Structural modifications of the mandibular condylar process as one of the sequels of traumatism in infancy

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ABSTRACT

Context: Mandible and condylar process fractures are well and plentifully described in dental bibliography with the exception of greenstick fractures of the condylar process, which are rarely included.

Aims: To compare laminographies and DICOM (Digital Imaging and Communications in Medicine) images of the mandibular condylar axis in patients that suffer blows to the chin with the same type of images of the mandibular condylar axis in patients with other pathologies that did not suffer blows to the chin.

Settings and Design: A population of 55 patients who suffered blows in the chin was compared with a control population of 20 patients without historic reference of traumatism in that part of the mandible.

The study included 28 Caucasian adult patients, 18 females and 10 males, age range from 22 to 43 years old and 27 Latin patients, 17 females and 10 males, age range from 22 to 43 years old. The control group included 12 Caucasian adult patients, seven females and five males, age range from 22 to 43 years old and eight Latin patients, five females and three males, age range from 22 to 43 years old.

Materials and Methods: These patients were studied by images obtained by laminographies with the mouth open and in maximal occlusion and volumetric studies by DICOM method.

DICOM is a standard for handling, storing, printing, and transmitting information in medical imaging. It includes a file format definition and a network communications protocol. The communication protocol is an application protocol that uses transmission control protocol (TCP)/internet protocol suite (IP) to communicate between systems. TCP is one of the core protocols of the IP and is so common that the entire suite is often called TCP/IP.

Statistical Analysis Used: Student’s t-test.

Results: This deflection of the condylar axis was not observed in patients with other pathologies that did not suffer blows to the chin region.

Conclusions: These fractures provoke deformation of the mandibular condyle, which in turn creates a morphofunctional dysfunction of the Temporomandibular joint (TMJ). It is important to know that this type of fracture can produce growth disturbances.

Keywords: Mandibular condylar process shape, morphofunctional pathology, greenstick fracture
INTRODUCTION

Greenstick fractures provoke morphofunctional pathology and can cause alterations in growth and anatomy.

When we study the temporomandibular joint in anatomy books, we verify that the majority of these descriptions assume that the mandibular and condyle has no pathology in orientation, size or shape, a fact that we know is not always so.[1-3] Furthermore, historically, we have defined the mandibular and condyle location presuming that no pathology affects this location. This fact does not match with new technology and diagnostic methods such as computerized tomography and magnetic resonance imaging (MRI).[3]

The TMJ can be affected by different pathologies. Many of these alterations attack osseous structures like the mandibular condylar head, articular fossa, and transverse apophysis of the zygoma.

“When we talk of the alterations of the mandibular head of the condyle, these alterations can be in the shape and/or position of the condyle”. [1,4,5]

The pathology of the mandibular and condylar process has been more frequently observed with the arrival of new diagnostic tools. Studies of quantification of mandibular asymmetry through cone-beam computerized tomography have been done.[6,7]

These alterations are usually labeled as “anatomical variations”.

Many studies describe TMJ alterations in children with involvement with juvenile idiopathic arthritis (JIA).[8]

Mandible and condylar process fractures are well and plentifully described in dental bibliography,[2,9,10] but it is exceptional to find literature in the dental world on greenstick fractures,[2,11] although it is a regular entity in medical bibliography.[10,12-14] Medical dictionaries define greenstick fracture as a fracture in which one side of a bone is broken, while the other is bent (like a greenstick).[15]

A greenstick fracture most often occurs during infancy and childhood when bones are soft.

The name is by analogy with green (i.e. immature) wood, which similarly breaks on the outside when bent.

Alterations of mandibular condyle orientation

The correlation of mandibular condylar axis alteration in patients that have suffered blows to the chin region has been observed in patients in our clinics of TMJ pathologies for more than 20 years. Each patient had a laminography of closed and open TMJ together with other images studies.

MATERIALS AND METHODS

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These patients were studied by images obtained by laminographies with the mouth open and in maximal occlusion and volumetric studies by DICOM (Digital Imaging and Communications in Medicine) method.

In those studies cephalometrics tracings on laminographies were built to evaluate and quantify the deflection of the mandibular condyles [Figure 1].[1]

The methodology used to construct the condylar axis and it’s alterations was the same used in the paper “Temporomandibular Joint Method to Study the Morphology and Relationship of the Hard Structures”. [1]

DISCUSSION

These blows can be frontal, posterior, vertical, or lateral. In these cases, we can observe a
curve-shaped deformation of the mandibular condyle head with an anterior concavity that can be, in some cases so severe that it compresses the retrodisceal zone, producing acute symptomatology [Figures 2 and 3].[16]

We can classify these traumatisms as direct and indirect.

Direct traumatisms are those that have their point of application in different sectors of the mandible. Indirect traumatisms are those that are a result of sudden and strong dislocation of the mandible.

These traumatisms produce different lesions in children than in adults. In children the mandibular condyle head has an embryonic cartilage that serves as a cleavage platform for the traumas; because of this, high fractures in children’s mandibular condyles are common.[16,17]

Any disturbance of mandibular condylar cartilage will result in alteration of mandibular development. The subsequent deformity of jaw and face will depend not only on the type, intensity, extent, and chronology of the noxious agent but also on the particular time of occurrence and growth activity.[18]

These fractures provoke deformation of the mandibular condyle that in turn creates a morphofunctional dysfunction of the TMJ. It is important to know that this type of fracture can produce growth disturbances [Figure 4].[11,19]

In some of these cases where the structures of the articular disk were not affected by the traumatism, the condyle disk relation can appear healthy but it is not so.
CONCLUSIONS

Greenstick fractures in children provoke deformation of the mandibular condyle, which in turn creates a morphofunctional dysfunction of the TMJ. The abnormal stress changes after greenstick fractures not only damage the condylar structure but can also provoke growth disturbances, facial asymmetry, and mandibular retrusion, all of which compromise its biomechanical environment.

REFERENCES