RHYTIDECTOMY APPROACH FOR THE TREATMENT OF SUBCONDYLAR FRACTURE OF MANDIBLE

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CERTIFICATE

This is to certify that ***Dr. DAVIDSON RAJIAH****, P.G. Student (2008-2011) in the Department of Oral and maxillofacial surgery, Tamilnadu Government Dental College and Hospital, Chennai-600 003, has done* dissertation *titled "***RHYTIDECTOMY APPROACH FOR THE TREATMENT OF SUBCONDYLAR FRACTURE OF MANDIBLE"** *under our direct guidance and Supervision in partial fulfillment of the regulation laid down by The Tamilnadu Dr.M.G.R. Medical University, Chennai, for MDS, Branch-III, Oral and Maxillofacial Surgery Degree Examination.*

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DECLARATION

I**, Dr. DAVIDSON RAJIAH**, do hereby declare that the dissertation titled "**RHYTIDECTOMY APPROACH FOR THE TREATMENT OF SUBCONDYLAR FRACTURE OF MANDIBLE**" was done in the Department of Oral and Maxillo Facial Surgery, Tamil Nadu Government Dental College & Hospital, Chennai 600 003. I have utilized the facilities provided in the Government dental college for the study in partial fulfillment of the requirements for the degree of **Master of Dental Surgery** in the speciality of Oral and Maxillo Facial Surgery **(Branch III)** during the course period **2008-2011** under the conceptualization and guidance of my dissertation guide ***Dr. D. DURAIRAJ M.D.S.,***

I declare that no part of the dissertation will be utilized for gaining financial assistance for research or other promotions without obtaining prior permission from the Tamil Nadu Government Dental College & Hospital.

I also declare that no part of this work will be published either in the print or electronic media except with those who have been actively involved in this dissertation work and I firmly affirm that the right to preserve or publish this work rests solely with the prior permission of the Principal, Tamil Nadu Government Dental College & Hospital, Chennai 600 003, but with the vested right that I shall be cited as the author(s).

Signature of the PG student *Signature of Guide*

Signature of Head of the department *Signature of the Head of the Institution*

CONTENT

INTRODUCTION

Facial injuries are increasingly common in modern society due to technologic development of faster automobiles, increased hostility among drivers and rise in violence. The Temporomandibular joint is not exempted from injury but its anatomic complexity makes it challenging. Few areas of Oral and maxillofacial surgery have generated as much controversy as the management of condylar fractures. Fractures of the mandibular condyle are common and account for 25% to 50% of all mandibular fractures.[68]

An ideal mode of treatment for condylar fracture should enable the TMJ to function normally and it should also prevent shortening of ramus, facial asymmetry and TMJ arthrosis. Currently there are three schools of thoughts available for treating condylar fracture- functional, conservative and surgical. Surgeons who prefer closed treatment claim that equally good results were produced with reduced overall morbidity and lack of surgical complications.[89] Following conservative treatment clinical outcome can be sub optimal as the severity of condylar fracture is often underestimated. Advocates of conservative treatment consider the risk and morbidity of the surgical procedure high to justify the surgical procedure. According to them the application of intermaxillary fixation for approximately three weeks and mouth opening exercise afterwards

results in reasonable good results. (**Takenoshita[79] et al, 1990**, **Konstantinovic and Dimitrijevic, 1992).**[46] There is evidence of functional disharmony and compromised results in a significant percentage of adult patients treated by closed reduction **(Lindall[49] 1977).**

Though conservative management has remained as the main stay in condylar fracture management, the development of recent techniques and armamentarium has made open reduction a better method of treatment.

There are various approaches available for open reduction and internal fixation of condylar fractures of mandible. Extraorally Preauricular, submandibular, retromandibular approaches are most commonly used for bone plating.[54] The various other approaches to the mandibular condyle are intraoral approach, trans masseteric antero parotid approach, trans parotid trans cutaneous approach and endoscopy assisted open reduction and internal fixation of subcondylar fractures.[90,31,76.]

Zide and kent[91] (1983) and Ellis and Dean (1993)[18] described Rhyditectomy or facelift approach to the condyle that obviates the lack of exposure that is common to the retromandibular and submandibular approaches. It allows increased exposure with direct visualization for fixation of fractures in posterior mandible,

especially in the pericondylar region and provides least noticeable scar.[91]

This study was done to evaluate the rhytidectomy transparotid approach for open reduction and internal fixation of subcondylar fracture of the mandible on patients who reported to the Department of oral and Maxillofacial Surgery, Tamilnadu Government Dental College and hospital, Chennai-3.

AIM OF THE STUDY

The aims of the study are:

1. To study the value of rhytidectomy approach for treating subcondylar fracture of mandible.
2. To evaluate occlusal stability.
3. To evaluate the various advantages of rhytidectomy approach for treating subcondylar fracture of mandible.
4. To evaluate the complications associated with it.

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REVIEW OF LITERATURE

CLASSIFICATION

Spiessl and Schroll[71] 1972 classified condylar process as follows

TYPE I FRACTURE fracture without displacement

TYPE II FRACTURE low condylar fracture with displacement

TYPE III FRACTURE high condylar fracture with displacement

TYPE IV FRACTURE low condylar fracture with dislocation

TYPE V FRACTURE high condylar fracture with dislocation

TYPE VI FRACTURE intracapsular fracture

Lindahl[49] 1977 gave the classification system of mandibular condylar fracture

A) FRACTURE LEVEL

1. Condylar head - at or above the ligamentous attachment.
2. Condylar neck – thin constricted region below the neck of condyle.
3. Subcondylar – sigmoid notch to the posterior mandible just below the neck of mandible.

B) DISLOCATION OF FRACTURE LEVEL

1. Angulation with medial over ride.
2. Angulation with lateral over ride.
3. Angulation without over ride.

C) POSITION OF CONDYLAR HEAD TO ARTICULAR FOSSA

1. No displacement
2. Slight displacement
3. Moderate displacement

Lindahl[49] 1977 divided traumatic force causing condylar injury into three categories.

1. Energy impacted on a static individual by a moving object.
2. Moving individual striking a static object.
3. Energy developed by the combination of the above two mechanism.

Zide and Kent[91] 1983 provided a series of absolute and relative indications for open reduction and fixation, emphasizing consideration of specific injury in the context of the patient as a whole.

Raustia[67] et al 1990 said that in difficult cases , the CT scan shows changes in relationship of the condyle to mandibular fossa more precisely than conventional radiographic examination.

Krenkel[48] 1997 divided the fractures of condylar process in to intracapsular fractures, high condylar neck fractures, medium condylar neck fractures, and low condylar neck fractures.

INCIDENCE

Haug[35] et al 1990 stated that fractures of condyle process of mandible is one of the most frequent sites of fractures, ranging from 21 % to 49 %.

Kirk L. Fridrich[47] et al 1992 stated that the most common site of mandibular fracture resulting from altercation was the angle (39.1%); condylar, symphysis, and alveolar fracture less commonly resulted from altercation than from motorcycle and automobile accidents.

Silvennoinen[72] et al 1992 in a review of different pattern of condylar fractures stated that in severe fractures in which the condyle was dislocated out of the glenoid fossa resulted more often from falls (22%) and road traffic accidents (26%) than from violence (8%).

Bradley[5] l et al 1994 said that fractures of the mandibular condyle are thought to account for about 35 % of all mandibular fractures.

Silvennoinen[73] 1994 stated that condylar injury has generated much controversy and discussion than any other in the field of maxillofacial trauma. Such injuries account for about 25 % and 52 % of all mandibular fractures.

Widmark[88] G et al 2000 said that fractures of mandibular condylar process are the most common fractures in the mandible and maxillofacial region.

Schan R[75] et al 2001 stated that fractures of mandibular condyle are common and account for 9 % to 45 % of all mandibular fractures.

Villarreal[83] P M 2004 said, the treatment of mandibular condylar fractures is of great significance, as condyle fractures account for about 30 % of all mandibular fractures.

ETIOLOGY

Ellis[17] et al 1985 found that falls were the most common cause of condylar fractures.

Richard H. HAUG[35] et al 1990 observed that assault and motor vehicle accidents were the most frequent cause of facial fractures.

Zachariades[93] 1990 found that the most common cause of trauma in children is fall from a bicycle, from steps and during sports.

Silvennoinen[72] 1992 found that personal violence is the most frequent cause of condylar fractures although severe fractures occur more frequently after falls and road traffic accidents.

Fridrich[27] et al 1992 observed road traffic accidents predominate in their study on mandibular fractures.

Marker[53] P et al 2000 said that in adults motor vehicle accidents account for the majority of condylar fractures. Interpersonal violence, work related accidents, sporting accidents and falls play a lesser role.

Fabio ROCCIA[29] et al 2010 conducted a retrospective study to analyse the etiology and patterns of maxillofacial fractures in females. Falls were the most frequent cause of maxillofacial trauma followed by motor vehicle accidents, assaults, sports accidents and other causes.

INDICATIONS

Zide[91] and Kent's 1983 indication for open reductions as follows

ABSOLUTE

Displacement into middle cranial fossa, impossibility of obtaining adequate occlusion by closed reduction, lateral intracapsular displacement, invasion by foreign body.

RELATIVE

Bilateral condylar fractures in edentulous patients. Condylar fractures where splinting cannot be accomplished for medical reasons, periodontal problems, loss of teeth. unilateral condylar fracture with unstable base.

Zide and Kent[92]'s 1989 indication for open reduction are;

ABSOLUTE

Fractures into middle cranial fossa, foreign body in joint capsule, lateral extracapsular deviation, inability to open mouth, or achieve occlusion in one week, open reduction in cases which have potential for fibrosis.

Kent[45] et al 1990

INDICATIONS FOR OPEN REDUCTION

Displacement into middle cranial fossa, tympanic plate injury, impossibility of obtaining adequate occlusion, lateral extracapsular displacement, invasion by foreign body, blocked mandibular opening, facial nerve paresis secondary to injury, contraindicated IMF, open wounds from initial injury.

Widmark[87]. G et al 1996 the indications for open reduction were condylar displacement of more than 30 degrees, inferior dislocation of the condyle of more than 5 mm and difficulty in obtaining adequate occlusion by closed reduction .

Banks[6] P. A 1998 discussed pragmatic approach to the management of condyle fractures. He stated that a patient with a condylar fracture cannot be considered to be cured until he is able to

masticate easily with the contralateral dentition which implies the recovery of the condylar excursion.

OPEN VERSUS CLOSED REDUCTION

Silverman[69] (1925) and **Aison (1926)** first reported open reduction of condylar fracture through use of an intra oral approach. Silverman reduced the condylar fragment with the aid of metal urethral sound and immobilized the jaw with maxilla mandibular fixation.

Raveh[66] et al 1989 cite that dislocation of the condyle out of glenoid fossa as their indication for open reduction but do not support it with a study demonstrating the superiority of such an approach over closed reduction .

Dahlstrom[14] et al 1989 speculates that an open reduction in older patients could be useful in presenting dysfunctional problem for selected cases.

Takenoshita[79] et al 1990 states that return to function following open reduction is more rapid but not better than closed reduction.

Konstantinovic[46] et al 1992 described a 15.4 % incidence of operative complications in their open reduction group.

Complications include either wound infection or transient paresis of the marginal mandibular branch of the facial nerve.

Norhott[58] et al 1993 described that fractures in children before or in early teens, regardless of the type of condylar fractures are said to be successfully treated by closed reduction with or without 1 – 3 weeks of IMF.

Warsaae and Thorn[86] 1994 conducted a prospective study showed that dislocated subcondylar fracture in adults treated by conservative procedure, complications could have been significantly reduced if open reduction has been performed.

Anastassov[1] et al 1997, Chos and Yoi[11] 1999, Delvin[16] et al 2002 advocated surgical procedure as it is safe and relatively easy. They advised surgical treatment in milder displacement and thus spare prolonged period of IMF and post IMF trismus and making period of rehabilitation shorter. Anatomic repositioning of the condyle, eliminates the chances of developing TMJ problem.

Joos V 1998, Kleinheiz[41]. J conducted a study to evaluate and compare the results of surgical and non surgical treatments and to device common recommendations for decision making for the treatment of condylar neck fracture dislocations. It was concluded

that statistically results do not always require excellent anatomic repositioning of the fragments and that deviation from normal morphology are acceptable unless restriction of function results ,provided the results are equal the simpler and easier treatment is the treatment of choice.

Baker[7] et al 1998 showed that among the members of IAOMS, that fifty percent of respondents had a preference for open management of condylar fracture citing anatomic reduction, occlusal, stability, and early restoration of function.

Newman[59] L 1998 reported a series of 33 patients in which there was a significant increase in limitation of mouth opening when the treatment was closed treatment as opposed to open reduction.

Jelle Hovinga[42] et al 1999 evaluated long term results of nonsurgical management of condylar fractures in children and concluded that this treatment is still the method of choice in children.

Heinrich Strobl[36] et al 1999 studied the conservative treatment of unilateral condylar fractures in children and confirmed the concept of a non surgical functional approach in children. Condylar remodelling was the mode of fracture healing in instances of displaced and dislocated condylar fractures.

Celso Palmier[10] et al 1999 reported that patients treated for fracture of mandibular condyle by open reduction had greater condylar movements than patients treated by closed method. Therefore open reduction may produce functional benefits to patients with severely displaced condylar process fractures.

Edwar Ellis[24] III et al 2000 reported that of the total of 137 patients with unilateral subcondylar fracture, 77 were treated by closed method. Patients treated by closed technique had a greater percentage of malocclusion compared with those treated by open reduction.

Marker[53] et al 2000 conducted a study to record the results of conservative treatment of condylar fracture and to find out if there were any variables that were predictive of complications. Authors concluded that conservative treatment of condylar fracture is non traumatic, safe and reliable and only a few cases may cause disturbances of function and malocclusion.

Giacomo De Riu[30] et al 2001 did a comparision of two samples of patients with condylar fracture was made, the first treated non surgically and the second with open reduction and internal fixation. The functional results of both groups were similar. However open reduction gave better results, anatomic restoration and faster recovery rate than non surgical technique.

Orhan Guven[62] et al 2001 stated that conservative treatment of condylar fractures during growth resulted in good function and good remodelling of the condyle. Functional treatment after IMF for 12 to 17 days proved to be quite acceptable.

Leon A. Assael[50] 2003 assessment of the literature indicate that both open and closed treatment of condylar fractures have a deserved role in the treatment of these patients, hence treatment selection of condyle fracture remains an evidence based art.

M. Todd Brandt[80] et al 2003 although it has been recognised that ORIF provides better functional reconstruction of mandibular condyle fracture than intermaxillary fixation, attempts have been made to limit the potential adverse sequel associated with ORIF. Although concern over the facial nerve continues to exist, this has been proved not to be a long term issue in case controlled studies.

Luc M. H. Smets[51] et al 2003 conducted a study to investigate the results of nonsurgical treatment of condylar fractures. He concluded that patients with shortening of the ascending ramus of 8 mm or more and / or considerable displacement of the condylar fragment, surgical repositioning and rigid internal fixation should be considered.

Richard H Haug[38] et al 2004 compared traditional versus endoscopic-assisted open reduction with rigid internal fixation of adult mandibular condyle fracture and stated that both the procedures provides uniform, consistent ,and favourable results .similar frequency of scar and transient facial nerve weakness was observed.

M. Hiawitschka[39] et al 2005 said that following ORIF of 14 patients with 15 displaced condylar fractures, which had caused a shortening of the mandibular ramus, were examined clinically, radiologically and axiographically. Following ORIF, patients showed better radiological results with regard to mandibular ramus height, resorption and pathological changes to the condyle. The TMJ displayed fewer irregularities in the condylar path.

Mike Stietsch – Schotz[56] 2005 reported that open as well as closed treatment gave clinically acceptable functional results. However condylar mobility was markedly greater after open treatment than after closed treatment.

C. A. Landes, R. Lipphardt[52] 2006 the results of his study indicate a 92 % primary successful management of condylar fractures with the practical approach of graded differentiation non dislocated , non displaced fractures which were treated by closed

reduction vs displaced dislocated which were treated by open reduction.

Zachariades[95] et al 2006 stated that early mobilization is the key in treating condylar fractures. Rigid internal fixation provides stabilization and allows early mobilization. conservative treatment is the treatment of choice for the majority of fractures.

C.E.Zimmermann[96] et al 2006 in pediatric facial fractures operative management should involve minimal manipulation and may be modified by the stage of skeletal and dental development. ORIF is indicated for severely displaced fractures.

Eckelt[26] et al 2006 stated that correct anatomical position of the fragments was achieved significantly more often in the operative group in contrast to the closed treatment group. Both treatment options for condylar fracture of the mandible yielded acceptable results .However , operative treatment, irrespective of the method of internal fixation used, was superior in all objective and subjective functional parameters.

J.Anderson[4] et al 2007 conducted a 31 year follow up of non surgical treatment of unilateral mandibular condylar fracture and showed that minor dislocated condylar fractures seem favourable concerning function, occurrence of pain and impact on daily life.

E.T.Niezen[61] et al 2010 analysed the relationship between complaints and mandibular function after closed treatment of fractures of mandibular condyle. The results showed that complaints are predictors of mandibular function impairment after closed treatment of fractures of the mandibular condyle.

SURGICAL APPROACHES

Dingmans and Urabb[15] 1962 studied 100 cadaveric facial halves, they found that posterior to facial artery, the marginal mandibular branch of the facial nerve was observed to run above the inferior border of mandible in 81 % of cases.

R. Koberg and Momma[43] 1978 described osteosynthesis of condylar fracture using four hole miniaturized dynamic compression plates.

Petzel[63] 1982 described the use of intramedullary screw transfixating the distal and proximal fragments of condyle fracture of mandible through submandibular approach.

Zide and Kent[91] 1983 showed in his rhytidectomy approach that temporal and zygomatic branch of facial nerve was more vulnerable.

Kitayama[44] 1989 described the use of intramedullary screw fixation of condylar fracture via an intraoral approach.

Raveh[66] et al 1989 facial nerve damage is caused chiefly by excessive traction of the retractors or by electrocauterisation of the vessels adjacent to the facial nerve.

Ellis E, Dean S, Dallas[18]1993 described the preauricular, submandibular, retromandibular, and rhytidectomy, approaches and also the surgical technique, advantages and disadvantages of each technique. Access is poor in plate and screw fixation of preauricular and submandibular approaches. Intraoral approach has advantage of no scar and used in case of low subcondylar fracture. Retromandibular and face lift approach is more reliable for plate and screw fixation and they provide excellent exposure. Face lift incision provides excellent access with an added advantage of a less conspicuous scar.

Pereira[64] M. D et al 1995 conducted a retrospective study to evaluate clinical and radiological results in 17 patients with 21 dislocated fractures treated by open reduction and internal fixation using steel wires and maxillomandibular fixation. Paresis of temporal branch of facial nerve was most common complication and was present in 6 out of 21 treated condyles.

Chossegros[9]. C et al 1996 described short retromandibular approach to displaced subcondylar fracture. The approach was more posterior, the parotid gland was not entered, scar was more slightly more conspicuous. They concluded that this technique is an

effective and safe technique, especially for displaced subcondylar fractures without deviation.

Anastassov[1] et al 1997 described facial rhytidectomy approach in seven cases treated by this method were presented. A review of various surgical techniques described in the literature indicates that difficulty in achieving adequate exposure of the fracture is a problem common to all the traditional surgical approaches. The endaural modification conceals a conspicuous scar on the tragus, and the authors avoided a retromandibular dissection to the condyle by adding a second flap which facilitates a direct approach. The latter incorporated dissection of the superficial musculo aponeurotic system and provided greater visualisation of the perimeter of the parotid gland. It also added greater exposure and ease in identification of the field nerve branches. They concluded that this approach is versatile, provides excellent exposure and a wide variety of reduction options. The other advantage of this technique were predictable and safe dissection, inconspicuous facial scar and a wide variety of reductive options

Newman[59]. L 1998 presented a study on clinical evaluation on long term outcome of patients treated for bilateral fracture of mandibular condyle. The approaches were mainly submandibular or pre auricular, but in two cases retromandibular approach was used which provided good access with minimum post operative

complications. They concluded that if either of the condyle is displaced ORIF of at least one condyle is the most satisfactory method of treatment.

Choi[11]. B. H 1999 conducted a clinical study to evaluate clinical and radiological results in patients treated by open reduction of high condylar neck fractures with exposure of facial nerve. He concluded his study and stated that accurate reduction and rigid fixation of high condylar neck fractures were possible through the use of an approach in which the facial nerve was exposed.

Umstadt[82]. H. E et al 2000 carried out clinical and axiographic study to assess the outcome of the patients with severely displaced fractures and fracture dislocation of the mandibular condyle was evaluated. Two operation methods were compared one via an intra oral approach .without joint revision and another via a pre auricular approach with open reduction of the joint. Revision of joints with disc reduction and reconstruction of ligaments in case of severely displaced or dislocated fracture resulted in better mobility and less pain. When treating severe TMJ trauma, both bony and soft tissue structures should be reconstructed if signs of internal derangement are present.

Schon. R[76] et al 2002 compared extraoral verses intraoral approach in endoscopy assisted ORIF of condylar fracture of the mandible.

Adequate anatomic reduction was achieved was by the submandibular and trans oral approach using an endoscopy assisted technique. The trans oral approach proved to be reliable surgical approach for the fractures of mandibular condyle even when the dislocation with lateral over ride was present. It was concluded that trans oral approach was less time consuming than the submandibular approach, intraoral scars are invisible and there is no risk of facial nerve damage.

Delvin[16]. M. F et al 2002 conducted a clinical study to review the morbidity of the standard surgical approach to openly reduce and internally fix the mandibular condyle. They concluded that by submandibular approach gives the benefit of good cosmetics and adequate exposure for manipulation and reduction of the fracture and for the placement of fixation.

Guerrissi[31]. J. O. A 2002 described rigid fixation of mandibular condyle by a trans cutaneous trans parotid approach The main advantages of this technique are easy screw placement, and avoid injury to the parotid gland and the facial nerve.

Manisali[54] .M et al 2003 carried out a prospective study to assess the morbidity of the retromandibular approach in the management of condylar fracture. They concluded that retromandibular approach provides good access with low morbidity, and they stated that a

rhytidectomy modification should be considered in patient with aesthetic expectations

Choi .B. H[12] et al 2003 carried out a clinical study to evaluate radiological results obtained with ORIF of the unilateral condylar fracture in 10 patients. The approach was similar to that used for parotidectomy. CT images were taken for the fractured condyle and compared to the contra lateral fractured condylar process. The results showed no significant differences between operated joint and contra lateral joint. The conclusion was that it is possible to anatomically reduce fractured condyles using a surgical approach involving facial nerve exposure.

Michael Milaro[55] et al 2003 described endoscopic assisted repair of subcondylar fractures. The major advantages of this intra oral approach is lack of facial scar, where as disadvantage are less visualisation, especially at the posterior border of ramus.

Haug[38]. R. H et al 2004 presented a clinical theory regarding traditional approach and endoscope assisted approach for ORIF of mandibular condyle fracture. He concluded that traditional approach and the endoscope assisted approach to ORIF of mandible condyle provides uniform, consistent and favourable results. The endoscopic approach currently used is more costly, takes longer time to perform and offer no better frequency of patent morbidity.

Wilson[90] A. W et al 2005 described transmasseteric anterior parotid approach for open reduction and internal fixation of condylar fractures to overcome problems like limited access and facial nerve injury during ORIF of condylar fractures. They recommended this approach as it offers excellent access to the ramus condylar unit and unlikely to damage the facial nerve.

Vesnaver[84] .A et al 2005 described a study on periauricular trans parotid approach for ORIF of condylar fractures to determine the safety and efficiency of surgical treatment using transparotid approach for direct plating. They concluded that the trans parotid face lift approach offers a safe and effective approach for direct plating of condylar fracture. They also stated that the face lift approach achieves a much wider, clearer and more direct exposure than submandibular and retromandibular approaches.

Schneiderr[77] .M et al 2007 conducted a study to compare the long term results following different approaches using functional, axiographical and radiological findings. It was concluded that intra oral approach should be reserved for those fractures which can be reduced even in a limited access. For all other fractures, extra oral reduction and osteosynthesis are the other methods of choice.

Foustanos[28] .A et al 2007 conducted a prospective clinical study to assess the face lift approach combined with a SMAS advancement

flap in parotidectomy. In this approach patients with benign parotid tumour treated with face lift approach combined with a SMAS advancement flap was assessed. Patients were followed every six months for a period of three years. It was concluded that face lift incision is an important innovation which improves the post operative appearance by avoiding an obvious cervical scar and also permit good exposure not only to the parotid region but also of the submandibular and the sternocleidomastoid muscle region.

Biglioli[8]. F et al 2008 conducted a clinical study to assess the outcome of a mini retromandibular approach. The conclusion of the study was that , condylar fracture reduction, fixation and healing can be managed carefully using limited retromandibular approach .The risk of facial nerve injury is limited as the nerve fibres are viewed directly .

Meyer[57] et al 2008 evaluated the clinical and radiological results obtained with a new kind of osteosynthesis device (TCP plates) especially designed for low subcondylar fracture and high subcondylar fracture of the mandible in association with the high submandibular approach. TCP plates, in association with high submandibular approach were found to be an efficient osteosynthesis device for stabilising subcondylar fractures.

Hupp[40] 2009 compared locking and non locking plates in the treatment of mandibular condyle fracture and stated that locking plates were more likely to break and non locking plates showed screw loosening.

Saikrishna[78] D et al 2009 conducted a clinical study on 30 patients and treated them by open reduction and internal fixation for condylar fractures via rhytidectomy / retromandibular approach. Group I (rhytidectomy approach) were compared and evaluated clinically and radiologically with Group II (retromandibular approach) for the following parameters like surgical access, duration of surgery, anatomic reduction assessment with relevant radiographs, occlusal discrepancies, need for post operative IMF, facial nerve morbidity, other post operative complications and scarring. The authors concluded that the rhytidectomy approach has all the advantages of the retromandibular approach with the added advantage of a less conspicuous scar and a wider exposure of the fracture site.

R.Gonzalez-Garcia[32] et al 2009 evaluated the results of transoral endoscopic–assisted open reduction and miniplate fixation of subcondylar fractures. No damage to the facial nerve was observed. No visible scars were present and no condylar resorption was present at the end of the follow up period. The authors consider that this procedure constitutes a valid alternative to a trans cutaneous

approach for the reduction and fixation of subcondylar fractures in selected cases.

Parascandolo[65] et al 2010 said that use of two plates provides greater stability compared with the single plate, reducing the possibility of displacement of the condylar fragment.

COMPLICATIONS

Hall[34] .M.B et al 1985 conducted a study on facial nerve injury during surgery of the temperomandibular joint where a comparison of two dissection techniques to assess the TMJ was done. Changing the dissection technique decreased the incidence of facial nerve injury from 25 % to 1.7 % and was due to elimination of a skin flap and dissection of tissue overlying the lateral capsule. They described about 6 different patterns of facial nerve distribution.

Ellis[21] .E 1998 carried out a clinical study in which he cited various complications of mandibular condyle fracture. Irrespective of the treatment modalities complications were malocclusion, hypo mobility, asymmetry, dysfunction or degeneration and iatrogenic injuries. Bilateral fractures seem to be one of the most common cause of most malocclusions.

Ellis[23] .E et al 2000 conducted a clinical study to assess the surgical complications after open treatment for fractures of the

mandibular condylar process. The conclusion of this study was that surgical complications of open treatment of condylar process that lead to permanent dysfunction or deformity were uncommon and they suggested that the preferred surgical approach for plate and screw fixation of condyle is the retromandibular or its face lift variant.

MATERIALS AND METHODS

Five consecutive cases of unilateral subcondylar fractures of mandible in the age group of 20 to 30 years were treated surgically in the Department of Oral and maxillofacial surgery, Tamilnadu Government dental College, Chennai. All the patients treated were men. Three Patients had associated parasymphysis fracture of mandible one patient had symphyseal fracture of mandible.

Patients who sustained subcondylar fractures were selected as per inclusion criteria. A complete history was taken from each patient in a standardised manner. The distribution of the fracture types was based on the classification of Spiessel/schroll.

INCLUSION CRITERIA

1. Adult patients of both sexes.
2. Unilateral subcondylar fracture.
3. Lateral fracture dislocation of condyle.
4. Fracture involving subcondylar region of mandible, with or without associated facial bone fracture.
5. Condylar fractures with occlusal derangement.
6. Condylar fractures with functional interference.
7. Patients who cannot tolerate IMF for long duration or in patients when IMF is contraindicated due to associated medical conditions.

8. Patients with high cosmetic concern.
9. Patients who are willing for regular follow up.

EXCLUSION CRITERIA

1. Patients with systemic bone disease.
2. Patients who have undergone previous surgery or trauma in the proposed surgical site.
3. Patients who have familial tendency to form hypertrophic scar.
4. Patients with history of pathology in pericondylar region.

A complete history was taken from each patient in a standardised manner. This includes

1. Name, age, sex, occupation and address.
2. Chief complaint.
3. History of presenting illness.
4. Past medical and dental history.

General examination regarding all system is carried out.

LOCAL EXAMINATION:

EXTRAORAL EXAMINATION

INSPECTION:

Swelling, soft tissue laceration, obvious deformity of bony contour was noted. Mouth opening and jaw movements were recorded.

PALPATION

Tenderness over the TMJ region.

Step deformity, bony crepitus.

Anesthesia or paresthesia of lower lip was recorded.

INTRAORAL EXAMINATION

INSPECTION

Occlusal derangement, mouth opening, deviation of mandible or mouth opening, laceration in overlying mucosa, missing, subluxated teeth, gingival and periodontal health were noted.

PALPATION

Tenderness, step deformity, mobility of teeth were recorded. Besides etiology, number and location of fracture, presence of preoperative infection were also recorded.

INVESTIGATIONS:

1. ROUTINE BLOOD INVESTIGATIONS:

- Total count.
- Differential count.
- Erythrocyte sedimentation rate.
- Haemoglobin.
- Bleeding time.
- Clotting time.

2. RENAL FUNCTION TESTS

- Blood sugar
- Urea.
- Creatinine.

3. URINE:

- Sugar, Albumin.

4. ROUTINE RADIOGRAPHS:

- OPG.
- Towne's view.
- Lateral oblique.

Informed consent was obtained prior to surgery after explaining the procedure and its complication to the patient.

TREATMENT PLANNING

All the cases were treated by Rhytidectomy approach under general anesthesia.

SURGICAL PROCEDURE

In all the patients fractures were reduced with upper and lower Erich arch bar fixation as a means for IMF. All the cases were treated under general anesthesia with naso-endotracheal intubation. A Rhytidectomy trans parotid dissection was performed.

RHYTIDECTOMY APPROACH

PREPARATION AND DRAPING

GA induced and maintained by nasoendo tracheal intubation. Preparation of the patient is done with betadine and draped with sterile towels so as to expose the surgical site. Structures that should be visible in the field include the corner of the eye, the corner of the mouth and the lower lip anteriorly, and the entire ear and descending hairline and 2 to 3cm of hair superior to the posterior hairline, posteriorly. The temporal area must also be completely exposed. Inferiorly several centimetre of skin below the inferior border of the mandible are exposed to provide access for undermining the skin. Throat pack is placed. Arch bar is placed in maxillary and mandibular arch, fracture is reduced, occlusion is achieved and inter maxillary fixation done.

MARKING THE INCISION AND VASOCONSTRICTION

The skin is marked before injecting a vasoconstrictor. The incision begins approximately 1.5 to 2 cm superior to the zygomatic arch just posterior to the anterior extent of the hairline. The incision then curves posteriorly and inferiorly, blending into a preauricular incision in the natural crease anterior to the pinna. The incision continues under the ear lobe and approximately 3 mm onto the posterior surface of the auricle instead of continuing in the mastoid-ear skin crease. This modification prevents a noticeable scar that occurs during contractive healing of the flap, pulling the scar into the neck. Instead, the scar ends in the crease between the auricle and the mastoid skin. At a point where the incision is well hidden by the ear, it curves posteriorly towards the hairline and then runs along the hairline or just inside it, for a few centimetres. Local infiltration with 2% lignocaine and 1:100,000 adrenaline is given in the surgical site subcutaneously to aid in hemostasis.

SKIN INCISION AND DISSECTION

The initial incision is made through the skin and subcutaneous tissue only. A skin flap is elevated through this incision using sharp and blunt dissection with metzabaum or rhytidectomy scissors. The flap is widely undermined to create a subcutaneous pocket that extends below the angle of mandible and a few centimetres anterior to the posterior border of the mandible. There are no anatomic structures of any significance in this place

except for the great auricular nerve, which is deep to the subcutaneous dissection.

DISSECTION TO THE PTERYGOMASSETERIC MUSCULAR SLING

Once the skin has been retracted anteriorly and inferiorly, the soft tissues overlying the posterior half of the mandibular ramus are visible. The scant platysma muscle overlying the superficial musculo aponeurotic system (SMAS) is visible. A scalpel is used to incise through the fusion of platysma muscle, SMAS and parotid capsule in the vertical plane. As soon as the globular parotid tissue started emerging from the incision, blunt dissection with a haemostat was employed parallel to the anticipated direction of facial nerve branches. When branches of facial nerve were encountered (usually at least 5mm deep to the parotid fascia) they were dissected anteriorly for about 10- 15 mm and posteriorly for about 5-10mm which exposes retraction of branches with very little tension. Beneath the retracted branches, masseter was encountered. The dissection was carried posteriorly to the posterior rim of ramus and in this way, the retromandibular vein was avoided as it was retracted posteriorly with the parotid parenchyma. The vein rarely required ligation.

DIVISION OF THE PTERYGOMASSETERIC SLING AND SUBMASSETERIC DISSECTION

The pterygomasseteric sling was incised on the posterior rim of ramus and periosteal elevator was used to expose the fracture site. The fracture was reduced back in to place. When the reduction was achieved the condyle was fixed with stainless steel miniplate and monocortical screws. Occlusion and mobility of the joint was checked.

CLOSURE

The surgical field was then irrigated and inspected followed by meticulous hemostasis. The pterygomasseteric sling was sutured together with resorbable vicryl suture. The parotid fascia and SMAS and platysma layer were repaired with a single watertight suture using 3-0 vicryl to reduce the risk of salivary fistula. After the parotid capsule (SMAS) platysma layer is closed, a 1/8 0r 3/32 inch round vacuum drain is placed into the subcutaneous pocket to prevent hematoma formation. The drain exit the posterior portion of the incision or through a separate stab in the posterior part of the neck. Subcutaneous sutures were placed using 4-0 vicryl. The skin was closed with 4-0 or 5-0 poly propylene suture. Pressure dressing was given which was left in place for 48 hours.

POST OPERATIVE CARE:

Post operative patients were recommended to take a soft diet for 6 weeks. They were encouraged to practice mouth opening and closing exercise. Check radiological imaging was performed .Patients were discharged 5 days post operatively. Sutures were removed 7 days post operatively. Relevant clinical parameters were assessed preoperatively, intra-operatively and post operatively, i.e during 1st post operative day, 3rd post operative day followed by weekly from 6 weeks to 3 months.

Case report-1

Name : Mr. Gurumoorthy

Age / sex : 24 /male

Chief complaint

Patient complains of pain during opening and closing of mouth and pain in left ear region

History of presenting illness

History of injury to lower jaw while practising boxing.

Past medical history and Past dental history: Not relevant

Personal history

Patient is on mixed diet.

General examination

Patient is moderately built, moderately nourished, no sign of anaemia, jaundice, no lympadenopathy, no pedal odema, not a known diabetic and hypertensive.

Local examination

No evidence of external laceration

Restricted mouth opening

Restricted lateral and protrusive movements

Tenderness on palpation in left temporomandibular region

Intra oral

Occlusion deranged

Investigations

Routine blood investigation, and urine investigation. Chest X ray, E C G

OPG and Towns view mandible shows left subcondylar fracture.

CT scan reveals left subcondylar fracture

Diagnosis

Left subcondylar fracture

Treatment plan

ORIF through rhytidectomy approach under general anaesthesia

Treatment done

Open reduction and internal fixation of left subcondyle with one 2 mm 4 hole stainless steel miniplate with gap and four stainless steel screws one 2 mm 2 hole with gap and 2 stainless steel screws and 26 guage wire trans osseous wire .

Structures encountered: Nil

Complications if any: Nil

Case report - 2

Name : Mr. Mohamed Ameer

Age / sex : 24 / male

Chief complaint

Patient complaints of pain in right ear region and left side of lower jaw.

History of presenting illness

Patient gives a history of self fall

Past medical history and Past dental history: Not relevant

Personal history

He is on mixed diet. He is an occasional alcoholic.

General examination

Patient is moderately built, moderately nourished, no sign of anaemia, jaundice, no lympadenopathy, no pedal odema, not a known diabetic and hypertensive.

Local examination

Extra oral

Mouth opening restricted

On mouth opening jaw deviates to right side.

Restricted protrusive and lateral movement

Tenderness on palpation in right temporomandibular and left parasymphyseal region.

Step deformity present in lower border of mandible in left parasymphyseal region

Intra oral

Occlusion deranged

Sublingual hematoma present

Mobility of mandible between 32 and 33

Investigations

Routine blood investigation and urine investigation. chest X ray, E C G

OPG and Towns view mandible reveals right subcondylar region and left parasymphseal fracture.

CT scan reveals right subcondylar fracture and left parasymphyseal fracture

Diagnosis

Right subcondylar fracture and left parasymphyseal fracture

Treatment plan

ORIF through rhytidectomy approach under general anaesthesia

Treatment done

Open reduction and internal fixation of right subcondyle with one 2 mm 4 hole stainless steel miniplate with gap and four stainless steel screws and left parasymphyseal fracture fixed with two 2 mm 4 hole stainless steel miniplate with gap and eight stainless steel screws.

Structures encountered: Nil

Complications if any: Nil

Case report – 3

Name : Mr. Mari

Age / sex : 30 /Male

Chief complaint

Patient complains of pain during opening and closing of mouth and pain in left ear region

History of presenting illness

History of self fall from about six feet during construction of building

Past medical history and Past dental history: Not relevant

Personal history

Patient is on mixed diet.

General examination

Patient is moderately built, moderately nourished, no sign of anaemia, jaundice, no lympadenopathy, no pedal odema, not a known diabetic and hypertensive.

Local examination

No evidence of external laceration

Restricted mouth opening

Restricted lateral and protrusive movements

Tenderness on palpation in left temporomandibular region

Step deformity present in lower border of mandible in symphyseal region

Intra oral

Occlusion deranged

Sublingual hematoma present

Avulsion 31

Mobility of fractured mandibular segment between 32 and 41

Investigations

Routine blood investigation and urine investigation. Chest X ray, E C G

OPG and Towns view mandible shows left subcondylar fracture and symphyseal fracture.

CT scan reveals left subcondylar fracture, symphyseal fracture

Diagnosis

Left subcondylar and symphyseal fracture.

Treatment plan

ORIF through rhytidectomy approach under general anaesthesia

Treatment done

Open reduction and internal fixation of left subcondyle with two 2 mm 4 hole stainless steel miniplate with gap and eight stainless steel screws and symphyseal fracture fixed with two 2 mm 4 hole stainless steel miniplate with gap and eight stainless steel screws

Structures encountered: Nil

Complications if any: Nil

Case report – 4

Name : Mr. Naseer Basha

Age / sex : 20 / male

Chief complaint

Patient complains of pain in left ear region and right side of lower jaw with difficulty in mouth opening

History of presenting illness

History of self fall from two wheeler

Past medical history and Past dental history: Not relevant

Personal history: Personal history patient is on mixed diet.

General examination

Patient is moderately built, moderately nourished, no sign of anaemia, jaundice, no lympadenopathy, no pedal odema, not a known diabetic and hypertensive.

Local examination

No evidence of external laceration

Restricted mouth opening

Restricted lateral and protrusive movements

Tenderness on palpation in left temporomandibular region

Step deformity present in lower border of mandible in right parasymphyseal region

Intra oral

Occlusion deranged

Sublingual hematoma present

Palatally displaced 14

Avulsion 11, 12, 13.

Crown fracture in relation to 21

Mobility of fractured mandibular segment between 42 and 43

Investigations

Routine blood investigation, and urine investigation. Chest X ray, E C G

OPG and Towns view mandible shows left subcondylar fracture and right parasymphyseal fracture.

CT scan reveals left subcondylar fracture, right para symphyseal fracture, dentoalveolar fracture 13 to 16.

Diagnosis

Left subcondylar and right parasymphyseal fracture

Treatment plan

ORIF through rhytidectomy approach under general anaesthesia

Treatment done

Open reduction and internal fixation of left subcondyle with one 2 mm 4 hole stainless steel miniplate with gap and four stainless steel screws and right parasymphyseal fracture fixed with two 2 mm 4 hole stainless steel miniplate with gap and eight stainless steel screws

Structures encountered: Retromandibular vein dissected and ligated

Complications if any: Nil

Case report - 5

Name : Mr. Arul Prakash

Age / sex : 26 / male

Chief complaint

Patient complains of pain and swelling in lower jaw.

History of presenting illness: History of self fall from two wheeler

Past medical history and Past dental history: Not relevant

Personal history

Patient is on mixed diet. He smokes about 8 cigarettes per day, and occasional alcoholic.

General examination

Patient is moderately built, moderately nourished, no sign of anaemia, jaundice, no lympadenopathy, no pedal odema, not a known diabetic and hypertensive.

Local examination

Extra oral

Swelling present in right cheek region and left parasymphyseal region of mandible.

No evidence of external laceration

Restricted mouth opening

Restricted lateral and protrusive movements

Tenderness on palpation in right temporomandibular region

Step deformity present in lower border of mandible in left parasymphyseal region

Intra oral

Occlusion deranged

Sublingual hematoma present

Mobility of fractured mandible between 32 and 33

Palatally displaced 13 14 15 16 along with alveolar bone

Investigations

Routine blood investigation and urine investigation. chest X ray , E C G

OPG and Towns view mandible shows right subcondylar fracture and left parasymphyseal fracture.

CT scan reveals right subcondylar fracture, left para symphyseal fracture, dentoalveolar fracture 13 to 16.

Diagnosis: Right subcondylar, left parasymphseal, dentoalveolar fracture

Treatment plan

ORIF through rhytidectomy approach under general anaesthesia

Treatment done

Open reduction and internal fixation of right subcondyle with one 2 mm 4 hole stainless steel miniplate with gap and four stainless steel screws and left parasymphyseal fracture fixed with two 2 mm 4 hole stainless steel miniplate with gap and eight stainless steel screws

Structures encountered: Retromandibular vein dissected and ligated

Complications if any: Nil

OBSERVATION AND RESULTS

In our study 5 patients in mean age group of 20 to 30 years were selected. All the treated patients were male. Three Patients had left subcondylar fracture, two patients had right subcondylar fracture. Three patients had associated parasymphyseal fracture of mandible, one patient had symphyseal fracture of mandible. All the patients treated had Type II fracture.

The patients were assessed for:

1. Access during the surgical procedure.
2. Anatomic reduction of the condylar fracture.
3. Occlusal discrepancies.
4. Facial nerve morbidity.

Facial nerve injury was deemed to have occurred if patient was unable to draw the lower lip and corner of the mouth downward, was unable to whistle or was unable to completely close the eyelids or wrinkle the brow.

5. Haematoma.
6. Sialocele, salivary fistula.
7. Mouth opening.
8. Auricular anesthesia.

To evaluate post operative function of the great auricular nerve, the reaction of the external ear was tested by means of a pin prick.

9. TMJ symptoms like joint pain, mandible deviation on opening.

   Severity of the pain was assessed using a visual analogue scale.

Visual analogue scale: score (0 -10).

No pain ----------→ pain cannot be worse.

0 1 2 3 4 5 6 7 8 9 10

10. Post operative IMF.
11. Scarring.

    The character of the scar was graded as

    1. Inconspicuous
    2. Conspicuous.
    3. Hypertrophic.

12. Wound infection
13. Plate fracture.

SURGICAL ACCESS

Surgical access was graded as excellent, good, fair. All the five cases access was excellent.

ANATOMIC REDUCTION

Anatomic reduction was rated as anatomically correct, good, fair. Anatomic reduction was rated with the help of post operative

radiograph. Good anatomical reduction was achieved in all the five cases treated.

OCCLUSION

Occlusal derangement was rated as deranged or normal. Normal occlusion was achieved in all the five cases

INTERMAXILLARY FIXATION

Patients were not kept under intermaxillary fixation post operatively.

POST OPERATIVE MOUTH OPENING

All the patients treated had a post operative mouth opening greater than 43 mm.

FACIAL NERVE WEAKNESS

Temporary facial nerve weakness (temporal branch) was reported in one patient which fully recovered in a period of 4 weeks.

HEMATOMA

No post operative hematoma was observed in any of the operated cases.

AURICULAR ANAESTHESIA

One patient had auricular anaesthesia which resolved in a period of 6 weeks.

TMJ DYSFUNCTION

There was no incidence of TMJ dysfunction.

SCAR

Scar was graded as conspicuous, inconspicuous, hypertrophic. All the patients had inconspicuous scar.

SIALOCELE AND SALIVARY FISTULA

There was no incidence of sialocele or salivary fistula in all the five cases.

WOUND INFECTION

There was no incidence of wound infection in any of the operated cases.

PLATE FRACTURE

There was no incidence of plate fracture in any of the cases.

S. No	Evaluation Parameters		CASE NO 1	CASE NO 2	CASE NO 3	CASE NO 4	CASE NO 5
1	Mouth opening	Pre-op	10mm	16mm	15mm	20mm	18mm
		Post-op	48mm	58mm	46mm	45mm	44mm
2	Occlusal derangement	Pre-op	Deranged	Deranged	Deranged	Deranged	Deranged
		Post-op	Normal	Normal	Normal	Normal	Normal
3	Deviation of mandible on mouth opening		Nil	Nil	Nil	Nil	Nil
4	Intermaxillary fixation	Pre-op	Yes	Yes	Yes	Yes	Yes
		Post-op	No	No	No	No	No
5	TMJ symptoms		Nil	Nil	Nil	Nil	Nil
6	Access		Excellent	Excellent	Excellent	Excellent	Excellent
7	Anatomic reduction		Good	Good	Good	Good	Good
8	Scar		Inconspicuous	Inconspicuous	Inconspicuous	Inconspicuous	Inconspicuous
9	Sialocele/salivary fistula		Nil	Nil	Nil	Nil	Nil
10	Facial nerve weakness		Nil	Nil	Yes	Nil	Nil
11	Recovery of facial nerve weakness				After 4 weeks		
12	Auricular anaesthesia		Nil	Yes	Nil	Nil	Nil
13	Recovery of Auricular anaesthesia		-	After 6 weeks	-	-	-
14	Hematoma		Nil	Nil	Nil	Nil	Nil
15	Wound Infection		Nil	Nil	Nil	Nil	Nil
16	Plate fracture		Nil	Nil	Nil	Nil	Nil

DISCUSSION

Injuries of the condyle deserve a special attention and consideration apart from rest of the mandible due to their anatomic difference and their healing potential. The management of fractured condyle has always stimulated debate.

Condylar fractures are very common representing about 25 to 50 % of all mandibular fractures. The treatment policy for condylar injuries has aroused more controversy than any other subject in maxillofacial trauma. Fractures of condyle heal by bony union regardless of any other treatment. The treatment of condylar fracture has continued to the present day and there has been two concensus conference held on this subject in 1985 at Budapest and 1998 in Groningen and still have not come to a conclusion regarding the treatment of Condylar fractures[16].

Walker[89] R. V. in 1998 described the goals for the management of condylar fracture.

1. Pain free movement of the condyle.
2. Good occlusion.
3. Symmetry of the face.
4. Good facial jaw symmetry.

He concluded that the protocol in the management of mandibular subcondylar fracture is to achieve these goals irrespective of the type of management.

Various authors preferred non surgical management as the result of surgical and nonsurgical treatment were comparable, but the treatment of mandibular condyle fracture by closed reduction has its limitations.

Silvennonoinen[73] V et al (1995) observed that there was a reduction in the height of the ramus and malocclusion following conservative management .

Amaratunga[2] (1999) found that there is no benefit following closed reduction of mandibular condylar fracture as they were not truly reduced.

Celso palmieri[10] (1999) observed a reduction in condylar movements following conservative management.

Ellis[22]et al 2000 in his research found that condyle was medially tilted following conservative treatment.

Ellis [25]et al in (2001) suggested that the amount of condylar displacement following closed reduction was not of sufficient magnitude to effect maximum biting ability.

Hanna thoreh[37] et al (2001) in his radiographic study showed aberrations following closed reduction.

Widmark[87] G et al (1996) conservative treatment of condylar fractures in both young and adults has been the choice of treatment. One of the reason for adopting conservative treatment is the difficulty in manipulating the fragments in a small area with the risk of damaging the facial nerve or vessels such as internal maxillary artery

Michael[91] F. Zide and **John. V. Kent** came with absolute and relative indications for open reduction of condylar fractures.

Warsae[86]and **Thorn (1994)** concluded that surgical management was more advantageous than non surgical management. One of the surgical indications is condylar fracture with dislocation outside the mandibular fossa, as the condyle cannot be retruded to its anatomical position accurately by conservative treatment. In adults management of the displaced condylar fracture should be surgical.[66,86]

Currently the only way to reposition the displaced condyle to its normal position is by surgery and adequate approach is necessary to avoid complications.

Nils worsae[86] and **jens Thorn (1994)** said dislocated condylar fractures treated conservatively produce more complications such as malocclusion, asymmetry, impaired masticatory function and pain than those treated surgically

M. Hiawitschka[39] **et al (2005)** said following open reduction and internal fixation patients showed better radiological results with regards to mandibular ramus height, resorption and pathological change to condyle TMJ displayed fewer irregularities in the condylar path.

Giacoma deriu[30] **et al** showed in his study that open reduction gave better results, anatomic restoration and faster recovery rate than non surgical management.

Takenoshita[79], **Konstentinovic** and **Dimitrijevic (1992)** [46]advocated surgical treatment only in severe displacement, fracture dislocation and ramus shortening. However **Anastassov et al 1997**[1], **Choi and Yoo 1999**[11], **Delvin et al 2002**[16] have said if surgical procedure is safe and relatively easy it is better to perform it in all access with milder displacement and thus avoid prolonged period of

intermaxillary fixation. Moreover with anatomic reposition and height restoration of the condyle, the chances of developing TMJ problems may be reduced.

The first approach for open reduction and internal fixation was intraoral approach by **Silverman (1925)**[69] and **Aison** (**1926). Koberg** and **Momma**[43] described the retromandibular approach for plate and screw fixation whereas **Petzel** and **Eckelt**[26] in the early **1980‘s** described lag screw fixation by submandibular approach. **Kitayama** described intraoral placement of lag screw.

It was followed by **Stein Hauser**[70] (**1964)** who described transoral open reduction and osteosynthesis of low condylar fractures of mandible. The main advantages are avoiding a visible scar and risk of facial nerve damage is minimised. The main disadvantage is limited access, difficulty in reducing medially displaced fractures and stabilising the fracture while applying the fixation.

Risdon (1934)[11] submandibular approach is used for open reduction and internal fixatrion of low condylar fractures. The disadvantage of this approach is greater distance from the skin incision to the fracture site. This approach makes retraction difficult for medially displaced condylar fracture and fixation with miniplates extremely

difficult. The incidence of facial nerve paresis is 11 to 37 %. (**Zide and Kent 1983).**[91]

Preauricular approach has been advocated for treatment of high condylar fractures this approach usually requires a trans cutaneous trocar to fix the most inferior screws of the bone plate as the acess is extremely difficult with this technique.

The retromandibular approach was first described by **Hinds E. C**, **Girotti. W. J** .in **1967**[33] and popularised for the management of open reduction and internal fixation of condylar fractures by **Ellis E** and **Dean J**[18] in **1993** where he made retromandibular trans parotid approach . This approach was followed by **M Manisali**[54] **2003** and **Vesnaver**[84] **et al** in **2005**. This approach was modified as short retromandibular approach by **Cyrille Chossegros et al in 1996**[9] and **G. Widmark**[87] **et al in 1996** where they do not transgress the parotid gland.

In **Chossegros**[9] et al technique the fracture site is exposed by lifting the tail of the parotid gland without identifying the marginal mandibular branch of the facial nerve. **Widmark**[87] et al also described an approach to the condyle by dissecting anterior to the parotid gland. In retromandibular transparotid approach by **Ellis** and **Dean** where blunt dissection is performed to transgress the tail of parotid gland to reach the ramus of mandible. This technique

minimises the risk of permanent damage to the branches of facial nerve as the nerve lies in a deeper plane and identification of nerve branches is easier against the background of parotid parenchyma.

The type of fracture were classified according to **Spissel** and **Schroll[71] (1972)** out of the five patients treated surgically all of them sustained type II fracture. In this study when performing a diagnostic imaging, an orthopantomogram and towns view were taken to identify the condyle fracture. Fractures that appear to be minimally displaced on OPG can be seen badly displaced on towns view and vice versa.

There was no need for post operative IMF in all the cases, this was in contradiction to **Zide[91] F M et al (1983)** who used IMF for four weeks after fixation of condylar fracture with wires using rhytidectomy approach. In our study we could achieve a post operative mouth opening greater than 43 mm.

Zide[91] F. M et al (1983) used rhytidectomy incision to open a fracture condyle where they could achieve post operative mouth opening of 45 mm compared to the other approaches used averagely they could achieve only about 35 mm .

TMJ DYSFUNCTION

In this study ipsilateral deviation was not noted in all the five cases operated . Pain was assessed subjectively using VAS score ranging from 1 to 10 depending upon the severity. Mild pain with a VAS score of 2 was reported by one patient. Patient was treated symptomatically and was resolved completely in a period of 2 months.

Zide[91] and **Kent (1983)** reported that 15 % of all surgically treated patients have problem in the form of pain, dysfunction, limitation of mouth opening or deformity.

FACIAL NERVE WEAKNES

In our study there was temporary facial nerve weakness in temporal branch was noted in one patient which resolved completely within a period of 4 weeks.

Zide [91]and **Kent (1983),** and **Vesnaver**[84] **et al** and **C hoi**[11] **B H et al** observed facial nerve palsy in 40%, 22 % and 20% of their patient respectively.

Vasconcelos[85] **et al (2007)** reported that facial nerve damage is chiefly caused by compression and or stretching of nerve fibres which resulted in neuropraxia. In our study we found that temporal branch was at risk when rhytidectomy approach was used.

According to **Raven** et al, facial nerve damage is caused chiefly by excessive traction of retractors or electro cauterisation of vessels adjacent to the facial nerve. So when the branches were identified within the parotid tissue overlying the ramus they have to be dissected anteriorly for 10 to 15 mm and posteriorly for 5 to 10 mm. After dissection the branches are retracted with less tension and post operative facial nerve weakness is reduced. (**Ellis and Zide 1995[20] Choi** and **Yao[11], 1999, Ellis[23] et al 2000)**

The results of this study, concerning inter incisal opening, deviation of mandible upon opening, occlusion and facial symmetry were good. Post operative transient facial palsy was observed in one patient, which resolved in 4 weeks.

There was one case of **auricular anesthesia** which resolved spontaneously in a period of 6 weeks. **Vesnaver et al (2005)[84]** reported 5 cases (6 %) of transient auricular anaesthesia due to injury of greater auricular nerve, which lasted for one to six months and all of them resolved spontaneously.

There was no **postoperative hematoma** in our cases. **Vesnaver[84] et al** observed post operative hematoma in 6 % of their cases. **Anastassov[1] G E et al 1997** also reported a case of postoperative hematoma when rhytidectomy approach is used. **Sialocele or salivary fistula** was not observed in any of our cases.

Ellis[23] et al (2000) reported 3 cases of salivary fistulae in their studies. **Vesnaver[84] et al (2005)** reported 14 % incidence of salivary fistulae in their study.

In our study more time was require for the **closure**. This is not of any important significance as we could achieve a more wider exposure, easy uncomplicated accessibility with minimal tissue trauma and it facilitated placement of plates and screws to be placed at right angles to the fracture line with an inconspicuous scar.

According **to Anastassov[1] et al 1997** and **Vesnaver[84] et al 2005** facial rhytidectomy technique provides excellent access to posterior mandibular fracture with minimal complications. The condyle and fracture are exposed directly and allow for good inspection and reduction, as well as vertical screw placememt, which is essential for osteosynthesis stability. This approach can be used in all kinds of condylar fracture including high condylar neck fractures, and condylar dislocations as well as in ramus fractures. The retromandibular approach achieves a limited exposure submandibular and trans oral approaches provide limited access and have to be combined with trans buccal screw placement and use of an endoscope.[54,20,84]

Scar was assessed clinically and was graded as conspicuous, inconspicuous, or hypertrophic. All the five patients had

inconspicuous scar, which is an important added advantage of the rhytidectomy procedure. The preauricular scar is very well camouflaged and invisible if the face lift incision is planned carefully. Face lift incision leaves no visible scar and it permits good exposure**.**

Ellis and **Zide (1995)**, **Anastassov[1] et al (1997)** said that in face lift approach has the advantage of less conspicuous scar and achieves a much wider, clearer and more direct exposure than the retromandibular or submandibular approaches[84]**.**

In our study we did not encounter any **plate infection**, **plate fracture** or any necessity for plate removal. The rhytidectomy (face lift) has all the advantages of wide exposure of the fracture site and less conspicuous scar. The esthetic outcome of this technique is superior to other approaches and the disadvantage of added time required for the closure is not of much concern. The advantage of rhytidectomy approach is

1. Wide exposure of the posterior mandible
2. Easy accessibility with limited retraction required, there by causing less tissue trauma.
3. Versality of treatment modalities like plates, screws, lag screws can be placed without hindrance to other structures.
4. Predictable identification of vital structures and minimal operative morbidity and an inconspicuous facial scar.[1]

In conclusion when open reduction and internal fixation of condylar fracture is indicated rhytidectomy trans parotid approach provides good access with low morbidity.

SUMMARY AND CONCLUSION

In this study 5 cases of subcondylar fracture were treated by open reduction and internal fixation via the rhytidectomy approach, and we have achieved excellent results.

The rhytidectomy (face lift) incision which we used in our study has the advantage of a less conspicuous scar and wider exposure of the fracture site when compared to retromandibular approach.

It may be concluded that surgical treatment of fractured displaced condyle achieved excellent results when a transparotid face lift approach is used. Clinical parameters were assessed preoperatively, intraoperatively, and post operatively. Patients were assessed clinically and radiologically and the following conclusion was drawn.

1. The rhytidectomy approach provides excellent access.
2. Branches of facial nerve were encountered but it can be safely retracted either superiorly or inferiorly, without any permanent damage.
3. We were able to achieve anatomic reduction of fractured subcondyle
4. More than 43 mm of mouth opening was achieved post operatively in all the cases

5. There was no post operative occlusal derangement.
6. There was no need for post operative IMF.
7. The scar was inconspicuous.
8. There was no deviation of mandible on mouth opening.
9. There were no TMJ symptoms like pain or clicking.
10. There was no complication of sialocele, salivary fistula.
11. There was no incidence of permanent facial nerve injury, auricular anaesthesia.
12. There was no incidence of hematoma.
13. There was no incidence of wound infection.
14. There was no incidence of plate fracture.

In conclusion, when open reduction and internal fixation of subcondylar fracture is indicated, we found rhytidectomy or face lift trans parotid approach is effective and safe technique with good access and low morbidity. This approach provides wider exposure of the fracture site. The only disadvantage is the added time required for closure which is not a concern as the aesthetic outcome is excellent. It may be concluded that surgical treatment of the fractured, displaced condyle achieves excellent results when rhytidectomy approach is used.

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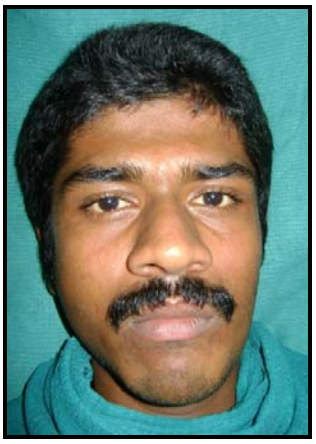

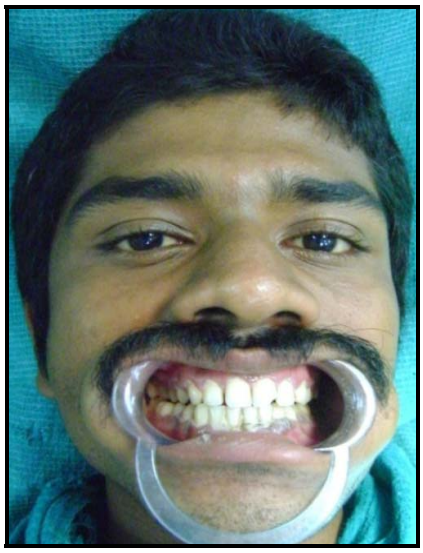

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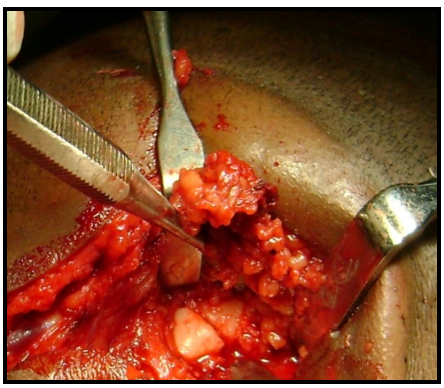

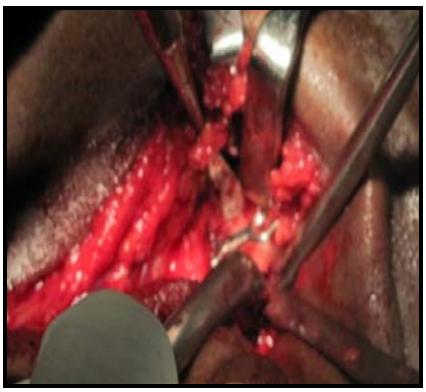

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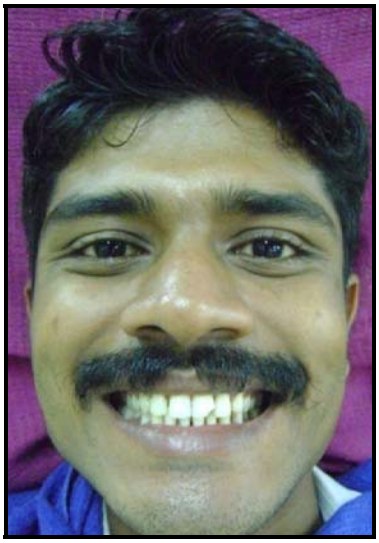

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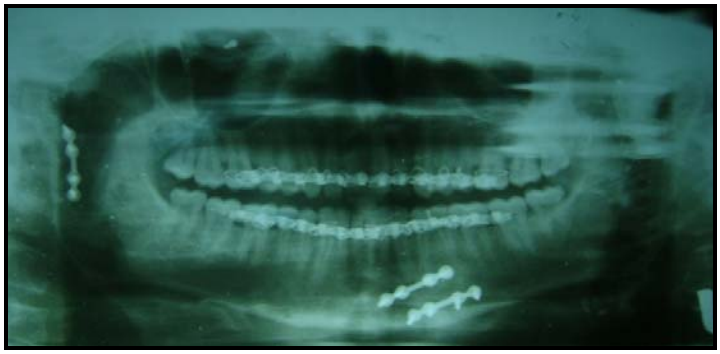

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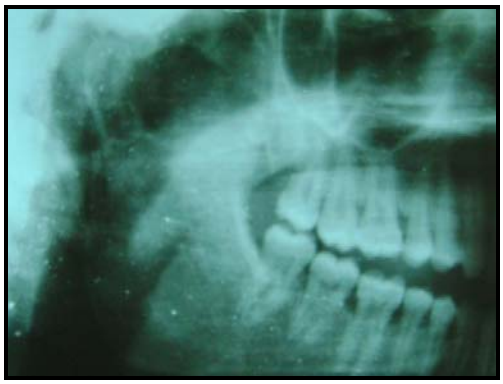

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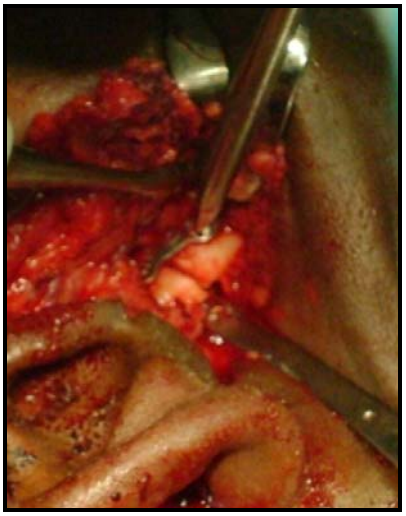

POST OPERATIVE

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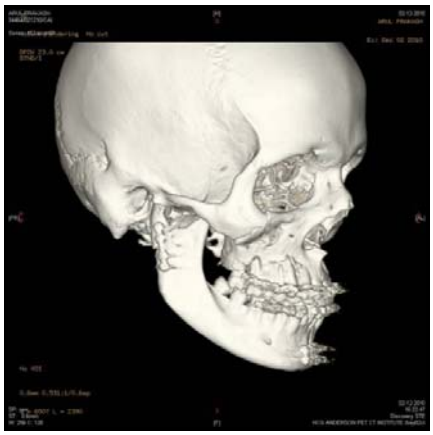
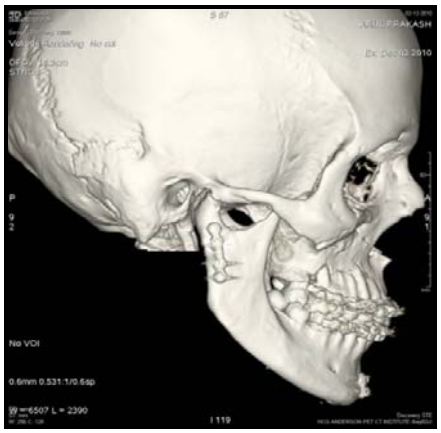
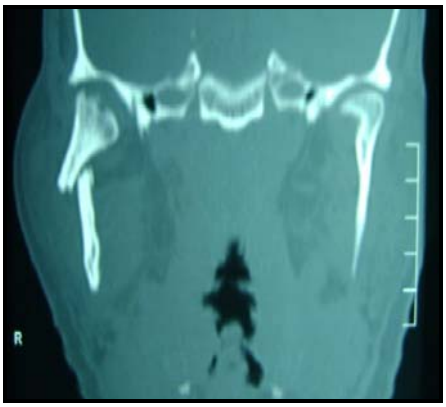
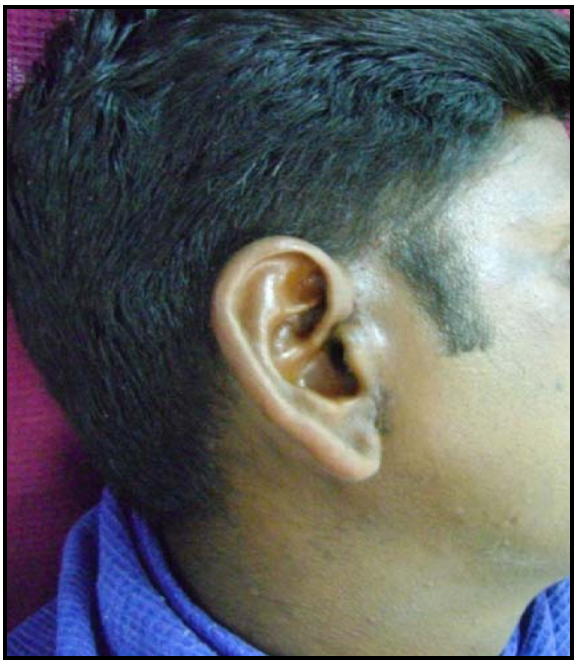






POST OPERTIVE VIEW OF SCAR



Case 1

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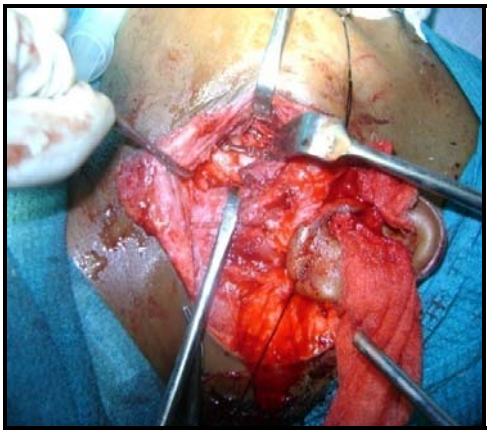

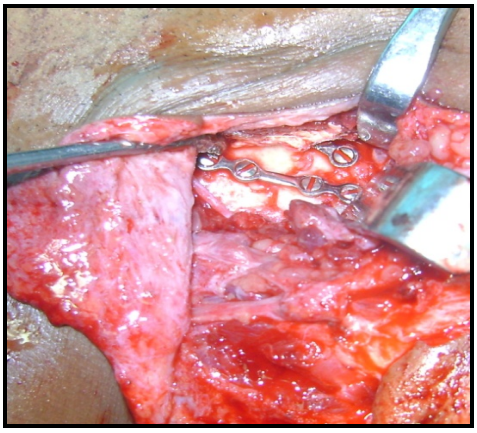

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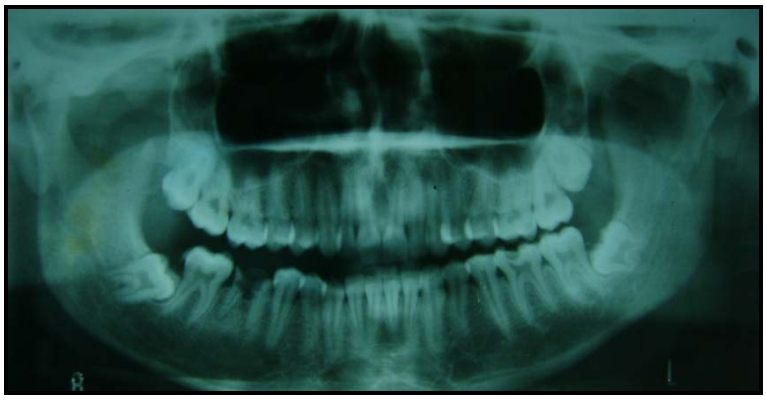
RADIOGRAPHS

PREOPERATIVE



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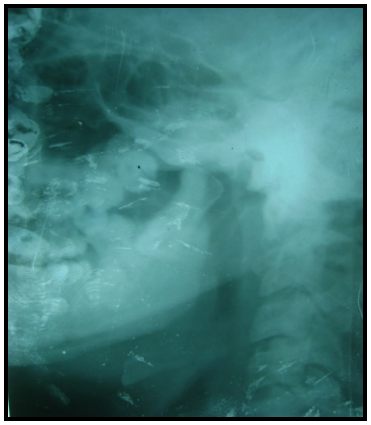

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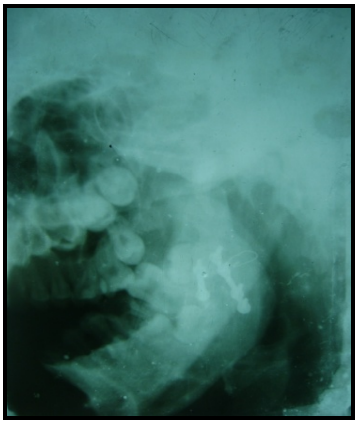
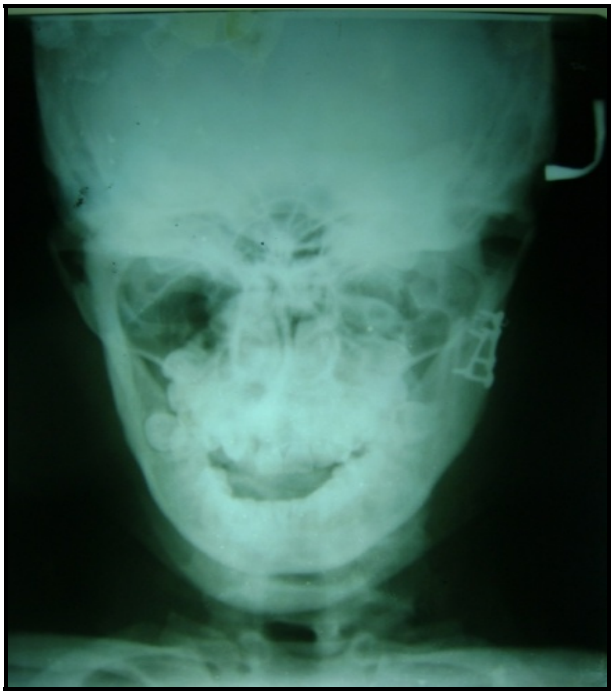


RADIOGRAPHS

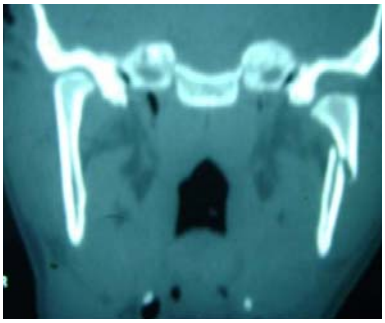
PREOPERATIVE

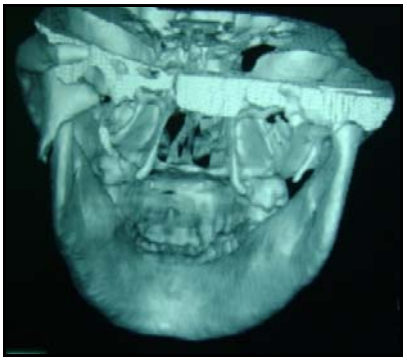
POSTOPERATIVE



CT SCAN

PREOPERATIVE





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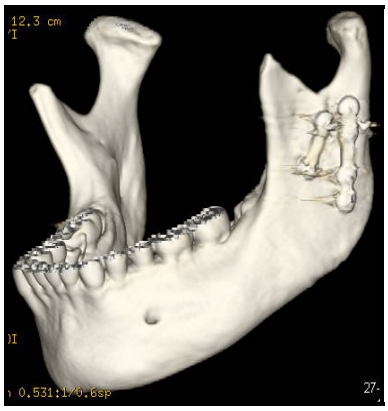
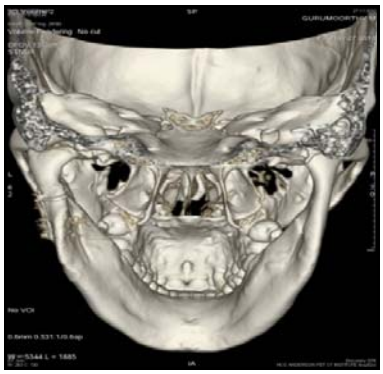
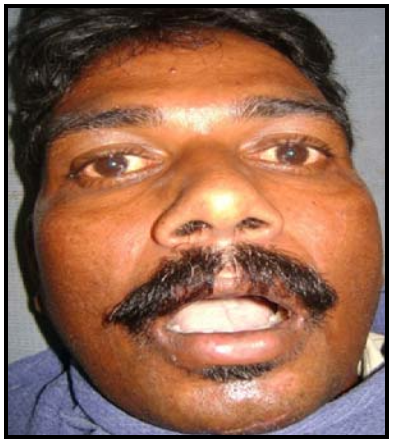




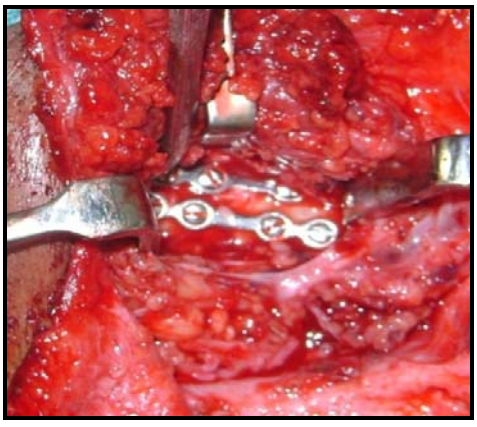
POSTOPERATIVE VIEW OF SCAR

Case 3

PREOPERATIVE



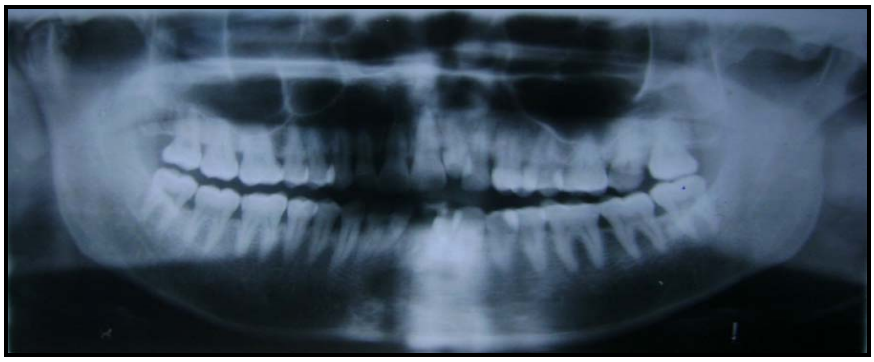
INTRAOPERATIVE



POSTOPERATIVE

RADIOGRAPHS

PREOPERATIVE



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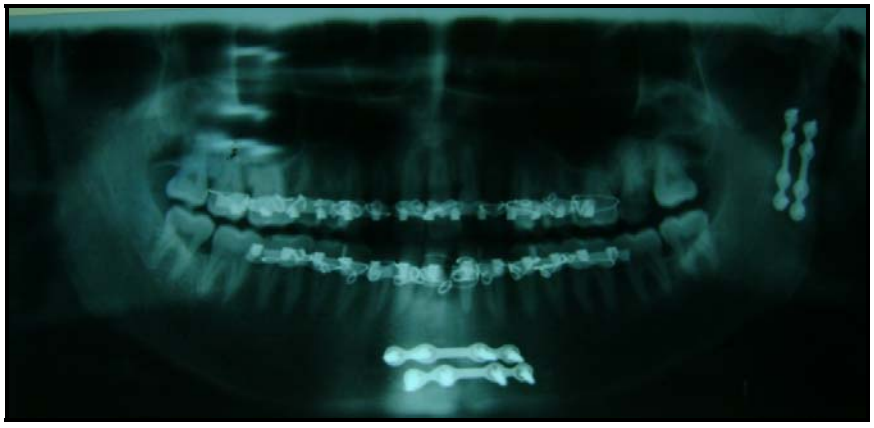


PREOPERATIVE **POSTOPERATIVE**

RADIOGRAPHS

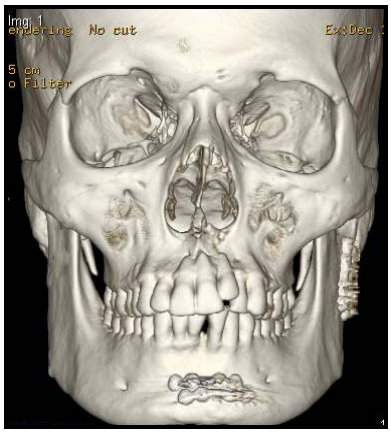
PREOPERATIVE

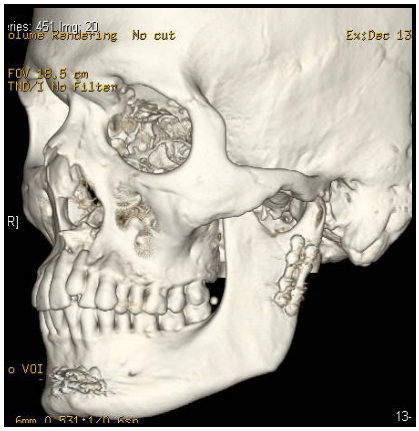
POSTOPERATIVE

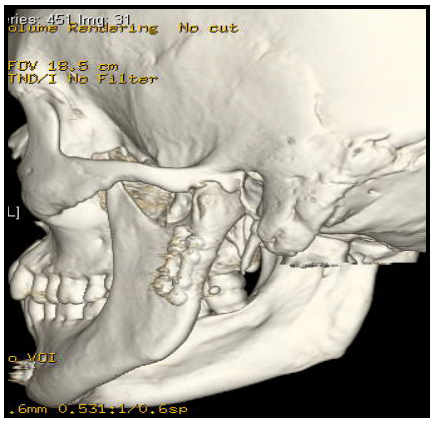
CT SCAN

PRE OPERATIVE

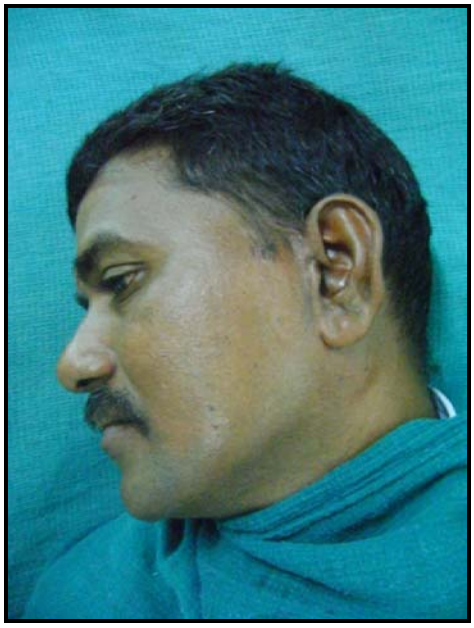
POST OPERATIVE







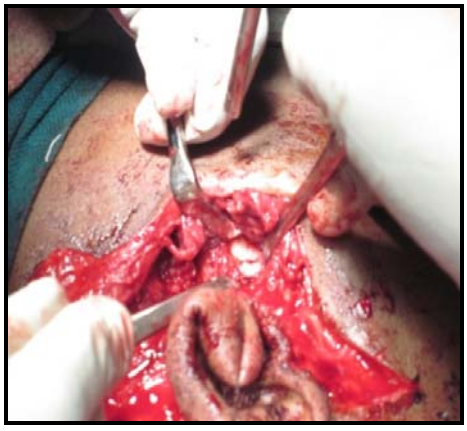
POSTOPERATIVE VIEW OF SCAR

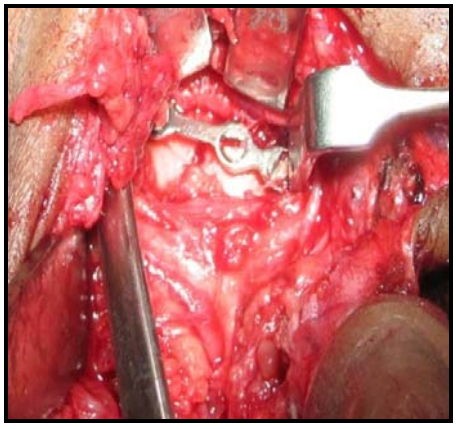


Case 4

PREOPERATIVE

INTRAOPERATIVE





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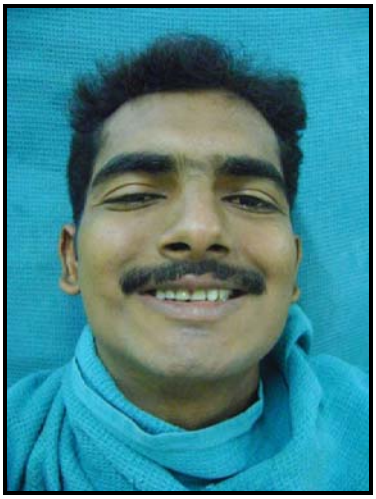
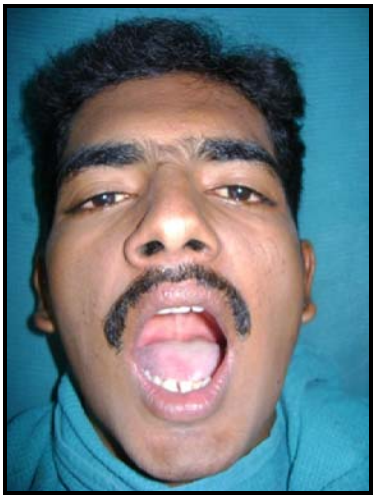
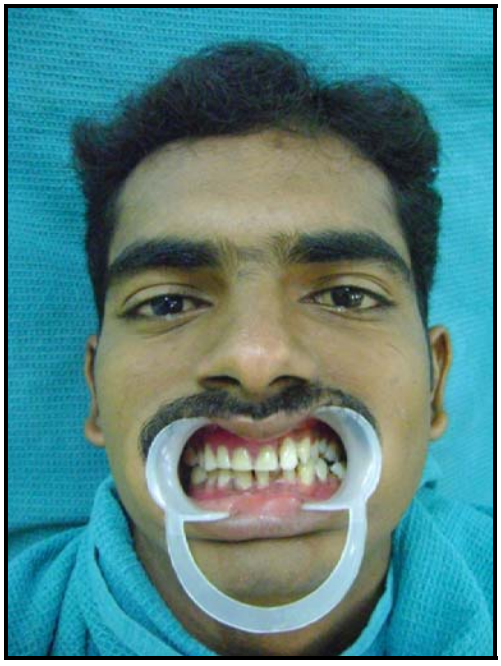






RADIOGRAPHS

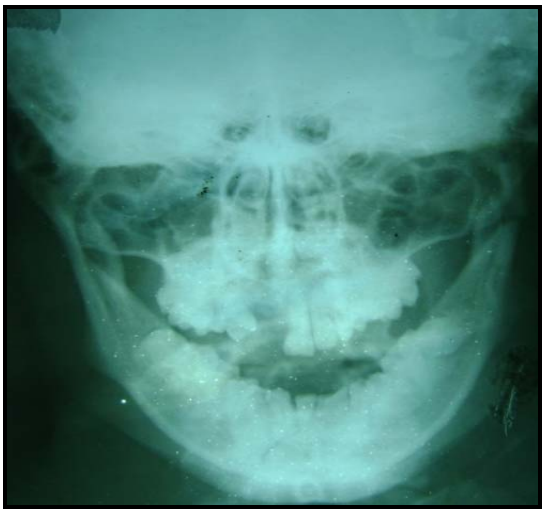
PREOPERATIVE

POSTOPERATIVE

PREOPERATIVE **POSTOPERATIVE**

RADIOGRAPHS

PREOPERATIVE



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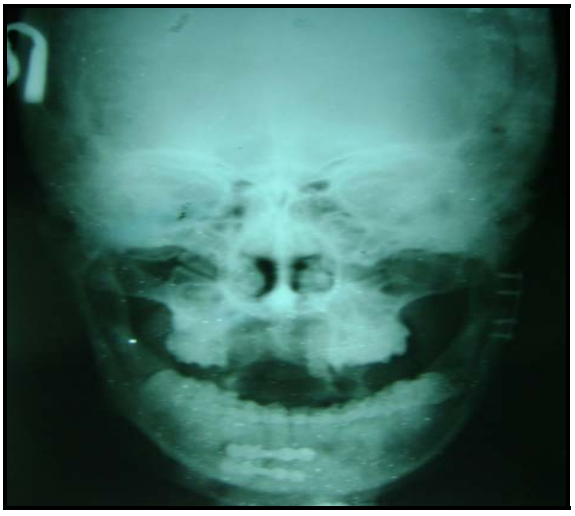
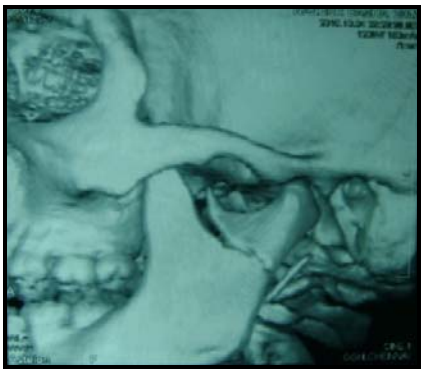
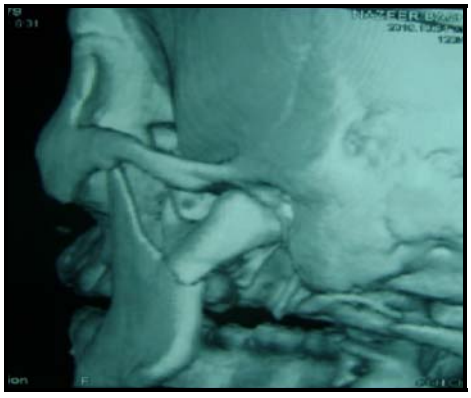


CT SCAN

PREOPERATIVE **POST OPERATIVE**





POST OPERATIVE VIEW OF SCAR

INFORMED CONSENT

RHYTIDECTOMY APPROACH FOR THE TREATMENT OF SUBCONDYLAR FRACTURE OF MANDIBLE

Patient'sIdentificationNo:_____Patient'sName: _____

Patient's Date of Birth: _____/ ____/ _____
dd mm yyyy

I confirm that I have read and understood the Information Sheet for the above study. I have- had the opportunity to ask questions and all my questions and doubts have been answered to my complete satisfaction.

I understand that my participation in the study is voluntary and that I am free to withdraw at any time, without giving any reason, without my legal rights being affected.

I understand that the Clinical study personnel, the Ethics Committee and the Regulatory Authorities will not need my permission to look at my health records both in respect to the current study and any further research that may be conducted in relation to it, even if I withdraw from the study. I agree to this access. However, I understand that my identity will not be revealed in any information released to third parties or published, unless as required under the law. I agree not to restrict the use of any data or results that arise from this study.

I agree not to withhold any information about my health from the investigator and will convey the same truthfully.

I agree to take part in the above study and to comply with the instructions given during the study and to faithfully co-operate with the study team, and to immediately inform the study staff if I suffer from any deterioration in my health or well being or any unexpected or unusual symptoms.

I hereby consent to participate in this study and I understand that I might be treated with Surgical Procedures under general anesthesia by pre auricular and post auricular incision (Rhytidectomy approach) followed by open reduction and internal fixation with stainless steel miniplates and screws for my lower jaw fracture.

I consent to give my medical history, undergo complete physical examination and diagnostic tests including hematological, biochemical and urine examination etc.

Signature / Thumb Impression: _____
Place_____ Date
of the patient

Patient's Name, Address & Ph No:

_____

_____

_____

Name of the Investigators : _____

Signature of the Investigator: _____
Place_____ Date

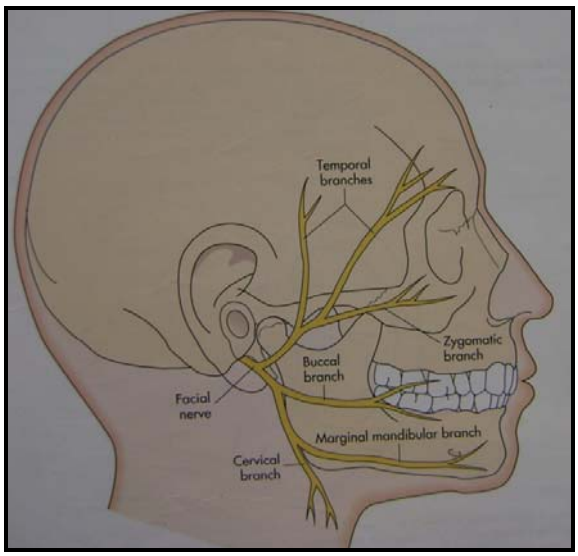
Institution: _____

* Signature of the Witness: _____
Place_____ Date

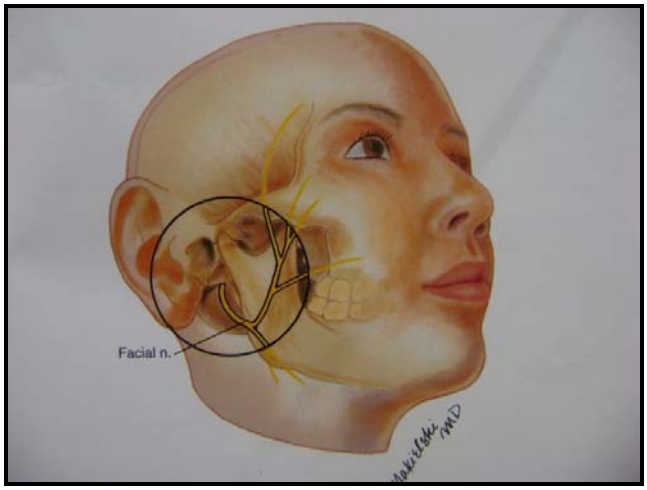
* Name & Address of the Witness _____

*Mandatory for uneducated patients (Where thumb impression has been provided above

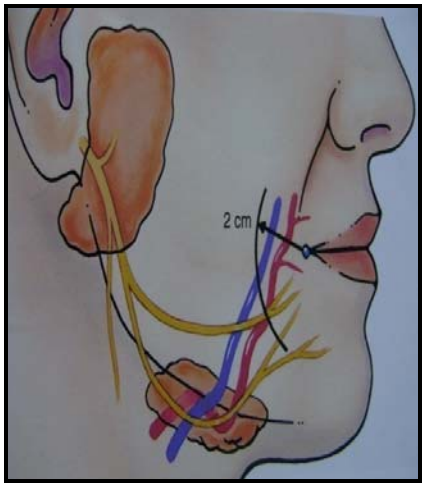
FACIAL NERVE

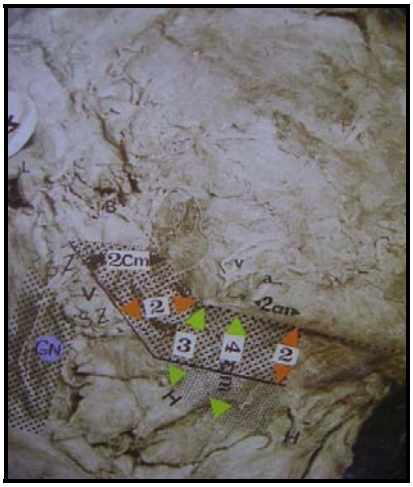


TEMPORALBRANCH OF FACIALNERVE

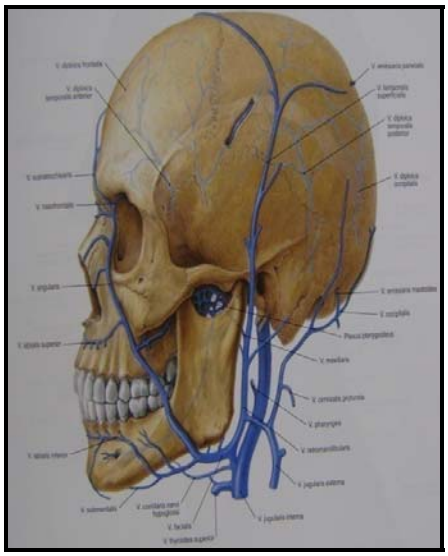


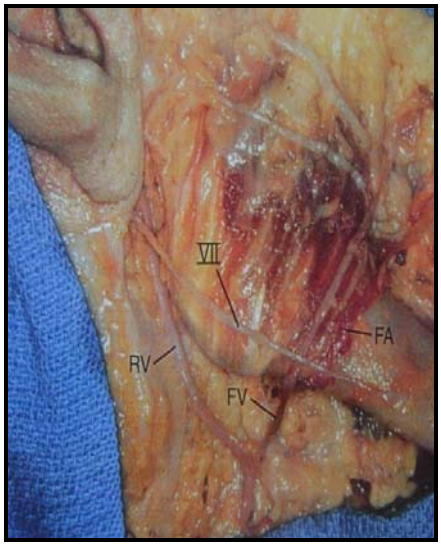
MARGINAL MANDIBULAR NERVE



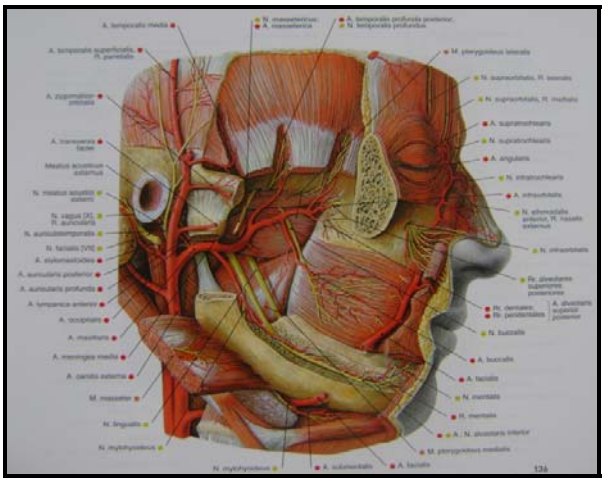


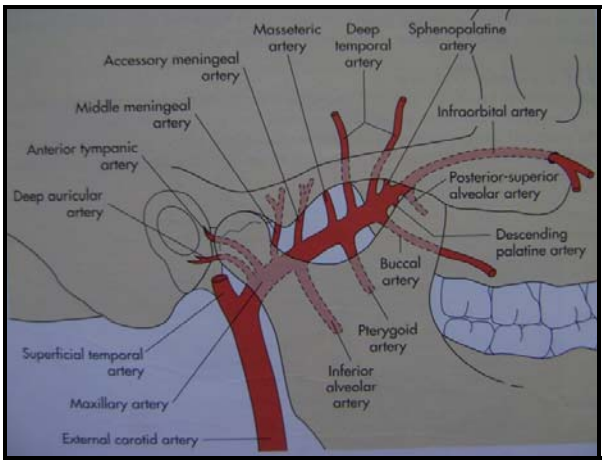
RETROMANDIBULAR VEIN



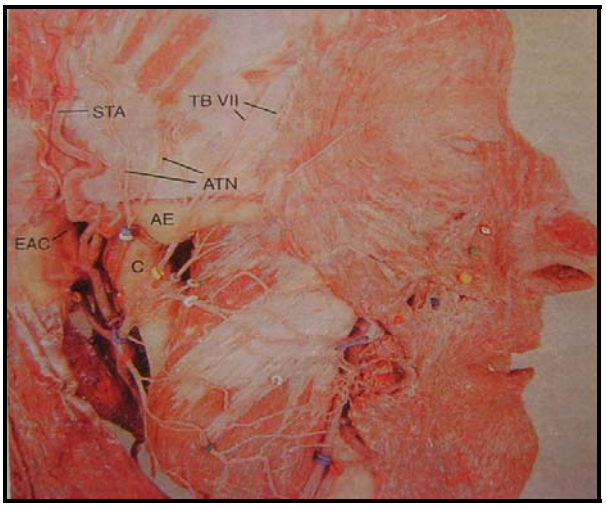


MAXIILARY ARTERY AND SUPERFICIAL TEMPORAL VESSEL





AURICULOTEMPORAL NERVE



TEMPOROMANDIBULAR JOINT

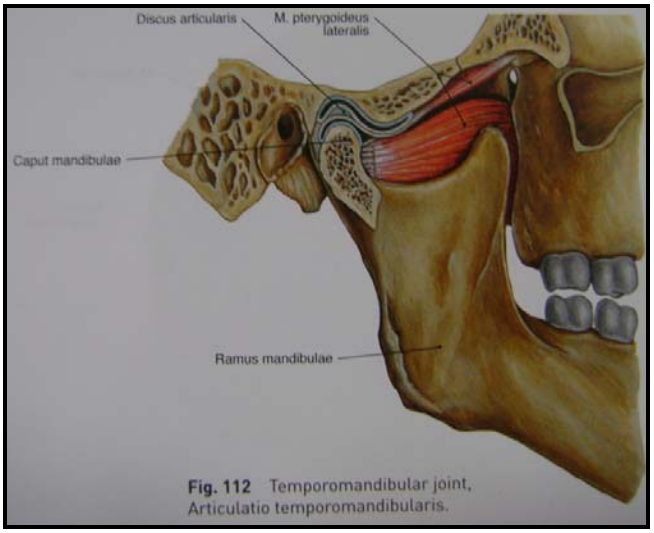
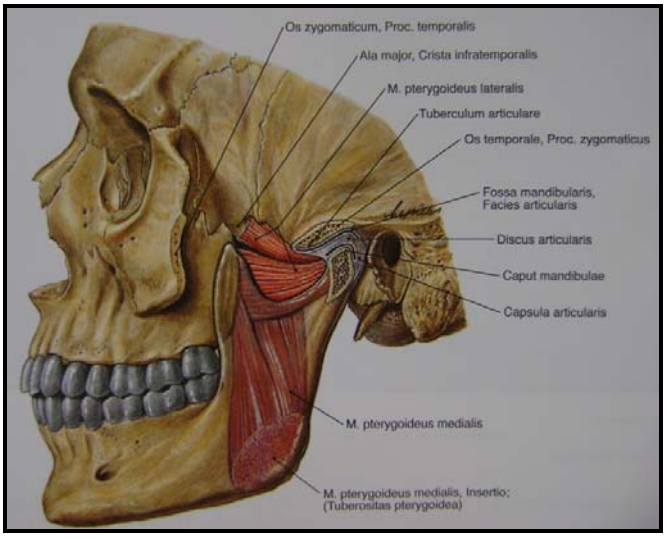
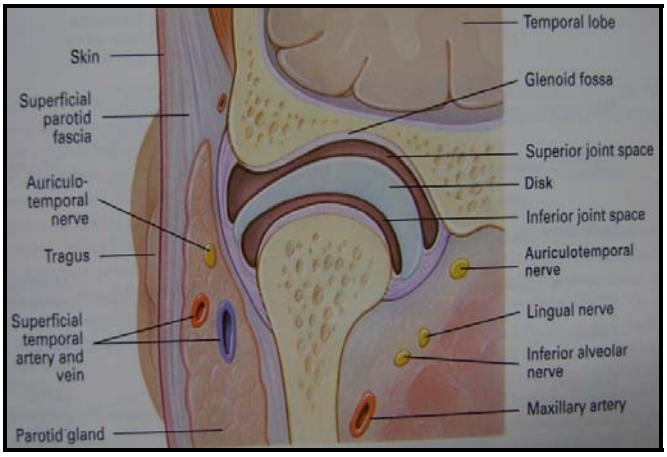


Fig. 112 Temporomandibular joint, Articulatio temporomandibularis.



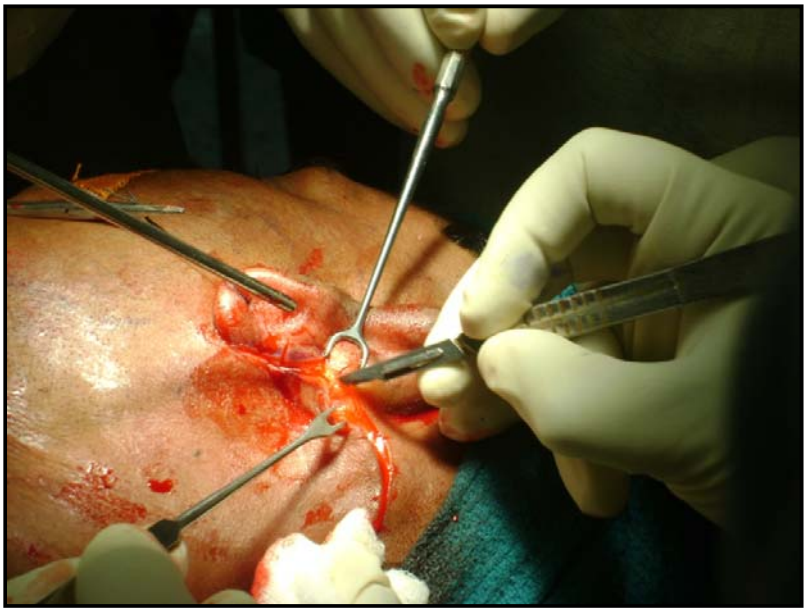


ARMAMENTARIUM

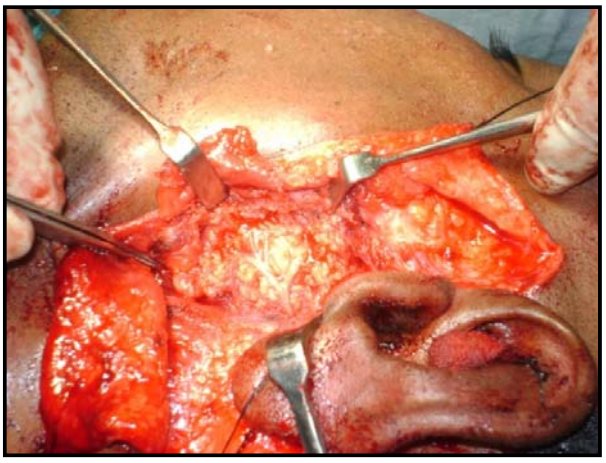
SURGICAL PROCEDURE

MARKING OF THE SKIN INCISION

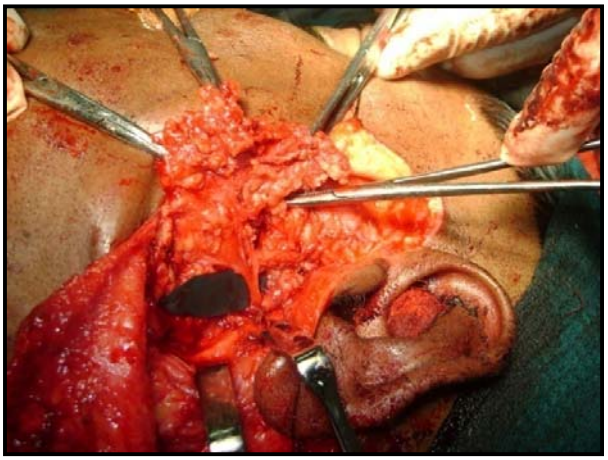
SKIN INCISION



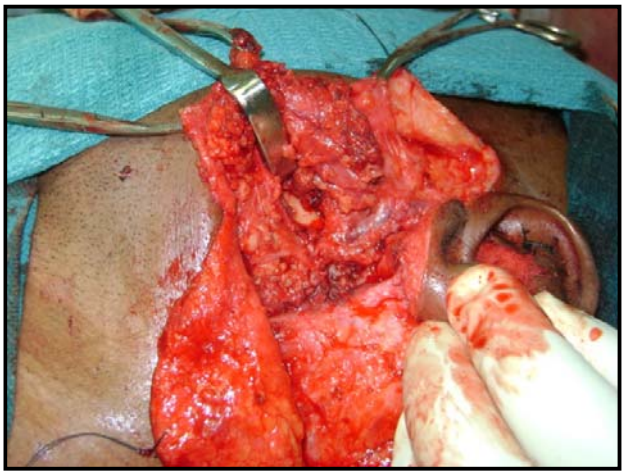
DISSECTION OF THE FACIAL NERVE



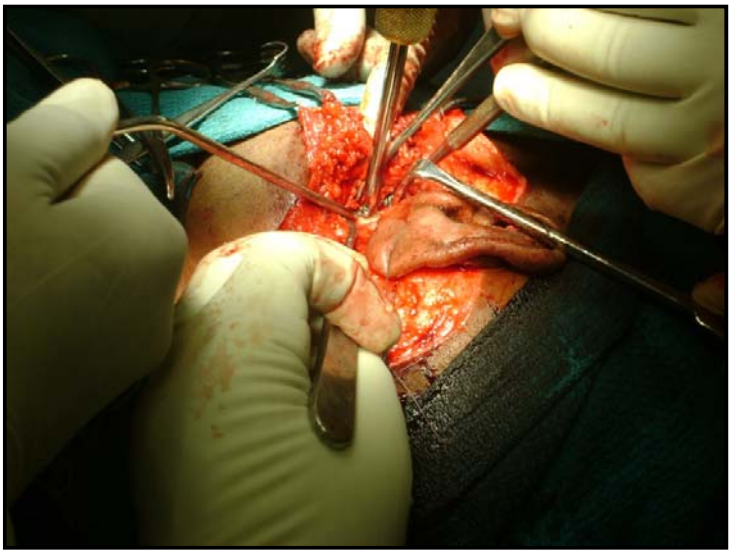
TRANSPAROTID DISSECTION



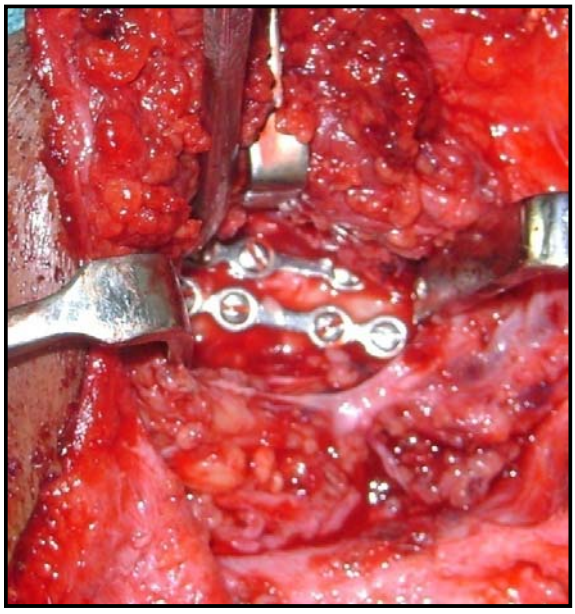
INCISION OF PTERYGOMASSETERIC SLING



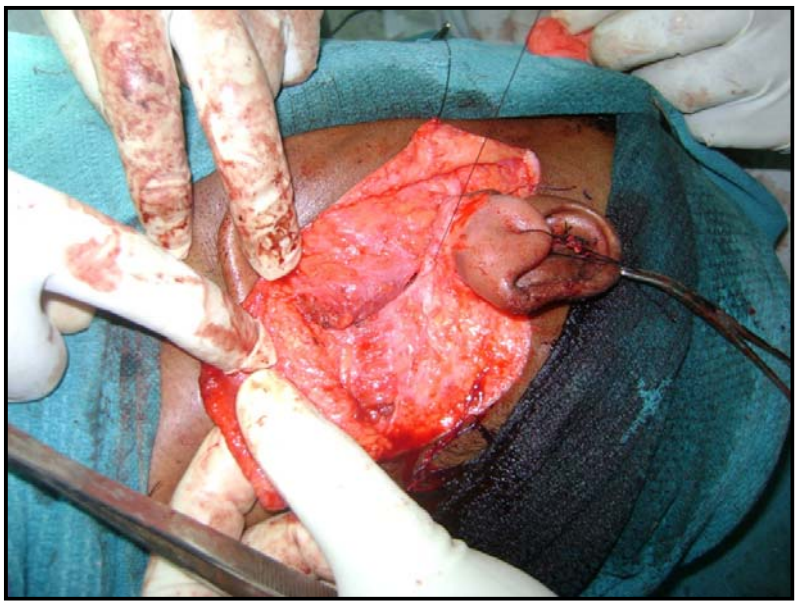
FRACTURE SITE EXPOSED



FRACTURE REDUCTION AND FIXATION



LAYER WISE CLOSURE



PRIMARY SKIN CLOSURE WITH DRAIN PLACED