Clinical and radiological evaluation of 3 types of plate osteosynthesis for fixation of subcondylar fractures.

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by

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Dedication

To the two candles who burned to show me the way my mother and my father.

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Introduction

The condylar region is one of the most common site of mandibular fracture. It constitutes 21.1% of mandibular fractures in adult patients while it rises to 50% or more in children and teenagers. According to Silvennoinen[(1)] condylar fracture is more frequent in males than in females with a ratio 3:1 with mean age 31.3 years with highest frequency among patients aged 20 to 29 years. It is usually the result of a direct blow to the chin or to the lateral side of the jaw caused by traffic collisions, violence, accidental falls, and sports injuries.

Displacement fractures are those in which the condylar head remains within the limits of the receptacle fossa. Degree of displacement may range from none to a wide malposition of fracture bone ends with marked overriding. Since fracture lines are usually oblique, the upward pull of three major masticatory muscles readily slips the fragments into an overriding position. When there is sufficient trauma to rupture the joint capsule and to expel the condylar fragments from the joint fossa, the condition is termed dislocation[(1)].

The diagnosis of condylar process fracture is based on clinical and radiological findings. Clinical signs such as jaw deviation, limitation during mouth opening, changes in occlusion, palpation through external auditory meatus or extraoral swelling of the preauricular region could be indicative of condylar process fracture[(2)]. Panoramic radiographs and conventional tomograms are excellent screening films demonstrating displacement of fractured condylar segments in

the anterior posterior direction but not in the medio-lateral dimension. Panoramic films have many advantages include its broad image, low radiation dose, and ability to be performed on patients who are unable to open their mouths. Other radiographic views are necessary to reconstruct a three dimensional image for diagnostic and therapeutic purposes. The open mouth reverse Towen's view is a useful adjunctive film since it is demonstrating displacement of fractured condylar segments in the medio-lateral direction [(3)].

In contrast to other mandibular fractures condylar process fractures are generally treated by maxillomandibular fixation, duration of immobilization usually ranges from two to six weeks depending on the type of fracture, degree of condylar dislocation and age of the patient early mobilization of the jaw and functional rehabilitation are considered important[(4)].

However, many methods for open reduction and internal fixation were used to treat these type of fracture including, intra-osseous wiring, K-wires, lag screws, and various types of plates. No absolute evidence tells the better method of fixation is addressed.

Review of the Literature

Anatomy of condyle and articulating fossa

Condylar head is elliptical in axial section and averages 10 mm in antro-posterior dimension by 20 mm in mesio-lateral dimension. Its greatest dimension is oriented perpendicular to the long axis of the ipsilateral mandibular body rather than the antro–posterior axis of the patient. The condylar head seats in the glenoid fossa of the temporal bone, which averages 15 mm in antro-posterior dimension by 23 mm in mesio-lateral dimension. Interposed between the condylar head and the glenoid fossa is the biconcave articular disk, which partitions the joint into an inferior joint space where hinge motion occurs and a superior joint space where translational motion takes place. The normal condyle–fossa articulation is complicated and precise. The anterior wall of the fossa at the articular eminence has an average slope of approximately 35° in the sagittal plane. This slope serves to guide the condyle through translation and contributes to the increase in interincisal opening that occurs past the initial hinge motion. The medial wall of the mandibular fossa has an average slope in the coronal plane of 15° (the Bennett angle), which interacts with the normal condyle to guide the mandible in lateral excursive movements.(5)

Fracturing of the condyle in particular is a preventive mechanism by which injury to the brain is avoided or diminished as the condylar neck constitutes the weakest region of the entire mandible and is therefore the most susceptible to fracture.. So, condylar fractures are often the result of indirect forces that transmitted along the mandible from distant sites such as the angle, body or symphysis. This

usually occurs when the mouth is opened at the time of injury so that some of the impacting force is transmitted along the mandible to its weakest link.[1]

The TMJ as a whole is supplied by a very rich plexus of vessels that runs throughout the tissues of the area. There are vessels of assorted sizes and it is difficult to determine which nearby major vessel provides the largest contribution. Every named vessel within 2 or 3 cm gives off 1 or more articular branches. The density of the plexus increases as the articular surfaces are approached.

Condylar blood supply is mostly derived from 3 sources. A branch of the inferior alveolar artery courses upward through the neck of the condylar process, where it anastomoses liberally with vessels from the attached musculature. Another major component to the condyle and its articular surface is derived from the TMJ capsule, with its lush vascular plexus. There is also a large contribution of blood supply from branches of the lateral pterygoid muscle through its attachment at the pterygoid fovea. Of these 3 sources, the medullary blood supply from a branch of the inferior alveolar artery was found to be the most important source in man.[6]

Classifications of condylar fractures

Lindahl and Hollender (1977) [7] classified Fractures of the condylar region into four levels:

Level (I): fracture confined to capsule (Intracapsular fracture).

Level (II): fracture line present itself at the junction between head and neck of the condyle (condylar head fracture).