



**“PREVALENCE AND DEGREE OF FACIAL NERVE INJURY WITH DIFFERENT
EXTRA ORAL APPROACHES FOR SURGERIES INVOLVING MANDIBULAR ANGLE
OR CONDYLE OR TMJ. A 3-YEAR RETROSPECTIVE STUDY”**

¹Dr. Shubham Dubey, ²Dr. Ananth Kumar G.B., ³Dr. Navin S. Shah, ⁴Dr. Tushar Manohar Rothe,
⁵Dr. Debasish Sinha and ⁶Dr. Shreya Shukla

¹MDS, Department of Oral & Maxillofacial Surgery, K M Shah Dental College and Hospital, Vadodara.

²MDS, FIBCSOMS, Professor, Department of Oral & Maxillofacial Surgery K M Shah Dental Collge and Hospital, Vadodara.

³MDS, Professor & HOD, Department of Oral & Maxillofacial Surgery, K M Shah Dental College and Hospital, Vadodara.

⁴MDS, Assistant Professor, Department of Oral & Maxillofacial Surgery, Y. C Dental College, Ahmednagar.

⁵MDS, Senior Lecturer, Department of Oral & Maxillofacial Surgery, K M Shah Dental College and Hospital, Vadodara

⁶BDS, Post Graduate Student, Department of Oral & Maxillofacial Surgery, Rungta College of Dental Sciences and Research, Bhilai, Cg.

***Corresponding Author: Dr. Shubham Dubey**

MDS, Department of Oral & Maxillofacial Surgery, K M Shah Dental College and Hospital, Vadodara.

Article Received on 01/07/2019

Article Revised on 21/07/2019

Article Accepted on 11/08/2019

ABSTRACT

The facial nerve is the main anatomical structure that the surgeon should consider while performing an extraoral surgical approach to the mandibular angle or condyle or temporomandibular joint. Impairment of facial nerve function interferes with emotional expression, muscles of facial expression, also causes functional deficits, and can create a grotesque cosmetic deformity. Most surgical approaches to this region have been specifically designed to offer maximal protection and minimize injury of neural structure. According to the literature, facial paralysis is transitory in the majority of cases and usually disappears within 9 to 14 weeks, but may last for up to 6 months. So primary aim of this reterospective study is to evaluate the Prevalence and degree of facial nerve injury with different extra oral approaches for surgeries involving mandibular angle or condyle or TMJ.

KEYWORDS: facial nerve, House-Brackmann Facial Nerve Grading System.

1) INTRODUCTION

Facial nerve is the 7th cranial nerve and the most important structure encountered during extraoral approaches for mandible, TMJ, condyle and parotid surgeries. Surgeon's Skill in preserving its functional integrity is a critical point when this type of surgery is performed. Injury to facial nerve, can leads to various cosmetic problems. Where as the facial nerve is always at risk and it is very difficult to provide adequate exposure without causing injury.^[1,2] 7th cranial nerves gives off branches to the auricular muscles, the posterior belly of the digastrics muscle and the stylohyoid muscle. Within the parotid gland, there is further branching with many individual variations. The upper division of the facial nerve gives off temporal, zygomatic and buccal branches, whereas the lower division emits marginal mandibular and cervical branches.^[3,4] Now a days condylar and TMJ fracture are most widely treated with an open approach using various surgical incisions like preauricular, retromandibular, submandibular, and

postauricular incision. Temporal and zygomatic branches of the facial nerve are highly susceptible for damage during TMJ surgery. According to Keith et al, the incidence of facial nerve injury resulting from TMJ surgery ranges from 1% to 25% and for the management of condylar fracture it is 0% to 30% with retromandibular approach. Al-Kayat modified preauricular incision is routinely used in TMJ ankylosis cases. Preauricular incision is also used in treatment of high condylar fractures.^[2,4] Marginalmandibular branch of is one of the main five terminal branches of the extracranial part of the facial nerve. It is given off within the substance of the parotid gland. There can be multiple rami of marginal mandibular nerve ranging from one to three. The marginal mandibular and the buccal branch of the facial nerve are at considerable risk when using extraoral approaches to access the mandibular fractures. Submandibular approach was used in all the cases of angle and body fractures. Reported incidence of damage to the marginal mandibular nerve during is 0 to

20%. Inversion and flattening of the ipsilateral lip, thus disabling inferolateral movement. This results in an asymmetrical smile with elevation of the lower lip. The deformity is more pronounced while the patient is crying. This disfigurement leads to a significant perceived disability.^[5,6] Various approaches are.

1. **Preauricular surgical technique** is made along the natural crease anterior to the tragus, commonly used to manage the problems encountered in upper condylar process and TMJ compartments.^[9]
2. **Blair and Ivy (1936)** used an '*inverted hockey stick*' incision over the zygomatic arch, which gave easy access and better visibility and facilitated exposure of the arch along with condylar area.
3. **Al-Kayat and Bramley (1979)** described a modified preauricular approach to TMJ and zygomatic arch. Advantages of this incision are minimal bleeding and less sensory loss, posterior placement of the skin incision and its wide backwards and upwards sweep spares the main branches of vessels and nerves, facial places are easily identified, excellent visibility.
4. **Retromandibular (Hinds and Girotti 1967; Koberg and Momma 1978)** bears advantages like shorter working distance from the skin incisions to the condyle, great access to the posterior border of the mandible and sigmoid notch, less conspicuous facial scar and easy reduction. The disadvantage associated with this approach is proximity to the branches of facial nerve, retromandibular vein and parotid gland.^[11]

Various methods have been established for assessment of function of facial nerve. The House Brackmann grading system, among the methods of clinical evaluation, is quite comprehensive and includes important items such as the appearance of the frontal, periorbital and peribuccal musculature, both at rest and in motion, and is used in several countries.^[7,8]

2) MATERIALS AND METHODS

2.1) STUDY DESIGN: This was a Retrospective type of study carried out at the department of Oral and Maxillofacial Surgery of K.M.SHAH DENTAL COLLEGE from January 2016 to December 2018. The study protocol was approved by Sumandeep Vidyapeeth Institutional Ethics Committee (SV IEC). Written informed consent was obtained from all patients after they were given full written and verbal information regarding the study.

2.2) SAMPLE DESIGN: data was collected from the departmental records of the patients who were treated with the different extra oral approaches for surgeries involving mandibular angle or condyle or TMJ and fulfill the inclusion criteria.

2.3) INCLUSION CRITERIA FOR THE SELECTION OF SAMPLE

1. Patients of any age group who are diagnosed with Mandibular fracture and TMJ deformities and treated in

Department of oral and Maxillofacial Surgery, K. M. Shah Dental College Vadodara during the period of 2016 to 2018.

2. Patient records with complete necessary details.

2.4) EXCLUSION CRITERIA FOR THE SELECTION OF SAMPLE.

1. Patients who present to the department of oral and maxillofacial surgery with Maxillofacial Infection
2. Patients with history facial nerve paralysis.
3. Patients with Incomplete records.
4. Patients who were treated conservatively.
5. Patient who did not come for post operative follow up.

3) MATERIALS

- 1) Data collected from the departmental records.
- 2) Hard copy of well formatted proforma.

3.1) METHODOLOGY

A 3 years retrospective study was designed to evaluate the Prevalence and degree of facial nerve injury with different extra oral approaches for surgeries involving mandibular angle or condyle or TMJ at the department of oral and maxillofacial surgery, kmsdch, piperia, waghodia, vadodara. For this study, we have collected the data of the patient who were operated in last three years at the department of oral and maxillofacial surgery. We have included the age, sex, approach and the degree of facial nerve injury was evaluated by, The House Brackmann Facial Nerve Grading System. After the collection of data, a descriptive method using tables and graphs was employed to elucidate the data for statistical analysis.

4) OBSERVATION AND RESULTS

Graph 1: showing 83% of male and 17% of female were involved.

Graph 2: showing, 25% of Al-Kayat and Bramley (1) surgical approach was used, 8% Pre auricular surgical approach was used, 21% Retromandibular surgical approach was used and 46% submandibular surgical approach was used.

Graph 3: showing grading of facial nerve injury according to HBFNGS at the 1st post operative day, end of 1st month and end of 3rd month. On 1st post operative day grade II present with 6 patients, grade III with 5, grade IV with 7 and grade V with 6 patients. At the end of 1st month grade I with 12 patients, grade II with 5, grade III with 5 and grade V with 2. At the end of 3rd month grade I with 18 patients, grade II with 3 and grade III with 3.

Chart 1.

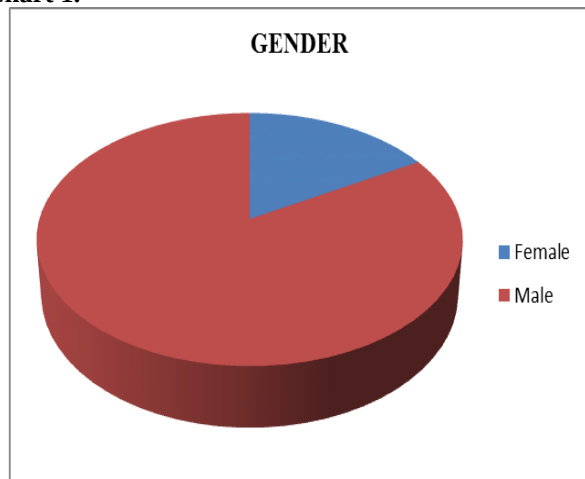
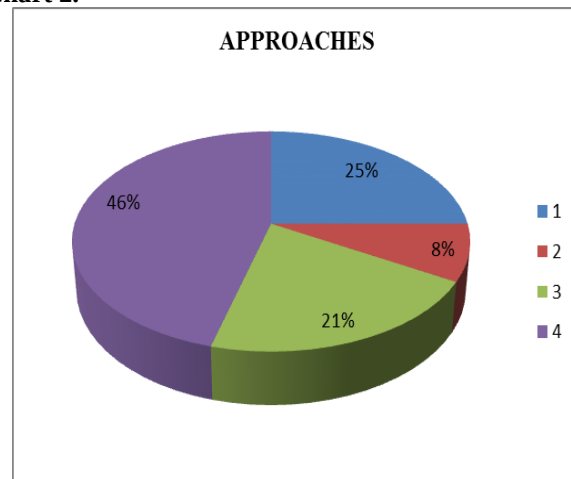
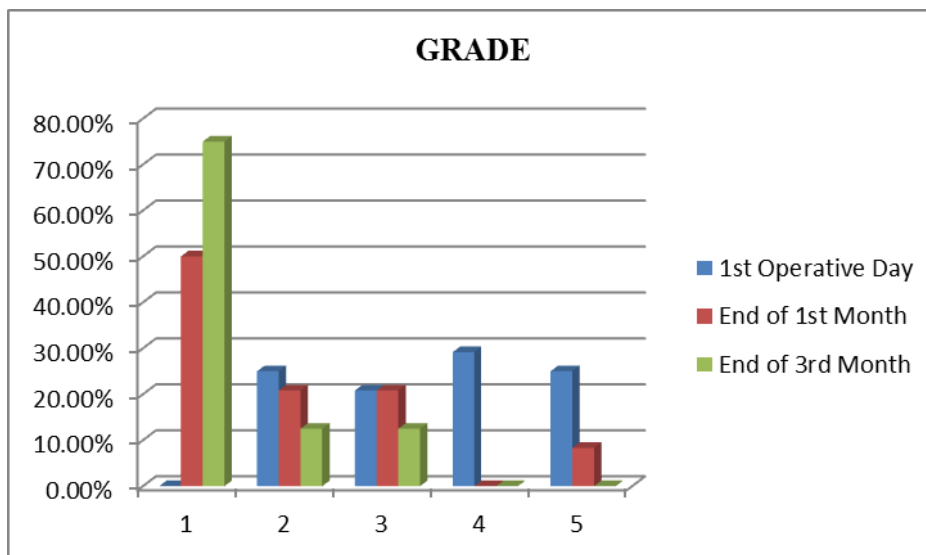


Chart 2.

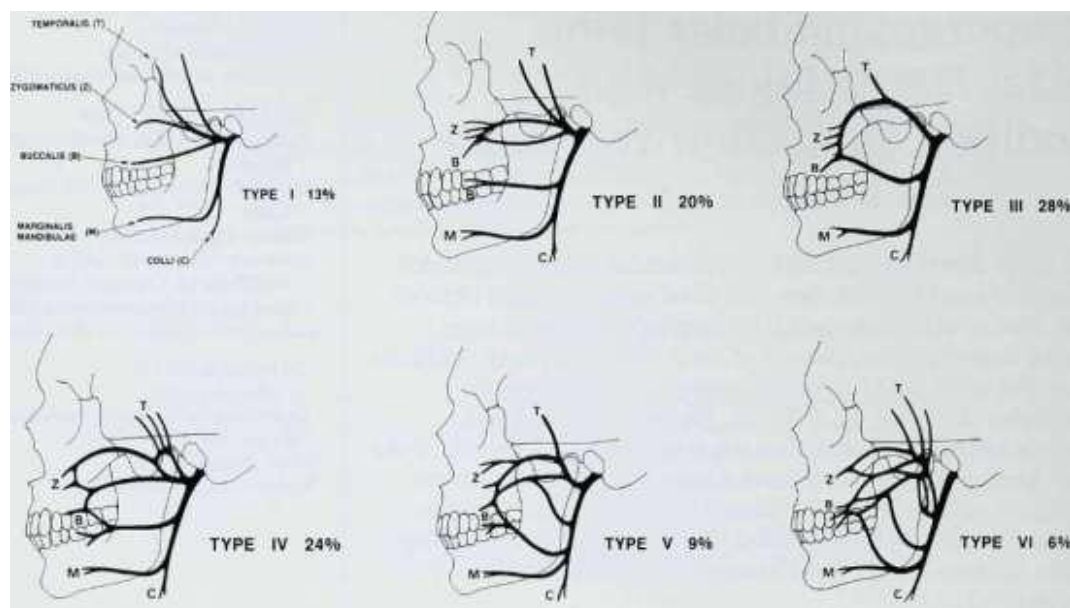


Graph 3.



Distribution of Nerve Injuries According to the House-Brackmann Grading System.

FOLLOW UP TIME PATIENTS WITH NERVE INJURY	1 st post operative day	End of 1 st months	End of 3rd months
2	Grade V	Grade V	Grade III
1	Grade V	Grade III	Grade III
3	Grade V	Grade III	Grade II
1	Grade IV	Grade III	Grade I
3	Grade IV	Grade II	Grade I
3	Grade IV	Grade I	Grade I
2	Grade III	Grade II	Grade I
3	Grade III	Grade I	Grade I
6	Grade II	Grade I	Grade I



5) DISCUSSION

Facial nerve is considered the “*Queen of The Face*” as it innervates the muscles of facial expression. Anatomic variations and multiple innervation patterns of the peripheral branches render facial nerve to an increased risk during various extra oral approaches for surgeries involving mandibular angle or condyle or TMJ surgical. Facial nerve injury following various surgical procedures to the maxillofacial region ranges from 0% to 48. Davis et al have demonstrated six different patterns of facial nerve distribution. Of interest is the fact that of the six variations, there is distal branching in four of the patterns that can allow for more than one pathway of innervation of the frontalis muscle.^[8] About which, Sixty-three percent (types I, II, IV, and VI) of these distributions showed branching and anastomosis of the temporal branch. Thirty percent (types IV and VI) again revealed anastomotic patterns.^[4] Hall et al speculate that because of this branching, there is possibility of injury to the most distal branch of the facial nerve that crosses the zygomatic arch in 63% of cases, without loss of frontalis function.^[9] Therefore Surgery for the treatment of this region requires elaborate planning and a refined surgical technique on the part of the surgeon. In addition, the preparation of a surgical approach that allows a suitable exposure of the surgical field with a minimum risk of damage to the facial nerve represents a great challenge for the performing of mandibular angle, condyle or TMJ surgery, because it requires meticulous surgical dissection, a thorough knowledge and an acute awareness of the regional anatomy.^[4,5,6]

Possible Causes of Facial Nerve Injury in TMJ Surgery

1. Preoperative palsy from previous surgery
2. Trauma from heat of electrocoagulation
3. Local anesthesia injected in immediate nerve are
4. Deep ligatures or plication sutures
5. Crushing by forceps or clamps
6. Excessive retraction and traction

7. Nerve transection

8. Hematoma or edema in nerve sheath

9. Inflammation and infection

10. Distortion of the normal anatomy by adhesions from previous TMJ surgery

Permanent facial nerve injury with different extra oral approaches for surgeries involving mandibular angle or condyle or TMJ surgery is a rare complication. The incidence and degree of temporary nerve injury in this study could be either due to heavy retraction causing compression and or stretching of nerve fiber resulting in neuropraxia and this has been a significant finding in the present study.

On analyzing the records of the cases which were operated in last 3 years for mandibular angle fracture, condylar fracture and TMJ deformities using extra oral surgical approach, 24 patients satisfied the inclusion and exclusion criteria's. Among the 24 patients, 83% were males in the mean age group between 20-30 years.

The common extra oral surgical approaches used were Al-Kayat and Bramley, Preauricular, Retromandibular, Submandibular surgical technique for managing the mandibular angle and condylar fracture and TMJ deformities.

11 cases of mandibular angle fracture, 7 cases of TMJ ankylosis, and 6 cases of condylar fracture were operated using extra oral surgical approaches. Amongst that Al-Kayat and Bramley was used in 6 cases, Preauricular in 2 cases, Retromandibular in 5 cases and submandibular approach was in 11 cases respectively.

Analysis of the degree of facial nerve injury in all 24 patients was evaluated by the House Brackmann Facial Nerve Grading System. On 1st post operative day we noticed that patient with facial nerve injury shows grade II in 25% of the cases, grade III in 21% of the cases,

grade IV in 29% and grade V in 25% of cases. At the end of 1st month it is noticed that 50% of the cases recovered to the normal, grade II and III are noticed in 21% of the cases and 8% of the cases noticed with grade V. At the end of 3rd month 75% of the cases recovered to normal, 13% of the cases noticed with grade II and III. According to our study it is noticed that on the 1st post operative day patient with facial nerve injury was more, in which 50% of the cases recovered to normal at the end of 1st month and 75% at the end of 3rd month.

6) CONCLUSION

Facial nerve injury is graded on 6 point scale according to HBFNGS with 1st being to normal and 6th being described as total paralysis. In our patients at the 1st post operative day all patient had varying degree of facial nerve injury. At the end of 1st month 30% of the patients recovered to normal, at the end of 2nd month 75% of the patients had normal facial expression. The most common type of Facial nerve injury is neuropraxia, which is transient in nature and recover in due course of time. In this short follow up in our study, we found that 75% of the patient had normal motor function of the facial nerve at the end of three months. The facial nerve injury in our patients was transient in nature and can be attributed to stretching and compression of nerve fibers due to retraction.

7) ACKNOWLEDGEMENT

The author would like to acknowledge that this research study entitled “PREVALENCE AND DEGREE OF FACIAL NERVE INJURY WITH DIFFERENT EXTRA ORAL APPROACHES FOR SURGERIES INVOLVING MANDIBULAR ANGLE OR CONDYLE OR TMJ. A 3-YEAR RETROSPECTIVE STUDY” is a bonafied and genuine research work done by the author in department of Oral and Maxillofacial Surgery of K M Shah Dental College and Hospital, Sumandeep Vidyapeeth, Piparia, Vadodara.

8) REFERENCES

1. Prabhu RK, Sinha R. Evaluation of facial nerve function following surgical approaches for maxillofacial trauma: *Ann Maxillofac Surg*, 2012 Jan-Jun; 2(1): 36-40.
2. Moin A, Shetty AD. Facial Nerve Injury in Temporomandibular Joint Approaches: *Ann Maxillofac Surg*, 2018 Jan-Jun; 8(1): 51–55.
3. Shi D, Patil PM. Facial nerve injuries associated with the retromandibular transparotid approach for reduction and fixation of mandibular condyle fractures: *rnal of Cranio-Maxillo-Facial Surgery*, xxx 2015; 1-6.
4. Jayavelu P, Riaz R, Tariq Salam AR. Difficulties encountered in preauricular approach over retromandibular approach in condylar fracture. *Journal of Pharmacy & Bioallied Sciences*, 2016; 8: S175-S18.
5. House JW. Facial nerve grading systems. *Laryngoscope*, 1983; 93: 1056–69.
6. House JW, Brackmann DE. Facial nerve grading system. *Otolaryngol Head Neck Surg*, 1985; 93: 146–7.
7. Davis RA, Anson BJ, Budinger JM, Kurth LR. Surgical anatomy of the facial nerve and parotid gland based upon a study of 350 cervicofacial halves. *Surg Gynecol Obstet*, 1956; 102: 385–412.
8. Mehra P, Murad H. Internal fixation of mandibular angle fractures: A comparison of 2 techniques. *J Oral Maxillofac Surg*, 2008; 66: 2254–60.
9. Weinberg S, Kryshchalskyj B. Facial Nerve Function Following Temporomandibular Joint Surgery Using the Preauricular Approach. *J Oral Maxillofac Surg*, 1992; 50: 1048-1051.
10. Weinberg S, Kryshchalskyj B. Analysis of Facial and Trigeminal Nerve Function After Arthroscopic Surgery of the Temporomandibular Joint. *J Oral Maxillofac Surg*, 1996; 54: 40-43.
11. Costa HJ, Ferreira da Silva C, Korn GP, Lazarini PR. Posttraumatic facial nerve regeneration in rabbits. *Rev Bras Otorrinolaringol*, 2006; 72; 6: 786-793.