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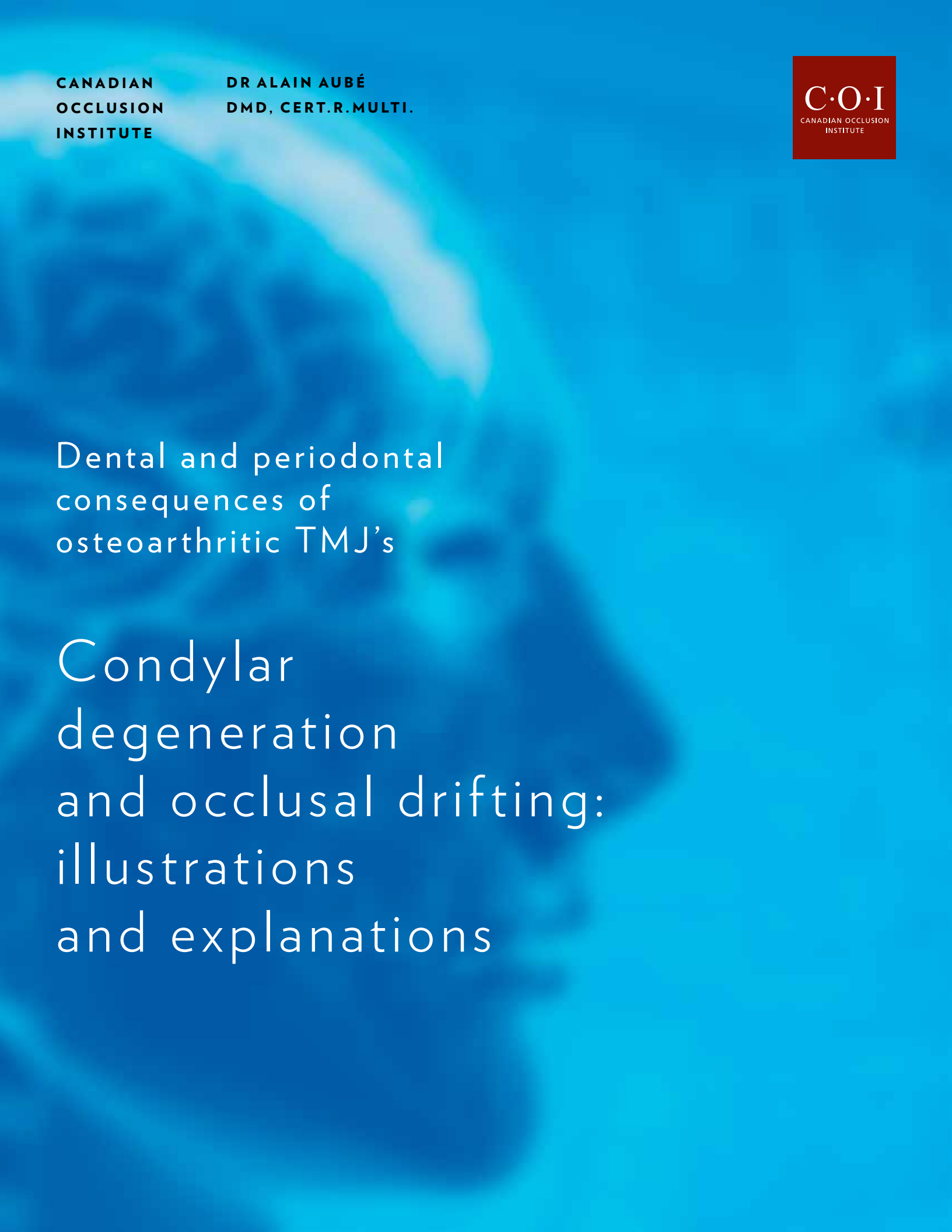

Dental and periodontal consequences of osteoarthritic TMJ's

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INTRODUCTION

DENTAL AND PERIODONTAL CONSEQUENCES OF OSTEOARTHRITIC TMJ'S

Osteoarthritis occurs when the cartilage layer on the condyle breaks down and the underlying bone is affected. Pain is sometimes present, but not always.

The degenerative process and the pain may be associated with cycles of joint loading. The intensity and frequency of loading influence both pain level and the degenerative process.

Mandibular condyle osteoarthritis has a high prevalence. 60 % of our patients demonstrate active osteoarthritis. It is almost always associated with disc displacement.

When the disc is displaced, the condyle is submitted to higher forces by surface unit. This, of course, puts the condyle at a higher risk of being affected by a degenerative process.

The biggest surprise comes from a study published by Nebbe in Dec 2000[1] : 72.5 % of female TMJs have a displaced disc at age 15. 62 % of male TMJs at the same age.

(1) Brian Nebbe phd et Al, Prevalence of TMJ disc displacement in a pre-orthodontic adolescent sample, The Angle Orthodontis, Dec 2000;70(6):454-63.

This leads to the clear conclusion that we work mostly with patients with displaced discs, and that their joints are at a high risk of degeneration and pain. When a degenerative process is present, the dentition is affected and cost of care may become very high. For those with pain, the patient's whole life may be affected.

Prevention and osteoarthritis control are imperative for maintenance of dental and periodontal health.

Until now, TMJ problems have been considered only when painful. This way of seing things has prevented us from understanding the dental and periodontal consequences of osteoarthritis of the mandibular condyle.

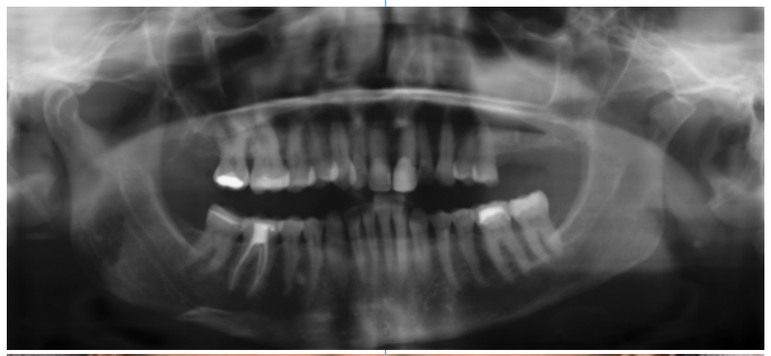
CASE PRESENTATIONS

In the following pages, you will find cases that represent the average patients we see. We see hundreds every year. ***The stories are similar : suffering, dysfonction, discomfort, affected lives and even broken lives.***

Dentists are not sufficently trained for these problems. Curriculums are already overloaded, but the fact remains. Today, more than 80 % of the population has internal derangements and the ensuing negative effects within the mouth.

More dental structure is now lost to wear than to decay. Fixing the damage due to premature wear costs more than the damage caused by decay. Today's dentists lack tools to recognize, discuss, prevent and treat.

This document, with its examples, has a mind opening goal in the face of the fact that there is a growing problem affecting many, if not actually most, of our patients.



CASE
N°1

This patient's chin is deviated to the left and her occlusal plane is canted following severe osteoarthritic damage to the left condyle.

Teeth number 26-27 (IS) (US 14-15) were lost to excessive loading that came as the left condyle "melted". The teeth first fractured, got crowned, hurt, required endodontic treatment, posts, cores and new crowns. Eventually the roots fractured, and the teeth were extracted.

What would happen to implants that may be submitted to the same forces ?

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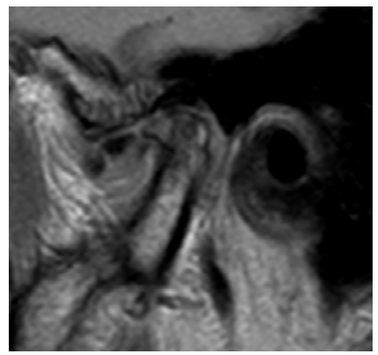
Both condyles suffer from severe osteoarthritis.

The left condyle is smaller.

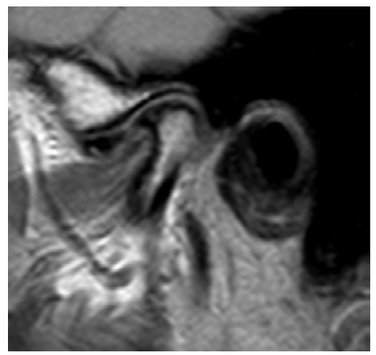
The right condyle's marrow is dark, a sign of osteonecrosis.

→

Right TMJ



Left TMJ

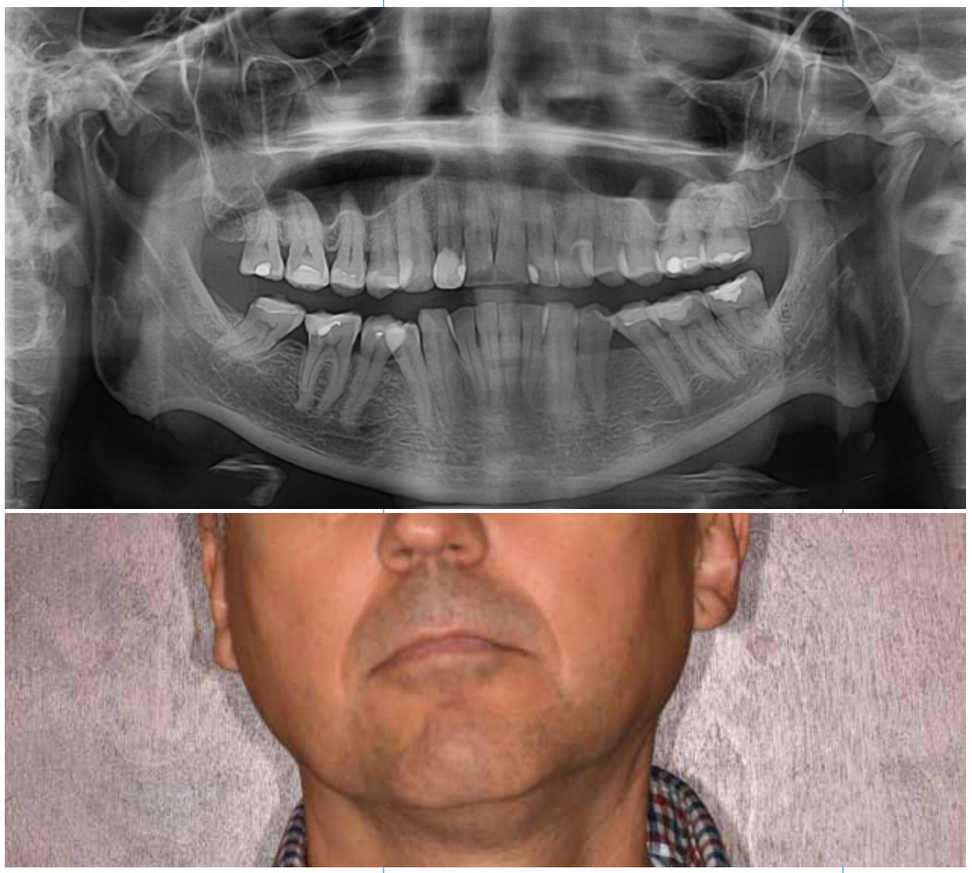


CASE
N°2

Note left side chin deviation and the short left ramus.

Observe wear on the teeth following osteoarthritis in the left condyle.

The right condyle lacks antero-posterior dimension, but it is longer than the left one.

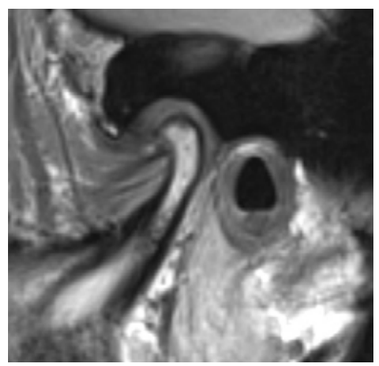


\+

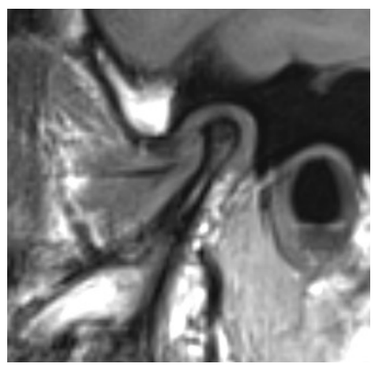
On the MRI : Anterior displaced discs and bilateral sub growth.

The right disc reduces. The left disc does not.

→



Right TMJ



Left TMJ

CASE
N°3

This bite results from severe osteoarthritis in both condyles. The bite is open from one end to the other.

\+

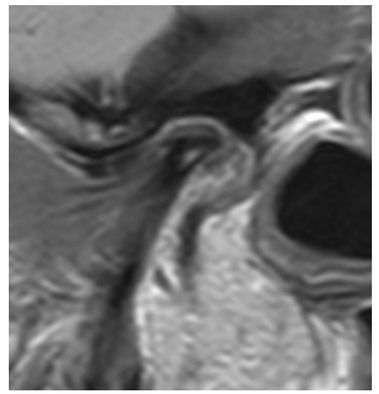
On the MRI: Bilateral sub growth.

Anteriorly displaced discs without reduction.

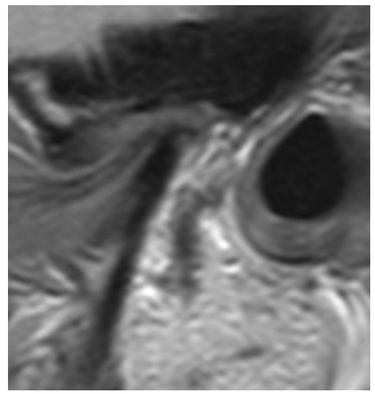
Severe osteoarthritis bilaterally.

→

Right TMJ



Left TMJ



CASE
N°4

Again, left chin shifting following osteoarthritis of the left condyle.

The left condyle, on the panoramic image, is lower than its coronoïd process.

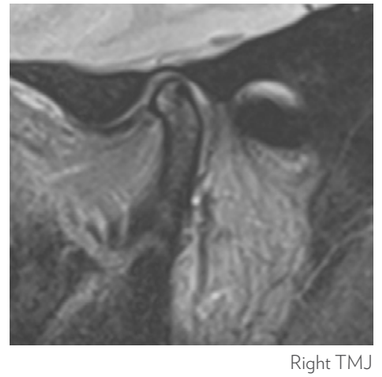
+

On the MRI : Bilaterally displaced discs.

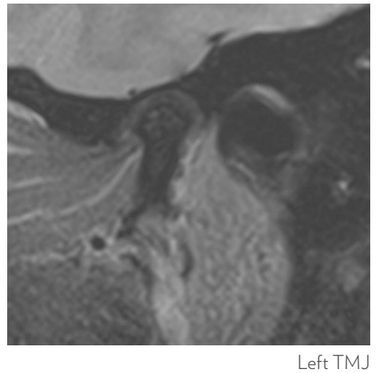
Right side osteoarthritis and osteophyte.

Left side severe osteoarthritis.

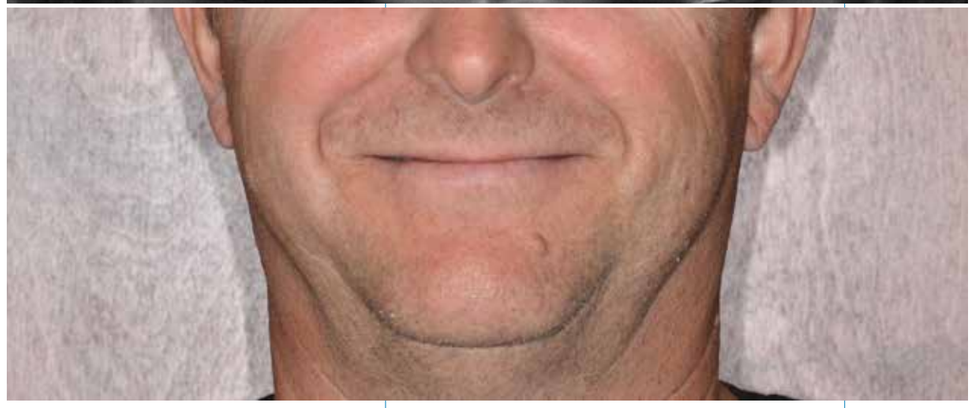
→



Right TMJ



Left TMJ



CASE
N°5

Severe wear distal crestal margin of upper second molars. This only happens with severely degenerated condyles.

\+

It is usually impossible to wear the distal crestal margin of upper second molars. This occurs only with severe condylar breakdown.

⟶

CASE
N°6

Severe osteoarthritis of the left condyle and severe mobility of all three molars in the lower left quadrant. Again, the condyle is shorter than the coronoïd process.

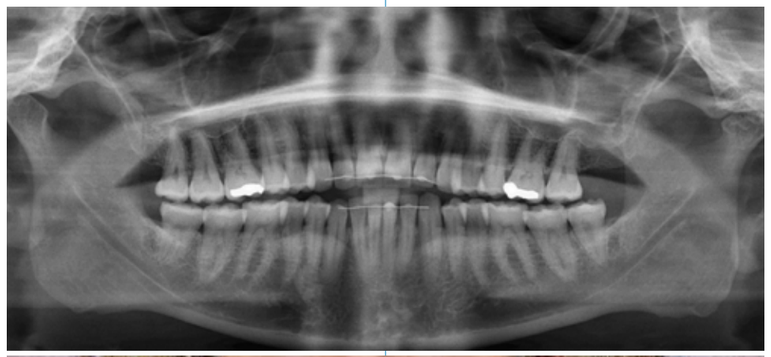
The chin is deviated towards the short ramus.

+

Again, it is the applied force that is causative.

In this case, the periodontium is the weaker link.

↓



CASE
N°7

Open bite from the second molar to second molar.

The left condyle is inferior to its coronoïd process.

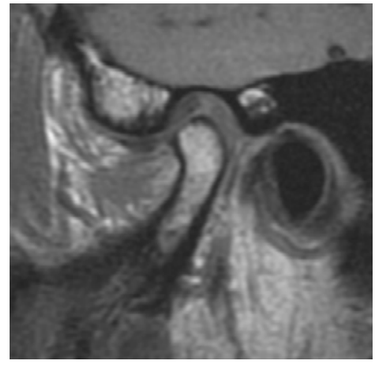
\+

The opening of the bite is created here following left condylar degeneration.

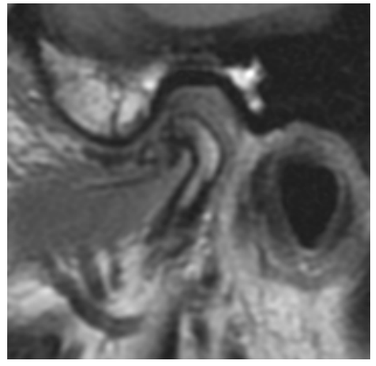
On the MRI : Right condyle : displaced disc without reduction.

Left condyle : Sub growth, anterior displaced disc without reduction, osteoarthritis and osteonecrosis.

⟶



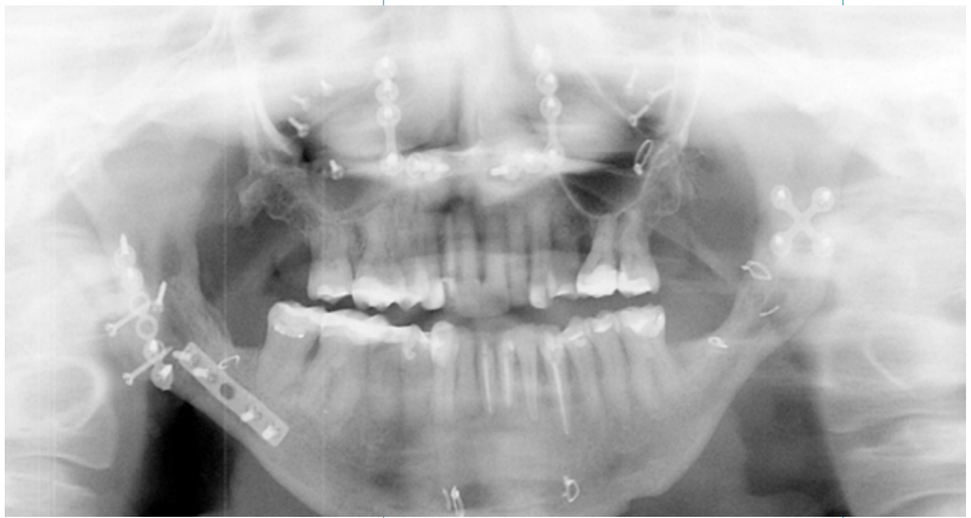
Right TMJ



Left TMJ

CASE
N°8

Multiple orthognatic surgeries to try and fix the bite following sub growth and osteoarthritis of the left condyle.



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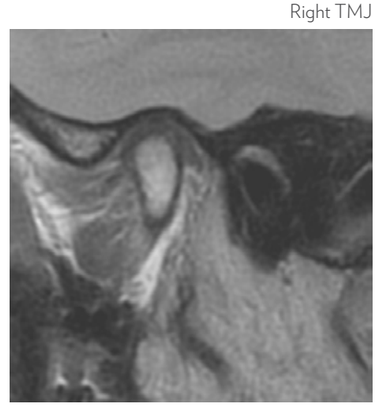
On the MRI :
Right side, disc in place.

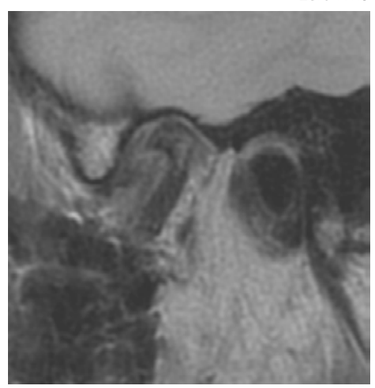
Left side, disc displacement, without reduction, degenerated disc, sub growth, severe osteoarthritis and osteonecrosis.

→

Right TMJ



Left TMJ



CASE
Nº9

Case of severe sub growth and osteoarthritis during chilhood and adolescence. This leads to poor maxillary developpement and crowding of the teeth.

The patient underwent orthodontics and orthognatic surgery.

Surgical relapse lead to total open bite in only 4 months.

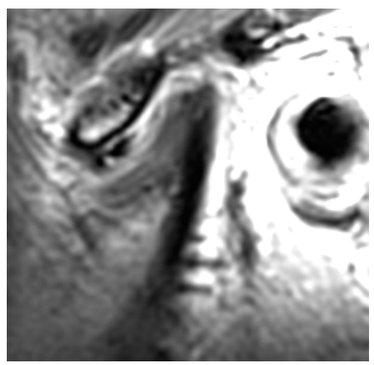
The patient had bilateral total joint replacement with prostheses.

Initial — june 15, 2011

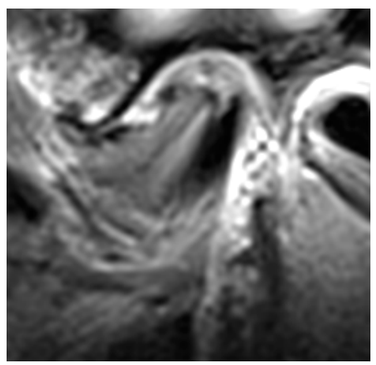
Initial 2011

Final — july 15, 2014

Relapse — november 3, 2014



Right TMJ



Left TMJ

Total joint replacements

The patient, as observed on the panoramic image, had small condyles. This only occurs with displaced discs. The patient had orthodontics and orthognatic surgery. 3 months post-op the patient had already developed a completely open bite and severe pain.

MRI showed total absence of condylar cortical bone left and right.

Did this happen post-surgically or was the situation present before surgery ? Is this the result of surgical stress on the condyle or could we have seen the weakened condyles before ? Is absence of cortical bone a risk factor for relapse ?

CASE
Nº10

Pain and headache following right condyle osteoarthritis.

\+

Lower midline shifted to the right.

An equlibrated night guard reduced the headaches. Occlusal equilibration will follow.

⟶

CASE
N°11

The melting condyle on the left caused the opening of the bite on the right.

The left condyle is shorter than its coronoïd process. The occlusal load is now on the left.

This increases the pressure on the left condyle causing it to wear even more. As this leads to an even stronger shift to the left, a vicious circle is initiated.

+

Abfraction and recession.

Occlusal forces migrated to the posterior as the condyle wore.

The litterature is clear on the fact that that increases the mechanical load : on the teeth, the periodontium, the bones and the joints.

CASE
N°12

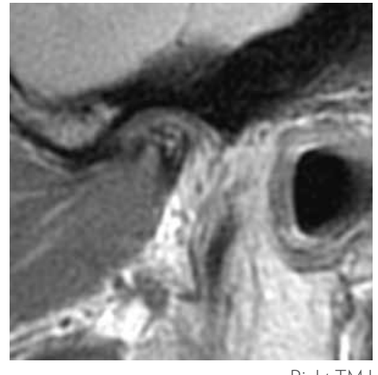
Open bite and severe attrition caused by osteoarthritis. That lead to full surgical relapse one year post-op.

March 2014

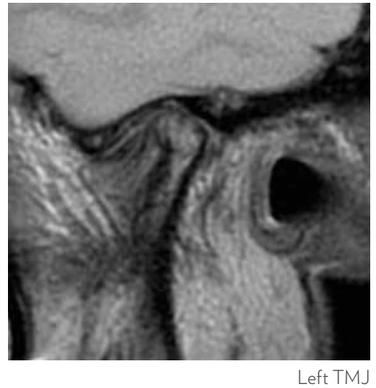
January 2015

\+

On the MRI: Bilateral disc displacement, sub growth, osteoarthritis and effusion.



Right TMJ



Left TMJ

Patient at 8 years.

YOUNG ADOLESCENT CASE Nº1

Patient underwent mandibular advancement growth stimulation.

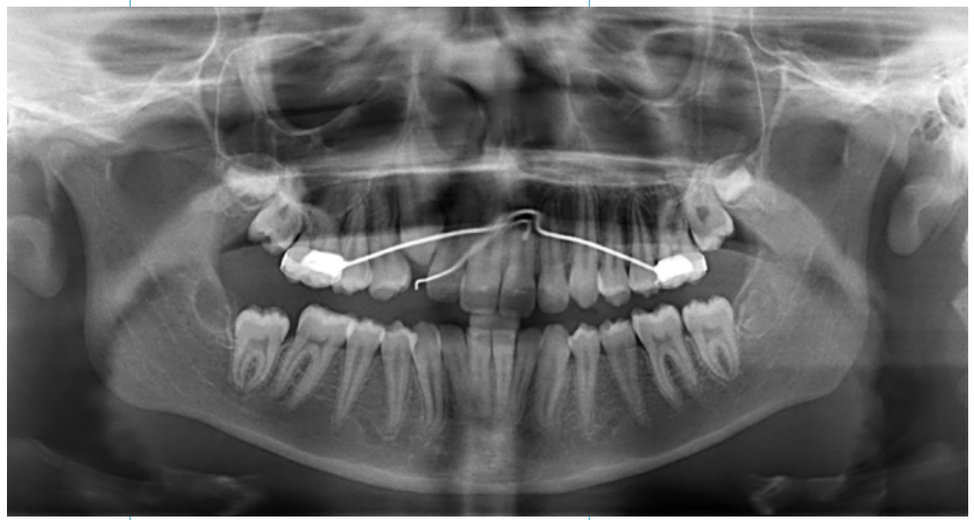
Succesful growth stimulation on the left side. Failure on the right side.

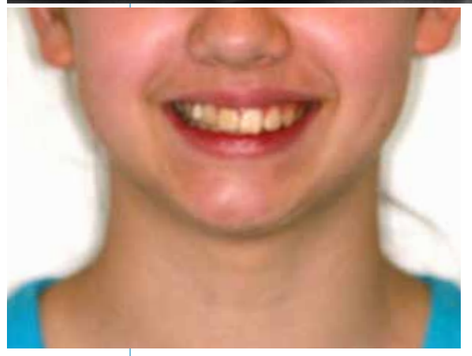
+

On the MRI : Right side : displaced disc without reduction, effusion, osteoarthritis, sub growth.

Left side : displaced disc with reduction, effusion, succesful growth.

→





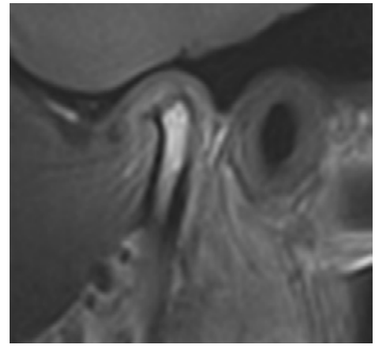
Patient at 13 years : chin and midline shift towards the osteoarthritic side.

+

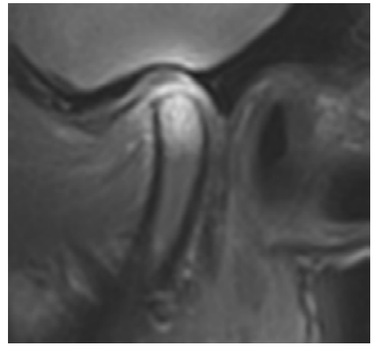
Right side : disc does not reduce, severe osteoarthritis.

Left side : disc reduces, stimulated growth.

→



Right TMJ



Left TMJ

YOUNG ADOLESCENT CASE N°2

Osteoarthritis of the right condyle. 12 year old patient.

Patient underwent mandibular advancement growth stimulation.

Successful growth stimulation on the right side. Failure on the left.

Menton dévié à droite.

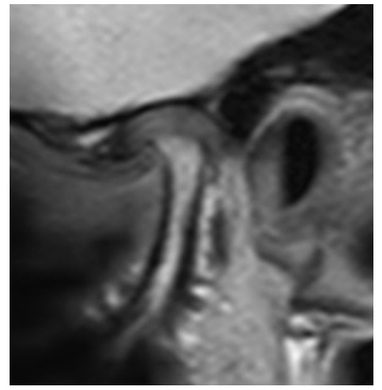
\+

Right side : Disc displacement without reduction / severe osteoarthritis.

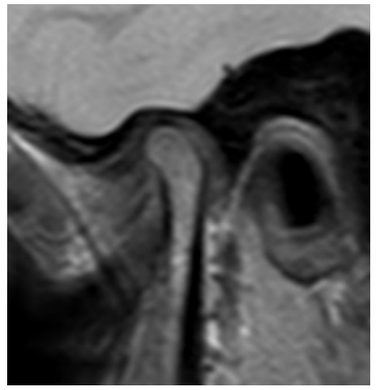
Left side : Disc displacement with reduction / successful growth.

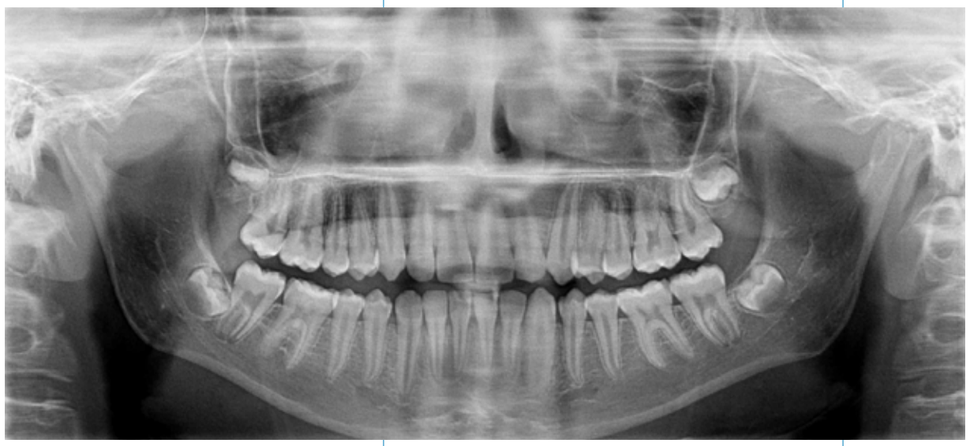
→

Right TMJ



Left TMJ





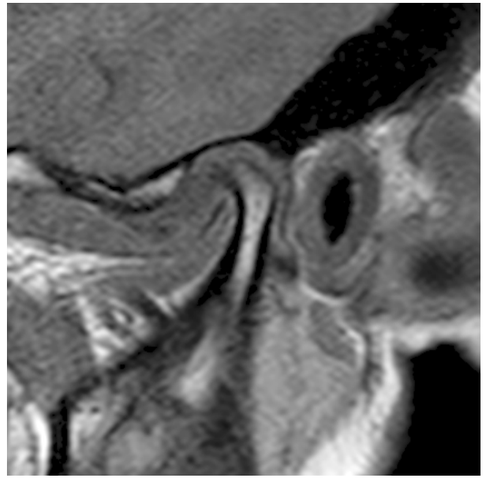
YOUNG ADOLESCENT
CASE
N°3

Young 13 year old boy with a history of palatal expansion and orthodontics. The patient has headaches 3 to 4 times per week. He also suffers from joint and muscle pain bilaterally.

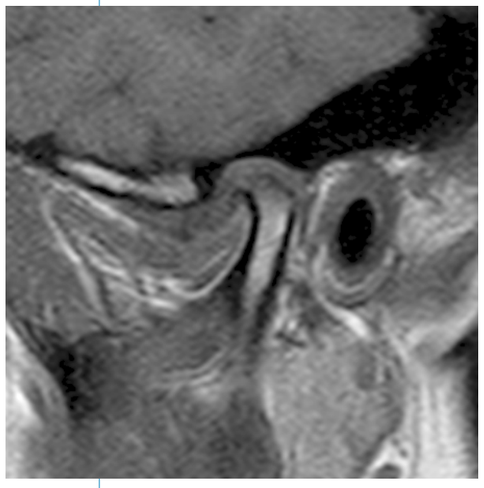
\+

On the MRI :
Both sides :
anteriorly displaced discs with late reduction. Severe osteoarthritis.

Right TMJ



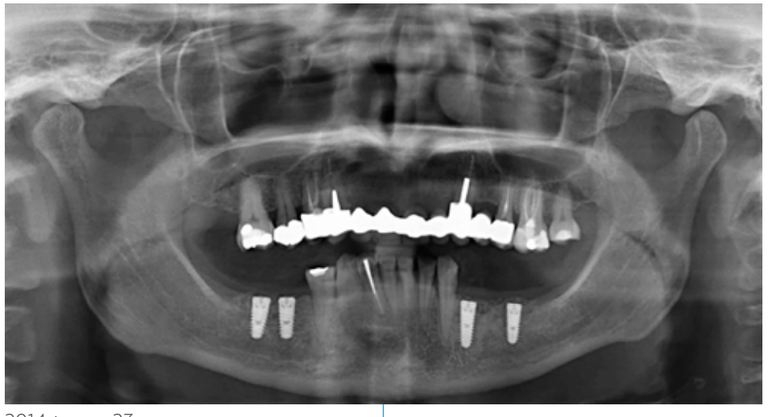
Left TMJ



IMPLANTS CASE

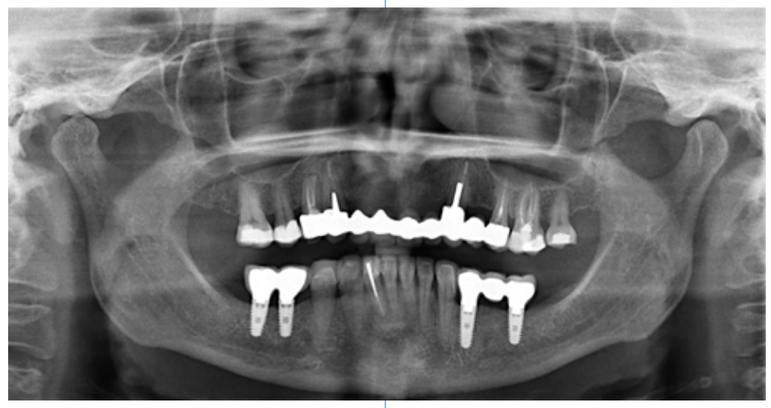
BONE LOSS AROUND IMPLANTS FROM OCCLUSAL OVERLOADING

2013 — Loss of lower left first bicuspid caused by occlusal trauma.



2014, january 23

2014, june 5



2014, october 16 — Crowns in place.

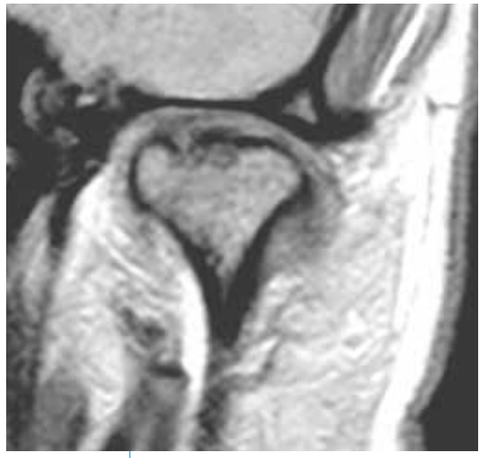
2016, april 11 — 1.5 years after crowns are loaded.

CORTICAL BONE REFORMATION

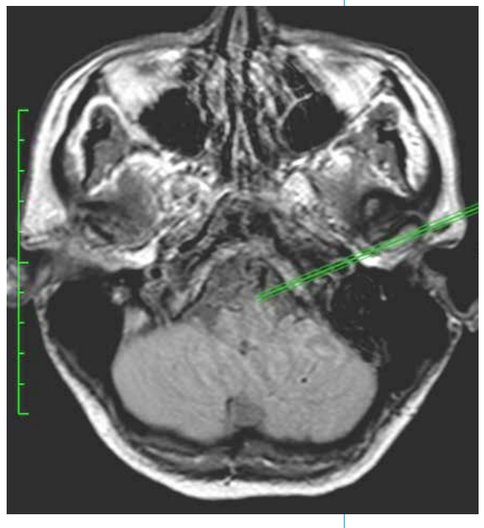
Condylar cortical bone improvement following wear of a splint with lightened posterior contacts.

+
3 cases :
page 43-44-45.
⟶

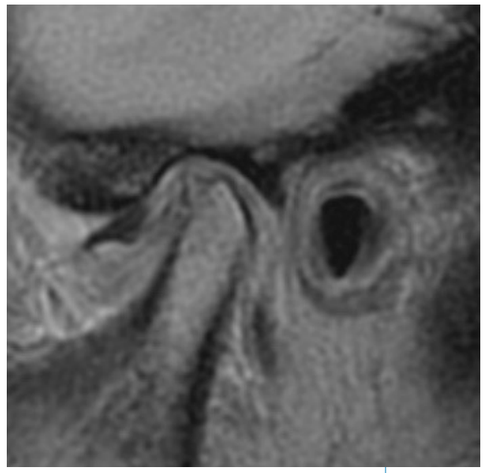
2013 LEFT TMJ



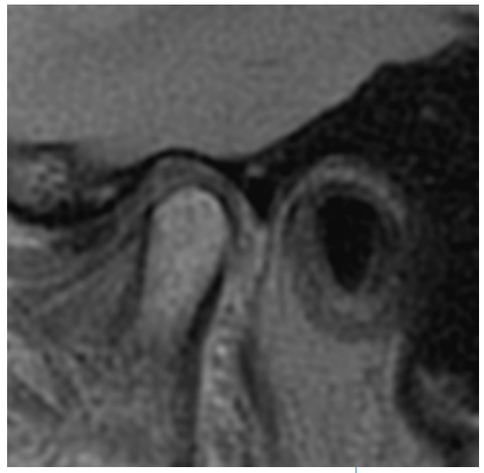
2015 LEFT TMJ

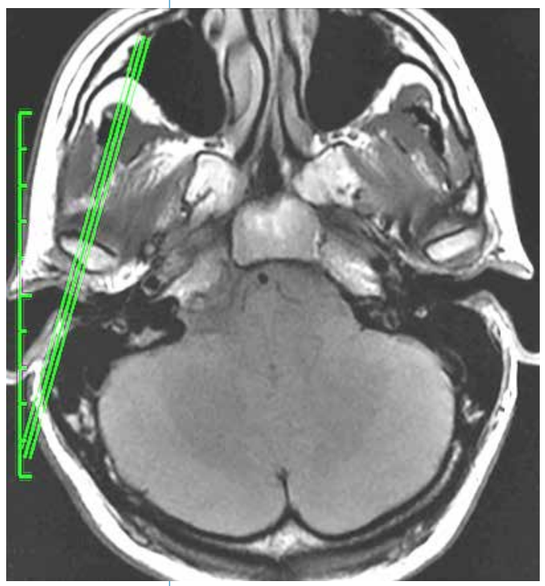


2014 RIGHT TMJ

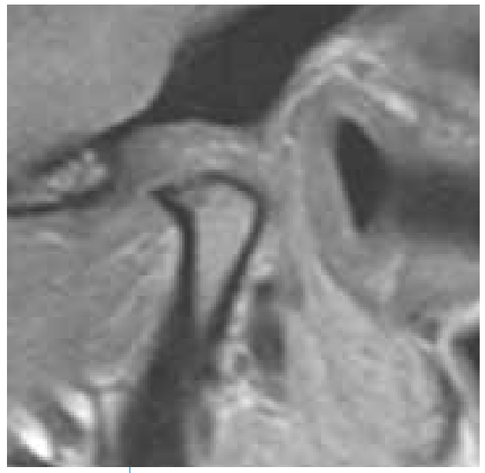


2015 RIGHT TMJ

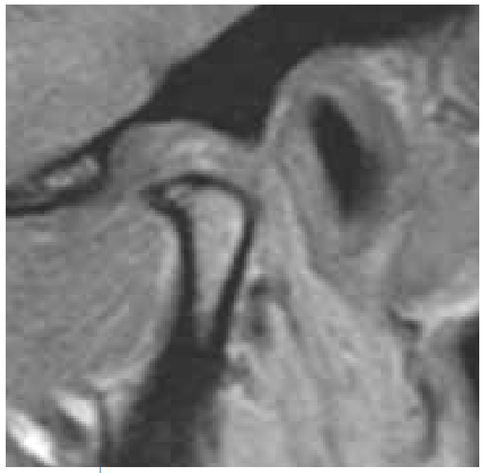


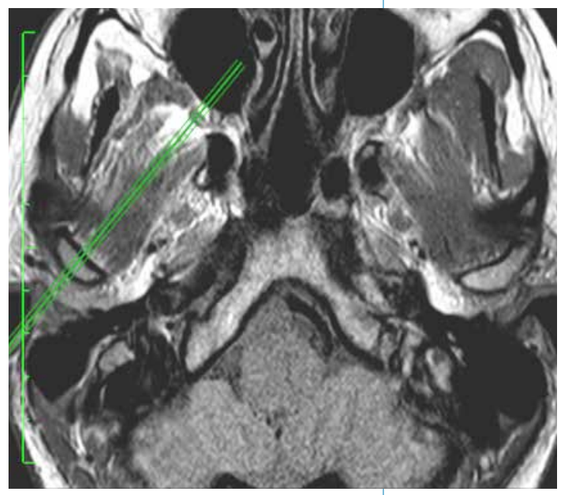


2013 RIGHT TMJ



2015 RIGHT TMJ





PIVOT SPLINT

VS

EQUILIBRATED SPLINT WITH LIGHTENED POSTERIOR CONTACTS

This patient had been treated for TMD before she came to us. The patient complained of pain and clicking.

A dentist having followed TMJ training had fabricated a pivot splint for daytime wear and an anterior bite plane for night time wear.

This combination had two goals :

1. Seperate the condyle from the fossa/eminence.
2. Recapture the disc.

I will remind the reader that this is in line with certains schools of thought in TMD treatment.

This method is based on a noble desire : recapturing the disc. Even though the method often alleviates pain, the method is contrary to orthopaedic principles :

1. First and foremost, a pivot splint only has posterior contacts. This is said to bring the condyle down and separate it from the fossa/eminence. The reality however is that this does not happen. The elevator muscles will constantly keep the condyle in the fossa or on the eminence.

2. From a physiological standpoint, posterior tooth contact creates a muscle "reflex" of the elevators. The muscles activate. Many patients then have a tendancy to contract the elevator muscles. This leads to an increased load on the condyle wich is the opposite of the goal.

3. From a mechanical standpoint, the literature is clear, the masticatory system is a class III lever, which implies that the more posterior the contact is, the stronger the load is. Again, this is contrary to the initial goal.

The patient saw her condyles melt from osteoarthritis, and mandibular regression occurred, leaving an anterior open bite. The patient now still has pain, an open bite and an even more increased load on her condyles.

Orthopedic and dental literature teach us that the main factor leading to initiation and progression of osteoarthritis is mechanical loading.

The patient, according to her MRI, showed after one year of initial therapy, signs of osteoarthritis, which is absolutely opposite to the initial goal.

WHAT WE DID

A full coverage splint with lightened posterior contacts was fabricated for the patient. This splint reduces physiologically and mechanically the load on the condyles. The splint is in line with orthopaedic principles.

Condylar compression is now recognized as the first cause of osteoarthritis. Reducing the load is recognized as being beneficial to reduce pain and degeneration.

After a few months, we were able to note a major reduction in the patient's discomfort, stabilization of the bite, and reduced osteoarthritis. A second MRI taken 10 months after the new splint confirmed cortical bone remodelling and reformation. Osteoarthritis had stopped its progression.

Complete diagnosis is always necessary. Only relying on symptoms is a serious flaw. We are responsible for diagnosing the pathologies underlying the symptoms. Our apprach must be scientific and medically acceptable.

The TMJ is a joint. More and more we should step back from a simple dental view of our joint. We should tend to embrace more medical orthopaedic concepts and principles.

Our patient is now under orthodontic care to restablish her bite.

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Condylar cortical bone reformation after lightened posterior contact full coverage splint wear.

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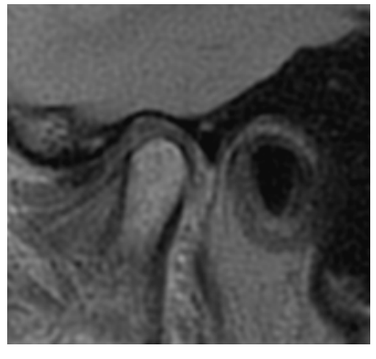
Right TMJ 2014

Right TMJ 2015



CONCLUSION

SELF EVIDENT CASES

We have shown here a series of typical cases.

Look at and observe your patient's panoramic images. You will regularly see the problems illustrated in this document. You may establish relationships with the fact that occlusal forces are imbalanced, creating attrition, fracture, fissure, recession, abfraction, etc. You may also associate with joint and muscle pain.

There are numerous more subtle cases. Note that for a condyle to appear small on the panoramic image, it must be approximately 30 % smaller than the norm...

Think well.

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