptoms were resolved following 3 months of physiotherapy and no evidence of recurrence was seen. None of the patients needed the occlusal adjustment appliance.

We operated 20 patients for internal derangement of TMJ by surgical lower positioning of condyle and none of the patient needed any appliance for the correction of occlusion post-operatively.

Rajkumar K Prabhu [12] et al in the year 2012 did an evaluation of facial nerve function on 100 patients following surgical approaches for maxillofacial trauma. In 20 patients the TMJ was approached using the Retromandibular approach and found that there was an involvement of marginal mandibular branch of facial nerve in two of the cases and buccal branch in one of the case. In our study we used retromandibular approach in all the cases to reach the TMJ, however did not find even a single case of facial nerve involvement.

Nam I W [13] studied internal derangement of TMJ by inducing it through incising on the retrodiscal ligament and then treating it by the lower surgical repositioning of condyle followed by oblique ramal osteotomy and also treated 5 patients with TMJ internal derangement. The author found that all the patients recovered completely using the lower surgical repositioning. We used lower surgical repositioning of condyle in 20 patients diagnosed with Internal derangement with satisfactory results.

Though surgery is considered to be one of the best possible treatments available for the correction of internal derangement, but there are other numerous non-invasive procedures available which can be applied to treat the cause. Hence before planning for any surgical procedure, one should weigh the risk as well as advantages associated with the surgery in the long run.

Conclusion

The Temporomandibular Joint disorders are very complex and thorough understanding of the anatomy as well as the subject is important for a surgeon to diagnose it and thereby treat the condition in accordance with the patient satisfaction. Internal Derangement being one of the commonly found Temporomandibular disorder, is associated with numerous etiology and is difficult to diagnose. MRI is most extensively used to

diagnose the condition as it is confined to the soft tissue structures of the TMJ. There is variety of treatment options available to rectify the problem, ranging from non-invasive procedures like Arthrocentesis, Joint lavage, physical therapy, splints etc to the invasive procedures like condylotomy, disc repositioning procedures etc. In our study we operated 20 patients diagnosed with the Internal derangement of the TMJ using the surgical lower repositioning of the condyle with all the patients recovered from the condition with no post-operative complications like facial nerve injury or deranged occlusion. Though each procedure has its own advantages and disadvantages, it depends on the clinical characteristic of the condition as well as the surgeons own choice.

References

1. M. Franklin Dolwick, Richard W, Katzberg Clyde A, Helms. Internal derangements of the temporomandibular joint: fact or fiction?. J Prosthet Dent. 1983; 49: 415-8.
2. William Hey. Practical observations in surgery, Illustrated with cases and plates. Third ed., Philadelphia 1803.
3. Hannson T, Solbers WK, Penn MK. Anatomic study of the TMJs of young adults: A pilot investigation. J Prosthet Dent. 1979; 41: 556.
4. Auvenshine RC. Etiology diagnosis and treatment of temporomandibular joint derangements. CSD J. 1985; 13: 64
5. Ingawalé S, Goswami T. Temporomandibular joint: disorders, treatments, and biomechanics. Annals of Biomedical Engineering. 2009; 37: 976-996.
6. Karsten.K.H.Gundlach. Long-term results following surgical treatment of Internal Derangement of the Temporomandibular Joint. J Cranio-Max.-Fac.-Surg. 1990; 18: 206-209.
7. Sanchez-Woodworth RE, Tallents RH, Katzberg RW, Guay. JA Bilateral internal derangements of temporomandibular joint: Evaluation by magnetic resonance imaging. ORAL SURG ORAL MED ORAL PATHOL. 1988; 65: 281-285.
8. Costa AL, D'Abreu A, Cendes F. Temporomandibular Joint Internal Derangement: Association with Headache, Joint Effusion, Bruxism, and Joint Pain. The Journal of Contemporary Dental Practice. 2008; 9(6): 1-10.
9. Roman M. Kowalchuk, Roman O. Kowalchuk , Katia Kaplan-List , Jolly M. Caplash , Penelope Block . Temporomandibular Joint Internal Derangement Score (TIDS): novel magnetic resonance imaging assessment score and its relation to invasive treatment in patients with clinical temporomandibular joint Pathology. Heliyon. 2018; 4(11): 1-15.
10. L. George Upton, Steven M. Sullivan. The Treatment of Temporomandibular Joint Internal Derangements Using a Modified Open Condylotomy: A Preliminary Report. J Oral Maxillofac Surg. 1991; 49: 578-583.
11. ROBERT V. WALKER, SABAH KALAMCHI. A Surgical Technique for Management of Internal Derangement of the Temporomandibular Joint. 1987; 45: 299-305.
12. Rajkumar K. Prabhu, Ramen Sinha, Sanjay Kumar Roy Chowdhury, Prabodh K. Chattopadhyay. Evaluation of facial nerve function following surgical approaches for maxillofacial trauma. Annals of Maxillofacial Surgery. 2012; 2(1): 36-40.
13. Nam I W. Clinical study on treatment of internal derangement of the T.M. joint. Taehan Chikkwa Uisa Hyophoe Chi. 1991; 29(1): 73-82.

Legends Figure And Tables

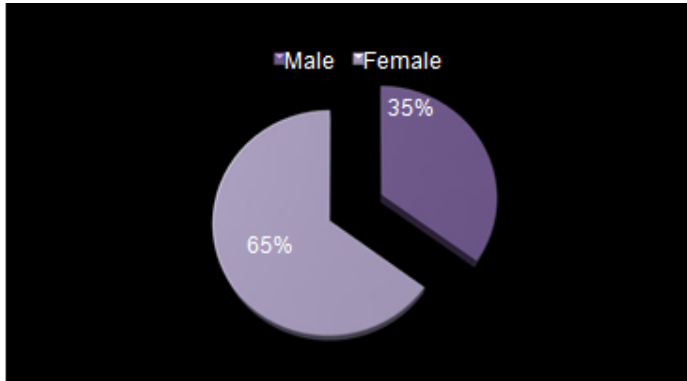


Figure 1: Gender-wise distribution of study subjects

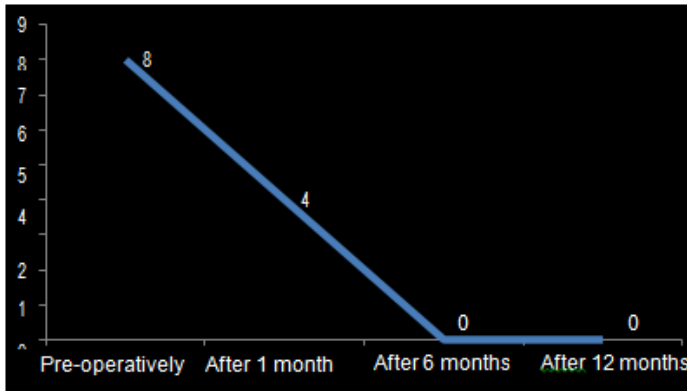


Figure 2: Change in median pain score with time after the treatment

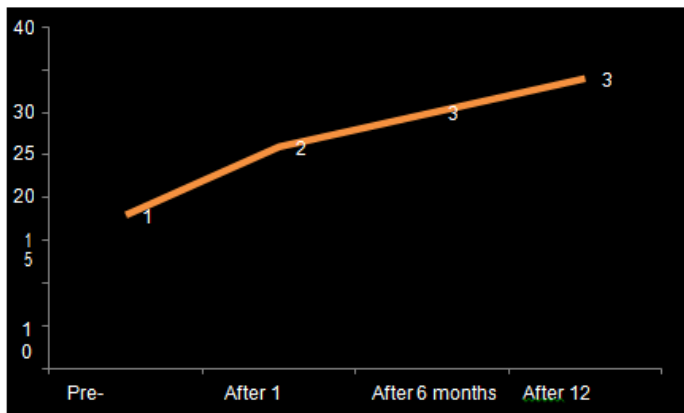


Figure 3: Change in median maximum mouth opening with time after the treatment

Parameter		Median	Inter-quartile range	P value ^Ω
Pain	Pre-operatively	8.0	8.0-8.0	0.000*
	After 1 month	4.0	2.0-4.0	
	After 6 months	0.0	0.0-2.0	
	After 12 months	0.0	0.0-0.0	
Maximum mouth opening	Pre-operatively	18.0	17.0-22.0	0.000*
	After 1 month	26.0	24.0-26.75	
	After 6 months	30.0	26.0-32.0	
	After 12 months	34.0	30.5-35.0	

*p value<0.05 was considered statistically significant.
^ΩFreidman test.

Table 1: Description and comparison of median values of pain and maximum mouth opening at different intervals

Parameter	Comparison	P value [∞]
Pain	Pre-operatively vs After 1 month	0.000*
	Pre-operatively vs After 6 month	0.000*
	Pre-operatively vs After 12 month	0.000*
	After 1 month vs After 6 month	0.000*
	After 1 month vs After 12 month	0.000*
	After 6 month vs After 12 month	0.014*
Maximum mouth opening	Pre-operatively vs After 1 month	0.000*
	Pre-operatively vs After 6 month	0.000*
	Pre-operatively vs After 12 month	0.000*
	After 1 month vs After 6 month	0.000*
	After 1 month vs After 12 month	0.000*
	After 6 month vs After 12 month	0.000*

value<0.05 was considered statistically significant.
[∞]Wilcoxon sign rank test

Table 2: Post hoc analysis (pair-wise comparison)

Duration	Number of patients satisfied	Percentage	P value
After 1 month	17	85%	0.097
After 6 month	19	95%	
After 12 month	20	100%	

[∞]Cochrane Q test.

Table 3: Comparison of patient satisfaction at different visit



Figure 4: Pre-op Radiograph

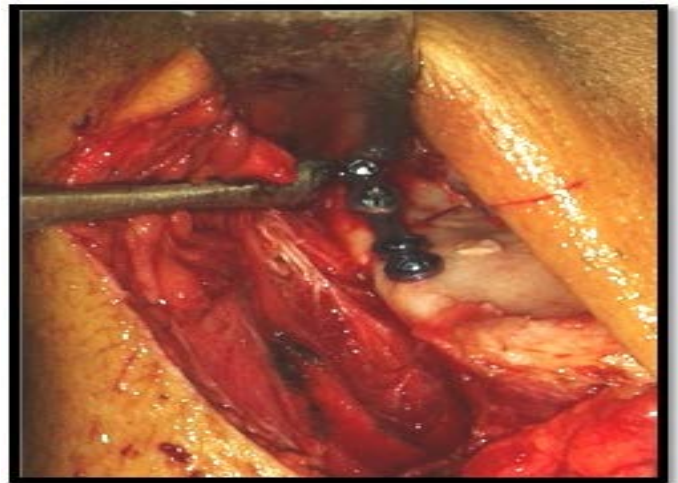


Figure 7: After plate fixation



Figure 5: Post-op Radiograph



Figure 8

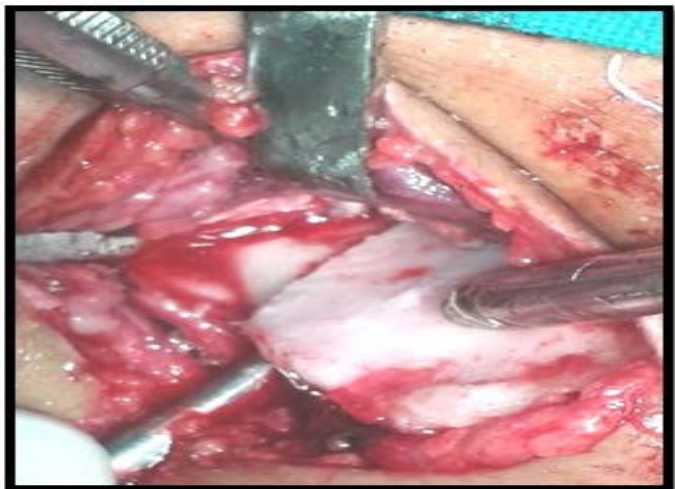


Figure 6: Osteotomy at subcondylar region