

## **TRANSOSSEOUS WIRING OF FRACTURE CONDYLE OF MANDIBLE**

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### **ABSTRACT**

This article is a report study for the management of the fracture of mandibular condyle in Maharat Nakhon Rachasima Hospital that come into my service between October 1989 to January 1995.

There are 21 cases, aged between 14-54 years old; 15 males, 6 female. The most common cause is from motorcycle accident 13 cases, car accident 4 cases, falling 4 cases. The bilateral condylar fracture were found 8 cases, the others 13 cases were unilateral condylar fracture. The fracture dislocation were found in 4 cases; 3 cases were bilateral fracture dislocation; 1 case was unilateral fracture dislocation. The fracture symphysis or parasymphysis were found together with condylar fracture in 7 cases; 5 cases were found together with bilateral condylar fracture and 2 cases were found together with unilateral condylar fracture. There were 3 cases of bilateral condylar fracture dislocation associate with fracture symphysis. Among 21 cases of condylar fracture, 15 cases need open reduction internal fixation of the fracture condyle, only 3 cases that need intermaxillary fixation only. Open reduction and internal fixation of 19 condylar fractures were done in 15 cases via preauricular incision and fixation by transosseous wiring technique. For the fracture symphysis or paraphysis 7 cases, the open reduction and internal fixation were done in 3 cases, using monocortical interosseous wiring alone 2 cases and monocortical interosseous wiring together with metacarpal dynamic compression plate in 1 case. The other 4 cases of symphyseal fracture need no open reduction and internal fixation due to the stable fracture site after the intermaxillary fix-

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ation were applied. The intermaxillary fixation was applied for 3 weeks in cases of fracture without dislocation, and the lower arch bar was retained for another 3 weeks longer. In case of fracture and dislocation the intermaxillary fixation was applied for only 1 week to prevent stiffness of the temporo mandibular joint. The result was satisfy in all cases, with acceptable occlusion, no pain, no infection. Minimal complication that found were temporary frontal and orbital branches of facial nerve palsy in 2 cases which all complete recover in 3 months, and a case of unilateral fracture dislocation that is found trismus after intermaxillary fixation for 3 weeks ,that can be resolved by post-op dilatation for one time.

## **Introduction**

The mandibular fracture is the most common fracture among other maxillofacial bone. The fracture of the condyle account for between 25% and 35% of all mandibular fractures in reported series. The management of the condylar fracture has generate more discussion and controversy than any other in the field of maxillofacial trauma. The necessity for precise anatomical repositioning of the bone ends, so desirable at other sites in the mandible, does not apply in the case of condylar fractures where the bony displacement will be compensatory by changes in the pattern of muscular activity, mediated by proprioceptive impulses derived from the periodontal membranes and soft tissues surrounding the joint. The management of the condylar fracture is to obtain optimal satisfactory occlusion, without ankylosis or pain and no disturbance of mandibular growth with resultant hypoplasia. To obtain these results there are three principal schools of management, namely, conservative, relying on rest and immobilisation; funtional, where the accent is on active movement as an aid to res-titution; and surgical, where operative reduction is the objective. The approach in each case is very different.

In case of none displace or minimal displace fracture, the close reduction tech-niques can be used with faverable results. While the cases of severe displacement fracture, fracture dislocation and fracture with soft tissue interpose between the fracture sites need open reduction and internal fixation. Several difference incisions and fix-ation techniques have been described in the past, including wiring techniques, <sup>(1-5)</sup> simple bone plating, <sup>(6)</sup> dynamic compression plates, and various internal pin-fixation techniques. <sup>(7-12)</sup>

## **Material and method**

From October 1989 to January 1995, there were 413 cases of fracture mandible that came into my service. Among these 413 cases, there were 21 cases of fracture condyle. The data is below in detail.

### **FRACTURE MANDIBLE**

OCT 1989 – FEB 1995

TOTAL CASES 413

CONDYLE	21	CASES		
FX UNILATERAL	10	CASES	LEFT 5	RIGHT 5
FX UNILATERAL+DISLOCATE	1	CASES	RIGHT	
FX UNILATERAL+SYMPHYSIS	2	CASES	RIGHT	
FX BILATERAL	3	CASES		
FX BILATERAL+SYMPHYSIS	2	CASES		
FX BILATERAL+SYMPHYSIS+DISLOCATE	3	CASES		
sex	male	15	cases	
	female	6	cases	
CAUSES				
MOTERCYCLE ACCIDENT	13	CASES		
FALLING	4	CASES		

## **OPERATION**

The indication to open reduction and internal fixation (ORIF) of the condylar fracture are the fracture and dislocation, the fracture with severe displacement such as severe angulation with mark open bite or the telescoping of the fracture segments, the fracture with soft tissue interpose that prevent the bony union. The intermaxillary fixation (IMF) is applied in every cases for 3 weeks in fracture without dislocation, for 1 week in fracture with dislocation. Except for 1 case with fracture and dislocation the intermaxillary fixation is applied for 3 week and follow up found post-op. stiffness of the TMJ, that needed one time of dilation. After the intermaxillary fixation is taken off, the lower arch bar will still remain for further 3 weeks in the cases that the fracture symphysis is coincident. For the coincident of fracture symphysis, the open reduction and internal fixation of the symphyseal fracture is indicated in case of dis-

place and unstable fracture after the intermaxillary fixation is applied. The monocortical wiring of the fracture symphysis by wire no.24, or 22 is use in every indicated cases, except in one case that combine fixation with metacarpal dynamic compression plate was used. The operative data is below in detail.

#### **Difference operation in each difference cases**

IMF for	UNILATERAL CONDYLAR FX.	3 CASES
	BILATERAL CONDYLAR FX.	1 CASES
ORIF for	UNILATERAL LT.CONDYLAR FX.	1 CASE NO IMF (EDENTULOUS)-
ORIF+IMF for	BILATERAL CONDYLAR FX.	2 CASES
	FX DISLOCATE BILAT.+SYMPHYSIS	3 CASES
	(SYMPHYSIS NO ORIF 3 CASE)	
	Fx BILATERAL+ SYMPHYSIS	2 CASES
	Fx UNILATERAL +SYMPHYSIS	2 CASES (ORIF SYMPHYSIS,-NO ORIF CONDYLE)
	Fx UNILATERAL	4 CASES
	FX UNILATERAL+DISLOCATE	2 CASES (SYMPHYSIS NO ORIF-1 CASE)
	FX RT.CONDYLE + DISLOCATE LT.	1 CASE

#### **Operative technique for transosseous wiring in condylar fracture**

Under general anesthesia,transnasal intubation,the intermaxillary fixation was applied at the time that the symphyseal fracture was fixed as indicated in anatomical position,by monocortical wiring using wire no.24 or 22..Via preauricular incision,the fracture site could be approach at any level of condylar fracture. By blunt dissection and carefully stop bleeding that could be perfuse from superficial temporal artery and vein, be careful not to injury to branches of facial nerve.The coagulation by cauterization

should be avoid where the facial nerve branches are suspected. Blind clamp of the profuse bleeding are not permitted,for injury to facial nerve. The clearly anatomical knowledge of facial nerve traveling is essential ,eventhough the facial nerve need not to be identified.The fracture site can be digital palpated and the periosteum is incised. The fracture site then is approached.The reduction could be difficult in case of fracture and dislocation or in severe displace with telescoping of the fragments or with soft tissue interpose because the medially pulling power of the lateral pterygoid muscle attached at medial portion of the condyle.In this case the insertion of the lateral pterigoid



muscle should be striped out to facilitate the reduction. Be careful not to injury to the internal maxillary artery medial to the condyle. Transosseous wiring (wire no.24) to the reduced fragment to the most possible anatomical position is then can be achieved without difficulty. The bleeding is carefully mediculous checked before the skin was closed. No drainage is essential.

### **Postoperative management**

The suture is stitched off at day seventh post-op, and the intermaxillary fixation is taken off at this time in the cases of fracture and dislocation. In the cases of fracture without dislocation the intermaxillary fixation will be retained for 3 weeks. But in the cases of fracture condyle in combination with fracture symphysis, the lower arch bar should be applied further more until 6 weeks period is reach. After the intermaxillary fixation is taken off, the patients are encouraged to exercise the temporomandibular joint to prevent stiffness of the joint. The patients can take only liquid diet for 6 weeks postoperative period.

### **result**

Follow up period is 2 to 3 months. All the patients have acceptable occlusion, no pain, no infection, no bleeding or hematoma. There are minor complication of temporaly facial nerve branch palsy which later total recovery in 3 months. There is no permanent damage to facial nerve. Another case with stiffness of temporomandibular joint which need one time dilation to recover. This is the unilateral fracture dislocation in 14 years old girl, that intermaxillary fixation is applied too long, for 3 weeks. After this case the intermaxillary fixation for fracture dislocation is applied for only one week post-op period without stiffness of temporomandibular joint.

### **Report case 1**

A thai male 21 years old falling from a car, physical examination reviewed tender and swelling of left preauricular. The occlusion showed premature posterior contact of left molar with right lateral open bite. The x-ray showed the fracture displaced left subcondyle (medial overlap). The open reduction and internal fixation with transosseous wiring was perform via preauricular incision. The intermaxillary fixation was applied for 3 weeks, and the patient was encouraged to exercise the TMJ. after the intermaxillary fixation was taken off. On follow up 6 weeks post-op, the patient had normal acceptable occlusion without ankylosis.



Figure 1. Premature of left posterior contact and right lateral open bite. The midline shift to the left side.

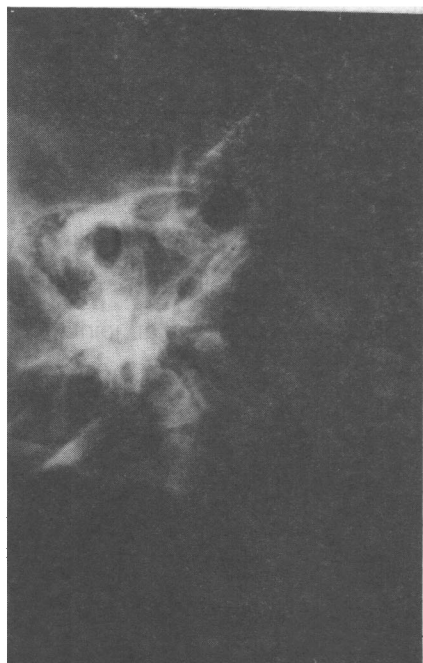


Figure 2,3 X-ray show displaced condylar neck with medial overlap

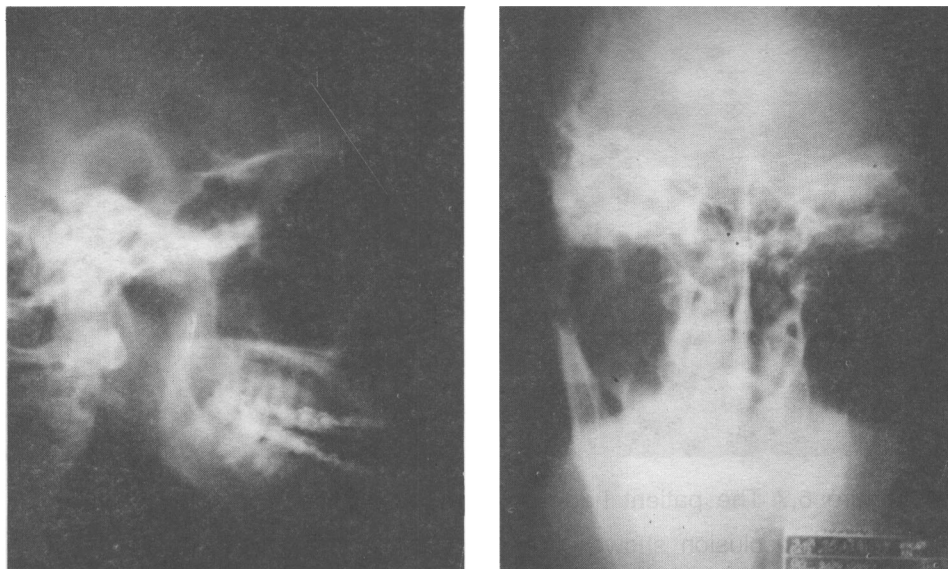


Figure 4,5 Postoperative x-ray show the fixed fracture segments in anatomical position

### **Report case 2**

A thai male 52 years old had a car accident,physical examination reviewed tender and swelling on left chin and right preauricular area. The patient had premature contact of right posterior and left lateral oper bite.The x-ray showed right subcondylar fracture with lateral overlap. Open reduction and internal fixation with transosseous was done ,and intermaxillary fixation was applied for 3 weeks. Then early TMJ. movement was encouraged.Postoperative occlusion is in good position without ankylosis. There was temporary frontal and orbital branch of facial nerve palsy that complete disappeared in 3 months postop.

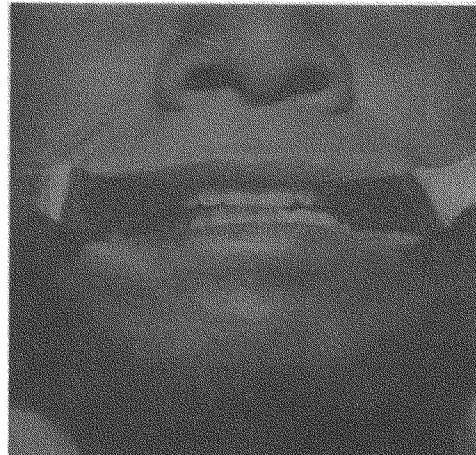
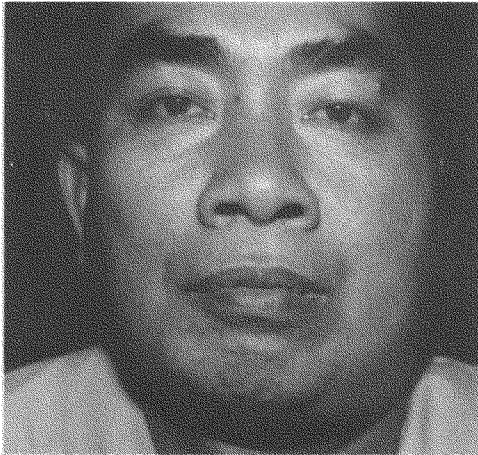


Figure 6,7 The patient had swelling right preauricular and left chin.  
The occlusion showed premature contact of right posterior malar with left lateral openbite.

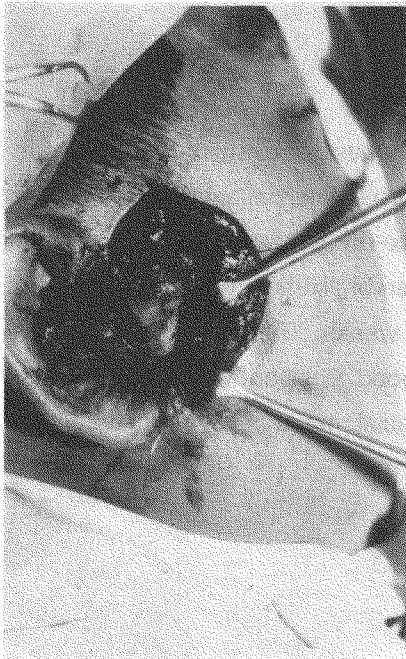


Figure 9 Pre-op. x-ray show displaced fracture with lateral overlap

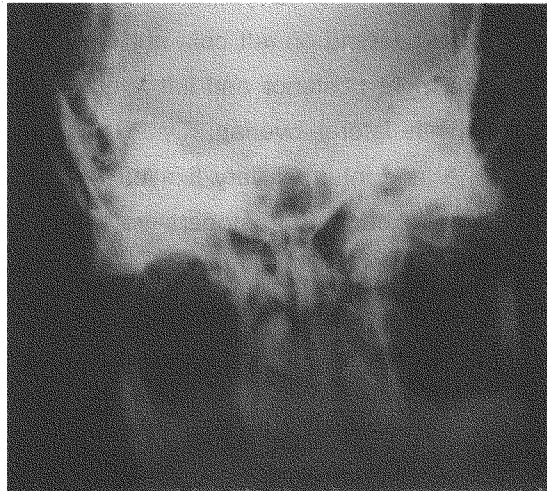
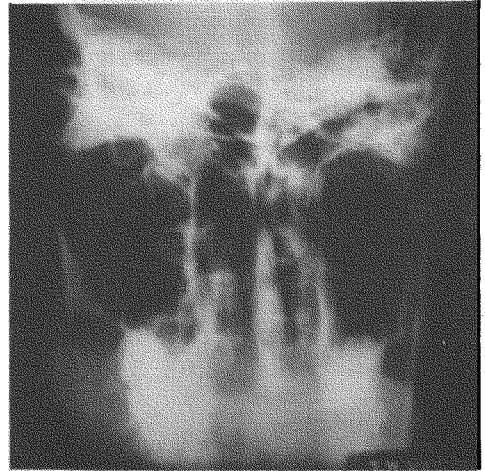


Figure 8 The preauricular incision can widely expose to fracture side at any fracture level,condylar head ,condylar neck or subcondyle. This case is fracture at high subcondylar level.

Figure 10 post-op. x-ray showed the reduced and fixed fracture in the anatomical position.



### **Report case 3**

A Thai girl 15 years old, good conscious, suffered from motor cycle accident. Physical examination reviewed preauricular tender and swelling with anterior open bite occlusion. The x-ray panoramic view shows bilateral condylar fracture dislocation. The open reduction, internal fixation was done via preauricular incision. Transosseous wiring technique using wire no. 24 was performed. The operative finding was bilateral fracture dislocation of condylar neck. Intermaxillary fixation was applied for one week. The early movement of TMJ was encouraged. Post-op. follow up 1 month, the patient had good occlusion without open bite and ankylosis.

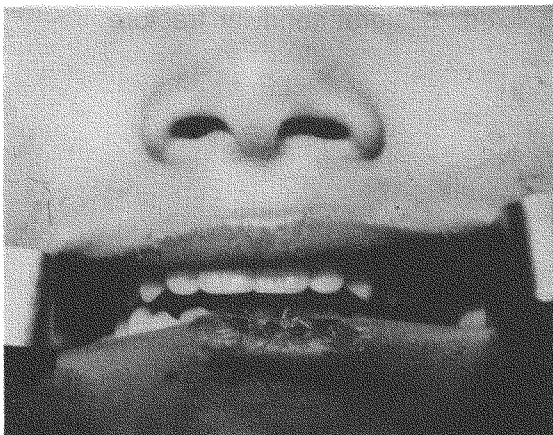


Figure 11 Bilateral fracture dislocation of condyle, showed the premature contact of posterior molar and anterior open bite.

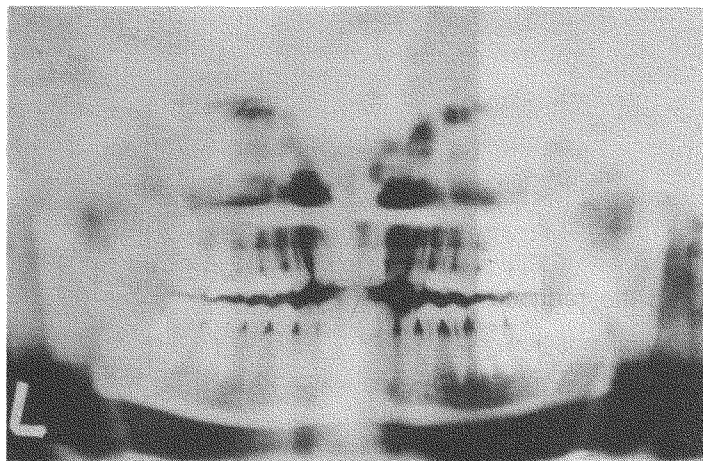


Figure 12 Pre-operative x-ray show bilateral fracture dislocation of condyles (condylar neck level). Note the condylar heads position are not in the sockets.



Figure 13 Intraoperative view showed the transosseous wiring of the fracture condylar neck.

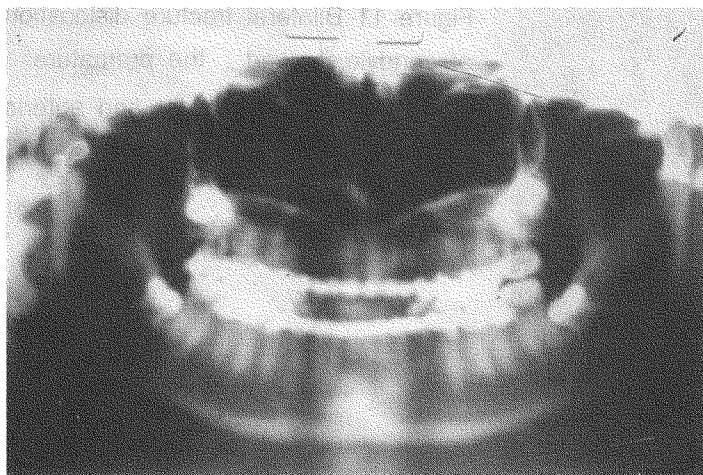


Figure 14 Post-op x-ray showed the fixed bilateral condylar fracture.



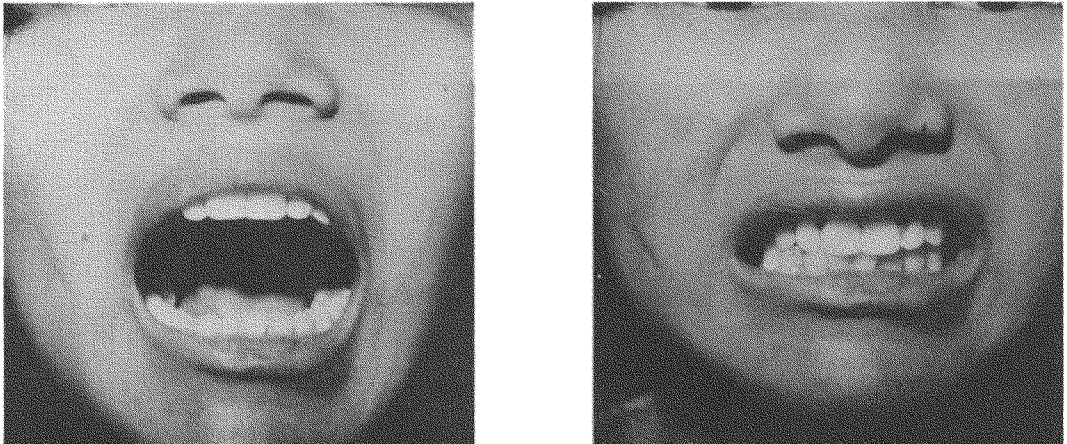


Figure 15 ,16 Post-op the patient can widely open her mouth ,  
the occlusion is in normal ,no open bite.

#### **Report case 4**

A Thai man 28 years old ,had a motor cycle accident.The physical examination reviewed the lacerated wound on the chin,bilateral preauricular tender,swelling and anterior open bite. The x-ray showed none displaced fracture of symphysis and bilateral fracture dislocation of condyles. Open reduction and internal fixation with transosseous wiring was done for the bilateral fracture dislocation of condyles.The none displaced stable fracture of symphysis was left without internal fixation. The intermaxillary fixation was applied for 1 week,while the lower arch bar was remained for further 5 weeks after upper arch bar is taken off, to complete 6 weeks period. By this time the patient was allowed to take only liquid diet. On follow up 2 month post-op ,the patient had the proper occlusion as the same as before he got the accident, without ankylosis.



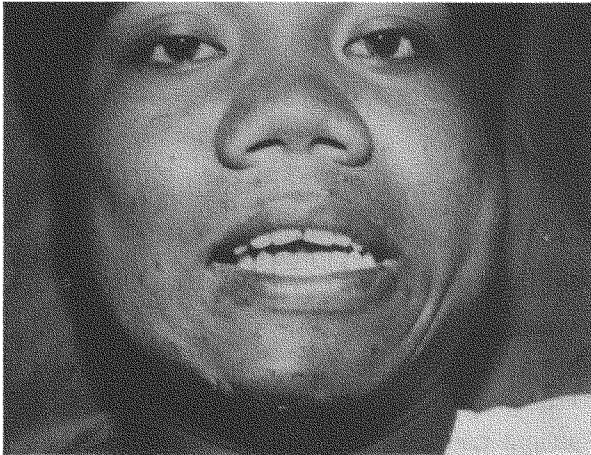


Figure 17 The fracture dislocation of bilateral condyles with fracture symphysis. Note the bilateral preauricular swelling, the anterior open bite.

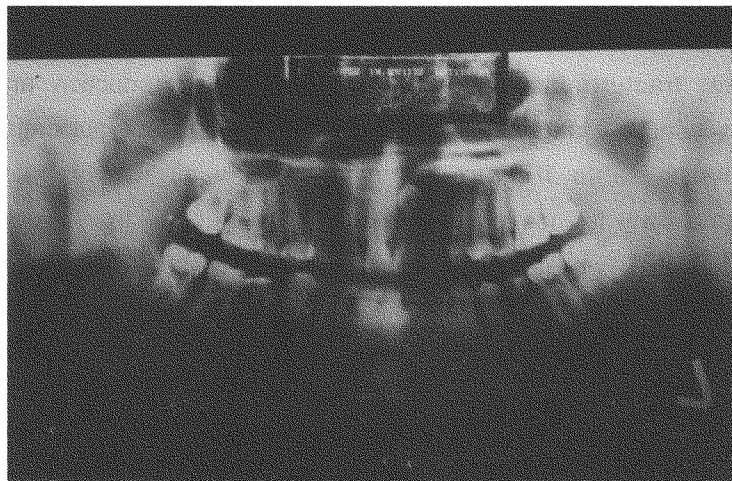


Figure 18 The x-ray showed bilateral condylar fracture dislocation. Note the head of condyles is out of the joint socket.

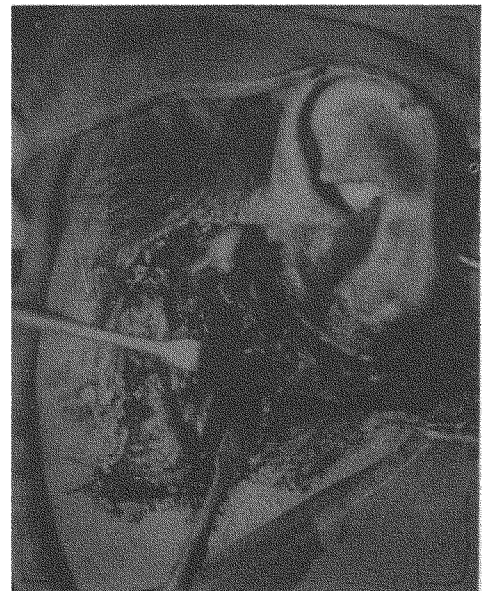
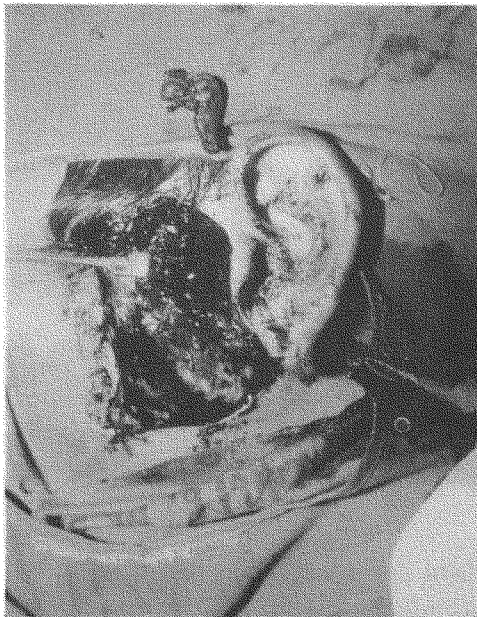


Figure 19,20,21

Show the preauricular incision, the intraoperative of right and left condyle which the fracture involve also the condylar head. The condyles were dissected free from the lateral pterigoid muscle to facilitate the reduction and fixation.

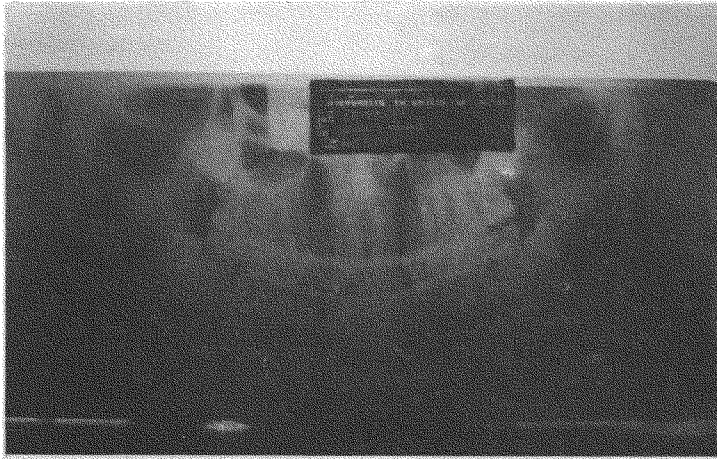


Figure 22 The post-op x-ray show the fragment were reduced and fixed into the normal anatomical position.

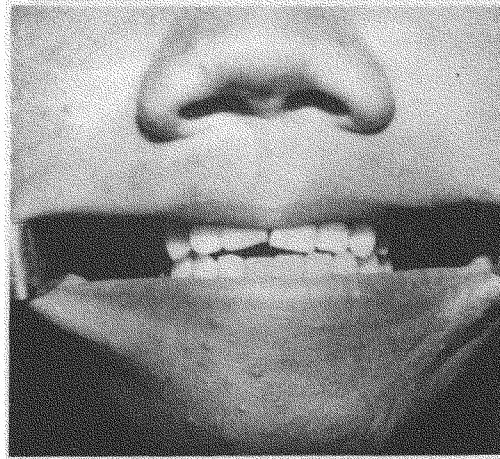
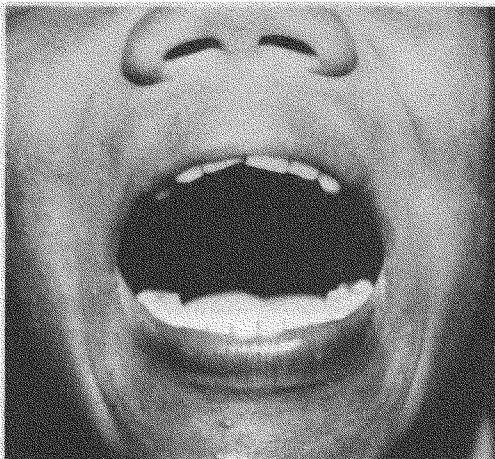


Figure 23,24 Post-op picture ,the patient can wildly open his mouth, and the occlusion returned to his normal position.

## **DISCUSSION**

The condylar fracture is not uncommon, it is about 5% of fracture mandible found in this series. Which incident is less than those reported series in caucasian people (35.6% Rowe and Killey in 1968, 32.4% Tansaned et al.1975, 27.7% Ekholm 1961, 25% Schuchdt et al.1966).The most common cause is from motor cycle accident (13 cases of 21 cases). Unilateral condylar fracture were found 13 cases (61.9%), bilateral condylar fracture were found 8 cases (38.1%) There were 4 cases of fracture dislocation (19%), 3 cases of bilateral fracture dislocation (14.3%), one case of unilateral fracture dislocation (4.8%). There were 7 cases with fracture symphysis, which was one third of the total cases (33.3%).In the other two third of the patient there were no symphyseal fracture together with fracture condyle. The diagnosis of fracture condyle of mandible should not be missed, for management is different in the period of intermaxillary fixation. The fracture condyle of mandible ,intermaxillary fixation time period should not exceed 3 weeks.They need early movement of temporomandibular joint to prevent ankylosis, since there may be hematrosis of TMJ., meniscus tear or ligament tear.Further more the fracture dislocation cases or the severe displacement cases need open reduction and internal fixation in order to achieve the satisfactory good result with acceptable good occlusion and without pain.No case of children under 14 years old was found in this series.In the children,one of the important thing to concern is the mandibular growth disturbance after condylar fracture,and the greater tendency to ankylosis .Eventhough the children have the great power of remodeling of the condyle, in the fracture dislocation and severe displacement cases the open redution and internal fixation is manditory needed to obtain good result.

The diagnosis is made from general history taking and physical examination.Most cases should have tender and swelling at preauricular area.The occlusion may be anterior open bite in bilateral displaced or dislocated fracture condyles, or contralateral lateral open bite of the unilateral displaced or dislocated fracture condyle. Decrease vertical height of the condyles caused premature contact of the posterior molar teeth on ipsilateral side and open bite on the contralateral side for unilateral condylar fracture;anterior open bite for bilateral fracture condyles.

From this series,the need for open reduction and internal fixation of the condylar fracture is very high.It is 15 out of 21 cases or 71% of all fracture condyles,or 15 out of 413 cases or 3.6% of all type of fracture mandible.

The reduction and stabilization by preauricular incision transosseous wiring comparing with other technique (simple bone plating, dynamic compression plate, pin fixation technique) is quick, reliable and save cost. Few disruption of vascularity of the condylar head is one of the advantage. In fracture dislocation or severe displaced fracture condyles some cases, are difficult to reduce the fracture into anatomical position due to the medial pulling of lateral pterigois muscle, need to free the condyles from the surrounding soft tissue. This can be jeopardize to the vascularity, and the condylar head will act as free bone graft. The studies of condylar reimplant <sup>(13,14)</sup> as a free graft after resection of the mandibular tumor, histological examination of one such condyle removed 28 months after reimplantation showed revascularized bone that had undergone extensive remodeling. A study by Daniels and coworkers <sup>(15)</sup> in young monkeyss showed that reimplanted condyle as a free graft functioned normally and maintained normal histological architecture of the growth and articular layers. Thus the use of the mandibular condyle as a free bone graft has biologic validity, although maintaining the vascular supply to the condyle during fracture reduction and fixation is probably a much more appropriate course when possible.

### **conclusion**

The condylar fracture management is a controversy topic.

The relative and absolute indication for open reduction and internal fixation of these fracture is vary and some have been enumerated. <sup>(16)</sup> The open reduction and internal fixation by transosseous wiring via preauricular incision is a simple, low cost and effective technique. It can be use in any fracture level, condylar head, condylar neck, low or high subcondylar.

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