ABSTRACT

BACKGROUND:
Fractures of the mandibular condyle are common and account for 25% to 50% of all mandibular fractures. There are various approaches available for open reduction and internal fixation of condylar fractures of mandible. This study was done to evaluate the efficacy of Rhytidectomy approach for open reduction and internal fixation of subcondylar fractures of mandible.

MATERIALS AND METHODS:
A total of 20 patients (16 males and 4 females) in the age group of 20 to 40 years were included in the study. All patients had unilateral subcondylar fractures with or without associated fractures of mandible. Patients were selected according to inclusion and exclusion criteria. Radiographic examination using CT scan was done pre and post operatively. All patients were treated with General anesthesia using Rhytidectomy or facelift approach for open reduction and internal fixation of unilateral subcondylar fractures of mandible.

RESULTS AND CONCLUSIONS:
Average mouth opening preoperatively was 23.2 ± 2.6 mm and was increased to 36.2 ± 2.8 mm post operatively. All cases had occlusal derangements pre operatively which got resolved excellently due to very good anatomic reduction. Surgical access was excellent and scar was inconspicuous in all patients. Post operatively, TMJ pain was found in two patients, and clicking sound and deviation was present in two patients. Salivary fistula was seen in three patients. Transient facial nerve weakness was noticed in three patients and auricular anesthesia observed in two patients.

KEY WORDS: Rhytidectomy, Subcondylar fracture, ORIF

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. There are very few areas of Oral and Maxillofacial Surgery that 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. 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. Clinical outcome of conservative treatment can be sub optimal as the severity of the condylar fracture is often underestimated.

Advocates of conservative treatment consider the risk and morbidity of the surgical procedure is 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. (Konstantinović VS, Dimitrijević B, 19922, Takenoshita Y et al, 19903). There is evidence of functional disharmony and compromised results in a significant percentage of adult patients treated by closed reduction (Lindahl L, 19774). 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. 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.
branches were then retracted and below the retracted branches, the hole miniplate 2 x 8 mm screws (Fig 2b).

2a), reduced and fixed with 4 hole miniplate 2 x 8mm screws and 2 the anticipated direction was faci al nerve branches. Facial nerves incised in the vertical plane, blunt dissection was done paralleling

subcutaneous tissue the skin was retr acted anteriorly and inferiorly, inside the hairline for a few centimeters. After incision of skin and ear it curves posteriorly toward s the hairline then runs along or

vascular system. The incision was gi ven 1.5 to 2 cm superior to the

general anaesthesia using naso endotracheal intubation. Elastics were placed pre operatively. All patients were treated under

Schroll7 classification. In all the patients Erich arch bars and IMF The condylar fractures were classified based on Spiessl and

Zide and kent (1983)5 and Ellis and Dean (1992)6 described Rhytidectomy 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. This study was done to evaluate the Rhytidectomy approach by retromandibular transparotid approach for open reduction and internal fixation of subcondylar fracture of the mandible.

METHODS:

This uncontrolled, non randomized prospective study was carried out from April 2011 to April 2014 for a period of three years after obtaining approval from the Institutional ethical committee. Informed consent was obtained from all patients in the regional language. Patients who were included in the study were within the age group of 20-40 years with unilateral subcondylar fracture associated with or without other mandibular fractures, occlusal derangement, and interference with functional movements, patients who cannot tolerate Inter Maxillary Fixation (IMF) for a long duration, patients where IMF was contraindicated due to associated medical conditions and patients with high esthetic concern.

Patients with systemic disorders contraindicating surgery, patients who had undergone previous surgery or any trauma in the proposed surgical site, with a familial tendency to form keloid or hypertrophic scar and patients with a history of pathology in the pericondylar region were excluded from the study. After recording the patient's history, physical and clinical examination of the patients was done. Radiographic examinations included CT scan of facial bones (Fig.1c,1d).

The condylar fractures were classified based on Spiessl and Schroll classification. In all the patients Erich arch bars and IMF elastics were placed pre operatively. All patients were treated under general anaesthesia using naso endotracheal intubation.

Surgical technique:

Marking of the skin was done prior to the infiltration of vasoconstrictors. The incision was given 1.5 to 2 cm superior to the zygomatic arch just behind the anterior extent of the hairline and then curved down posteriorly and inferiorly blending into a pre auricular incision in the natural crease anterior to the pinna. The incision was continued under the ear lobe and on to the posterior surface of the auricle, at a point where the incision is hidden by the ear it curves posteriorly towards the hairline then runs along or inside the hairline for a few centimeters. After incision of skin and subcutaneous tissue the skin was retracted anteriorly and inferiorly, then fusion of platysma, SMAS and the parotid capsule were then incised in the vertical plane, blunt dissection was done parallelising the anticipated direction was facial nerve branches. Facial nerve branches were then retracted and below the retracted branches, the pterygomasseteric sling was incised on the posterior rim of ramus and periosteam was incised, and the fracture site was exposed (Fig 2a), reduced and fixed with 4 hole miniplate 2 x 8mm screws and 2 hole miniplate 2 x 8 mm screws (Fig 2b).

The pterygomasseteric sling in parotid capsule was then sutured using resorbable suture after which a vacuum drain was placed in the subcutaneous pocket to prevent hematoma or seroma formation. Deeper layers were sutured with 3-0 Vicryl (Polyglactin 910) and Subcuticular sutures were placed on skin using 4-0 or 5-0 Prolene (poly propylene) suture.

1a- Pre operative Frontal view of the patient;
1b- Pre operative Occlusion with restricted mouth opening;
1c- 3D Computed Tomography (CT) scan showing fracture Left Subcondyly
1d- Coronal View of CT scan showing fracture Left Subcondyly

The parameters assessed were mouth opening preoperatively and post operatively, presence of occlusal derangement pre operatively and post operatively, TMJ symptoms such as pain, clicking, deviation of mandible and other parameters like surgical access, scar, wound infection, salivary fistula and auricular anesthesia. The severity of the pain was assessed using a visual analogue scale with a scale of 0 to10. The character of the scar was graded as Inconspicuous, Conspicuous, and. Hypertrophic. Facial nerve weakness due to facial nerve injury was deemed to have occurred if patient was unable to draw the lower lip and corner of the mouth downward or unable to whistle or was unable to completely close the eyelids or wrinkle the brow. Auricular anesthesia is to evaluate post operative function of the greater auricular nerve. The reaction of the external ear was tested by means of a pin prick. Surgical access was graded as excellent, good and fair. Anatomic reduction was rated as good, fair and poor. Anatomic reduction was rated with the help of post operative CT scan.

2a- Exposure of the fracture site
2b- Reduction and fixation of the fracture site
2c- Post operative 3D CT scan showing anatomic reduction
2d- Post operative Coronal view showing anatomic reduction

Post operatively patients were advised a soft diet for 6 weeks, active mouth opening exercises. Radiological investigations were done postoperatively (Fig 2c, 2d). The sutures were removed after 7 days, regular follow up of the patients were made on 1st postoperative day, 3rd post operative day, followed by weekly for 6 weeks to monthly for about 6 months and yearly for 3 years (Fig 3a, 3b, 3c, 3d).

3a- Post operative frontal view of the patient
3b- Post operative profile view of the patient with inconspicuous scar
3c- Post operative occlusion of the patient
3d- Post operative maximal mouth opening of the patient

An Initiative of The Tamil Nadu Dr. M.G.R. Medical University University Journal of Surgery and Surgical Specialities
RESULTS

Total number of patients included in the study was twenty. Out of the 20 patients, 16 were male and 4 were female. The mean age group of the patients was 27.7 ± 5.6 years. The etiology of fracture were trauma due to road traffic accident in 11 patients, assault in 6 patients and self fall in 3 patients. The condylar fractures were isolated in 8 patients, associated Symphysis fracture in 2 patients, Parasymphysis fracture in 10 patients. The average delay between the fracture and the surgery was 5 days. The condylar fracture was on the right side in 12 patients and on the left side in 8 patients. All the patients treated had Type II condylar fracture according to Spiessl and Schroll classification. The follow up period was three years. In 18 patients pre injury occlusion was achieved pre operatively which was assessed by the molar relationship whereas two patients had a minor occlusal discrepancies. The mean preoperative maximal mouth opening was 23.2 ± 2.6 mm (Fig 1a,1b). The average maximal post operative mouth opening after a follow up period of three years was 36.2 ± 2.8 mm. Out of all the patients, eighteen patients were free of pain, two patients had pain in joint while opening and closing mouth. Two patients complained of clicking sound and had mild deviation while opening and closing mouth. There were 3 case of facial nerve weakness which recovered within 3-4 weeks. Salivary fistula was seen in 3 cases which resolved spontaneously over a period of one month and auricular anesthesia was observed in 2 cases. There was no incidence of hematoma or wound infection. The scar was inconspicuous in all patients and the surgical access was excellent and good anatomic reduction was obtained in all the cases using this approach.

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 debate on treatment of condylar fracture has continued to the present day and there has been two consensus 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. Many classification systems had been proposed by many authors such as Spiessl and Schroll (1972), Lindahl (1977), Krenkel (1977). In the current study, fractures were classified based on Spiessl and Schroll classification and all the fractures were Type II – which are low condylar neck fracture with displacement. Lindahl even classified the traumatic force causing condylar injury into three, as energy imparted on a static individual by a moving object, moving individual striking a static object, energy developed by the combination of the above two mechanism. In the present study injuries seem to be a combination of the above two mechanisms.

In the current study, 80% of the patients were males. This was consistent with the studies by Zachariades et al, Saikrishna et al, which also suggested a high male predominance. The increased frequency of condylar fracture seen among male patients could be due to more exposure to road traffic accidents by males. Road traffic accidents were the most common cause in the reported study and this is in concordance with the findings by Haug et al, Fridrich et al, Marker et al. In contrast Ellis et al, reported that falls were the most common cause of condylar fractures, Silvennoinen et al found that personal violence is the most frequent cause of fractures in women. However in this study in women, falls were the cause as reported by Wilson et al and Roccia et al. The management of condylar fractures has always been controversial. Zide and Kent proposed absolute and relative indications for open reduction of condylar fractures. Joos et al suggested condylar displacement of more than 30 degrees, displacement of more than 5mm as indication for open reduction. Edward Ellis and Dean reported that patients treated by closed method had a greater percentage of malocclusion compared with those treated with open reduction. Smets et al conducted a study to investigate the results of non surgical treatment of condylar fractures and concluded that patients with shortening of ascending rami of 8mm or more / considerable displacement of condylar fragment need surgical repositioning and ORIF. Taking into consideration the above mentioned factors, the fractures were treated by ORIF in the present study.

The retro mandibular approach was first described by Hinds et al in 1967 and was popularized for the management of open reduction and internal fixation of condylar fractures by Ellis and Dean in 1993 where he made retromandibular trans parotid approach. This approach was followed by Manisali et al (2003) and Vesnaver et al (2005). This approach was also described as modified short retromandibular approach by Chossegros et al in 1996 where the fracture site is exposed by lifting the tail of the parotid gland without identifying the marginal mandibular branch of the facial
nerve and Widmark et al in 1996 where they do not transgress the parotid gland. In retromandibular transparotid approach by Ellis and Demos blunt dissection is performed to transfix the tail of parotid gland to reach the ramus of mandible. This technique minimizes 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. In our study, technique suggested by Anastassov et al was followed. In this study when performing a diagnostic imaging, CT facial bones were taken to identify the condyle fracture after initial evaluation by orthopantomogram. Patients were not placed on post operative IMF in all the cases and this was in contradiction to Zide and Kent (1983) who used IMF for four weeks after fixation of condylar fracture with wires using Rhytidectomy approach. In our study we could achieve average post operative mouth opening about 36.2 ± 2.8 mm. The average pre operative mouth opening was 23.2 ± 2.6 mm that resulted in an increase of average mouth opening about 13 mm. Zide 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. In contrast in the present study 4 patients (20%) had TMJ symptoms in the form of pain (2 patients), clicking sound and deviation (2 patients). In our study there was temporary facial nerve weakness in temporal branch in three patients (15%) which resolved completely within a period of 4 weeks. In contrast higher percentage of facial nerve injury was observed in the studies by Zide and Kent (1983) and Vesnaver et al where they observed facial nerve palsy in 40%, 22% and 20% of their patients respectively.

In our study we found that temporal branch was at risk when Rhytidectomy approach was used. According to Raveh et al, facial nerve damage is caused chiefly by excessive traction of retractor or electro cauterisation of vessels adjacent to the facial nerve. When the branches were identified within the parotid tissue over 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. This technique was used in our study to reduce the incidence of facial nerve damage. The results of this study, concerning inter incisal opening, deviation of mandible upon opening, occlusion and facial symmetry were good. There were two cases (10%) of auricular anesthesia which resolved spontaneously in a period of 6 weeks. Vesnaver et al (2005) in their study reported 5 cases (6%) of transient auricular anesthesia 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 since a vaccum drain was placed in all cases. Vesnaver et al observed post operative hematoma in 8% of their cases. Anastassov et al also reported a case of postoperative hematoma when rhytidectomy approach was used. Salivary fistula was noted in three patients (15%) in our study similar to the results of Ellis et al who reported 3 cases of salivary fistulae in their studies and Vesnaver et al (2005) who reported 14 % incidence of salivary fistulae in their study. In our study we did not encounter any plate infection, plate fracture or any necessity for plate removal. In our study more time was required for the closure. This is not of any important significance as we could achieve a 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, which is much more important than the time taken.

According to Anastassov et al 1997 and Vesnaver et al 2005 facial Rhytidectomy technique provides excellent access to posterior mandibular fracture with minimal complications. Similar correspondence regarding the surgical approach in the current study. The condyle and fracture are exposed directly and allow for good inspection and reduction, as well as vertical screw placement, 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 performed in ramus fractures. On the contrary the retromandibular approach has a limited exposure, also submandibular and trans oral approaches provide limited access and have to be combined with trans buccal screw placement and use of an endoscope. All the twenty patients had inconspicuous scar, which is an important added advantage of the Rhytidectomy procedure. The pre auricular 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. In agreement with this Ellis and Zide (1996), Anastassov et al have also reported that the 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.

CONCLUSION:

The Rhytidectomy (face lift) has all the advantages of wide exposure of the fracture site and less conspicuous scar. The esthetic cut come 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 wide exposure of the posterior mandible, easy accessibility with limited retraction required, thereby causing less tissue trauma. Versatility of treatment modalities like plates, screws, lag screws can be placed without hindrance to other structures. Predictable identification of vital structures leads to minimal operative morbidity and an inconspicuous facial scar.

In conclusion when open reduction and internal fixation of condylar fracture is indicated, Rhytidectomy trans-parotid approach provides good access with low morbidity. However it is very technique sensitive and good surgical expertise is needed to achieve good results when using this approach. The sample size in the present study is minimal and larger randomized studies are needed using this approach to substantiate our results.

REFERENCES:


CONFLICTS OF INTEREST:
The authors have no conflicts of interests.

FUNDING:
This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.