TMJ TOUR

How the Jaws (Should) Work
Part I: Introduction

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Disorders of the jaws, including the jaw joints (TMJs) can be fixed!

Presented here is a brief description about how the jaw joints (TMJs), upper and lower jaw bones, and the teeth (the bite) should normally work, as well as some common jaw disorders. Learning about the jaws will help you understand your problems and enable you to make treatment decisions that “make sense”.
The Goal for Optimal Jaw Health:

*Intermeshing of Teeth Coincides with the Hinge Axis of Jaw Closure!*
Stated another way:

*The best jaw health occurs when the jaw bones, teeth, and joints are healthy and properly aligned!*
The shapes, positions, and alignment of the upper and lower jaws, the teeth, and the jaw joints (TMJs) must be evaluated together. These three basic parts of the jaws must work in harmony. Pain, and other symptoms, usually indicate a problem within one, two, or all three of these basic structures.
Consider the face similar to a door. Both have three main parts: The Hinge (TMJ), The Frame (Jaw Bones), and The Lock (Teeth and how they mesh). All three parts must be properly aligned for proper function. A problem in any one will have deleterious effects upon the others.
Normal Door: Closes with one finger…
…because the Hinges, Frame, and Lock are properly aligned and work in harmony.
Door problems: May occur in the frame, hinges, or lock…
…or any combination of two or more.
When the jaw closes...the teeth should intermesh coinciding with the hinge axis of jaw closure!

Like a normal door, the “hinge” closure of the jaw should line up the teeth so they meet evenly together. If the teeth must hit *and slide* to mesh together, then the jaw bone position has to accommodate (like wiggling a door to close it) and unfavorable forces are being placed on the teeth and TMJs.
Normal jaw opening exceeds 40mm

Jaw opening, as measured between the edges of the upper and lower teeth, should exceed 40mm. Most adults can open 45-55mm, and some persons can open much wider. Opening jaw movements should be quiet, smooth, and free of pain. Joint noises during jaw movements are not normal.
There is a disk in jaw joints (TMJs), just like there are disks between the bones in the knee, back, and neck. The disk functions as a sliding, lubricating, and shock-absorber while the jaw moves. Disk dislocation often causes jaw pain, popping, limited jaw movement, and difficulty chewing.
When the teeth come together, the back teeth should touch evenly and the front teeth should be very slightly apart. Both sides of the back teeth should touch at the same time. The front teeth should not be the first teeth to touch when the jaw is closed.
Normal right and left jaw movements should exceed 5mm

The jaw should move to the right, left, and forward (protrude). During these movements only the front teeth should touch and there should be space between the back teeth. Anterior Guidance protects the back teeth. It is abnormal for the back teeth to touch during these movements.
The front teeth should overlap with 2-3mm of overjet and 2-3mm overbite when the jaw is closed. Overjet and overbite determine Incisive Guidance (also called Anterior Guidance), that is, the way the jaw slides forward and to the sides. A deep bite or an open bite is abnormal.

Here are three examples of abnormal Overbite and Overjet. The negative numbers indicate the OB and OJ are in the opposite directions of what they should be.
Normal Anterior Guidance is essential for jaw health. Open bites and deep bites place excessive forces upon the teeth and TMJs, which lead to joint and tooth problems. Open bites and deep bites commonly indicate that abnormal bone growth has occurred within the upper and/or lower jaws.
Facial symmetry and proportions are normal values that are shared by all races. The normal face usually has three equal, horizontal sections. The lower third especially concerns upper and lower jaw alignment.
Symmetry?

There should be vertical and horizontal symmetry of the face. Asymmetry usually indicates disproportionate growth of the bones and/or soft tissues, including the muscles of the face and jaws.
A closer look reveals more subtle asymmetry. In fact, all faces have some asymmetry. The asymmetry becomes problematic when these irregularities are caused by a skeletal or dental misalignment that results in unfavorable distribution of muscular forces upon the teeth, TMJs, and bones.
Dentofacial deformities involve the TMJs, upper and lower jaws, and the teeth. All of these structures must be thoroughly evaluated so that the proper treatment may be rendered to each part, and in the proper sequence.
Common symptoms and complaints:

- Jaw popping
- Jaw locking
- Difficulty chewing
  - Jaw pain
- Difficult to open jaw
  - Teeth don’t fit
  - Headaches
  - Jaw aches
- Jaw moves irregularly
  - Jaw used to pop, but doesn’t now
- Jaw moves to side when opening
  - Asymmetry of face
  - Bad bite with broken teeth
  - Cannot hold jaw open

A thorough evaluation provides information to identify problems to establish the correct diagnosis. Some of the most important diagnostic information is revealed by just talking with the doctor.
Diagnostic records usually include facial and intraoral photographs, and radiographs (x-rays) of the face and teeth.
Plaster dental models mounted on a dental articulator (jaw position simulator) reveal the jaw and tooth (mis)alignment in 3-dimensions.
The hinge axis of jaw movement can be objectively measured. The mandibular (jaw) position is graphed in 3 dimensions. These records are made to determine if, and when, the TMJs are stable. An interocclusal (bite) splint is used as part of this diagnostic process.
A splint cannot fix a dislocated TMJ disk! But the splint can help painful symptoms.

Unstable bite and jaw position cause painful muscles and TMJs

Stable bite and jaw position when teeth evenly contact the splint

That is, a splint is an essential tool for jaw rehabilitation when used with definitive treatments that correct TMJ, jaw bone, or tooth (bite) deformities (such as joint surgery, jaw bone repositioning, orthodontics, etc.).

An interocclusal (between the bite) splint is a therapeutic and diagnostic tool, not an endpoint of treatment! As a therapeutic tool, it makes the jaw feel better because it stabilizes jaw position and helps relax sore muscles. As a diagnostic tool, it helps identify the (mis)alignment of the jaws and teeth.
A Cine Magnetic Resonance Image (Cine-MRI) scan is very helpful to evaluate how the disk and bone moves in the TMJ.

Abnormal TMJ:
Disk dislocation without recapture
Jaw problems are often very complex and challenging to correct. TMJ, jaw bone, and dental tooth position (bite) issues are interrelated. Successful treatment requires correction of all the problems in the proper sequence.

For predictable, stable results correct in this sequence:
1. Temporomandibular Joint .............. TMJ
2. Facial Bone Alignment ............... Bones
3. Dental Occlusion .................... Bite
Successful treatment must be performed in the proper sequence. Like the door analogy, the hinge (TMJs) must be stable before addressing problems with bite and facial bone alignment. Likewise, if the door hinges are broken, how would you know where to fix the frame or realign the lock?

Bite, bone, and TMJ disorders?...

...diagnose the problems, then,

First: Fix the Joints (TMJs)!
Diagnosing and treating jaw problems requires expertise, dedication and excellent communication. The doctor treatment team usually includes a restorative dentist, an orthodontist, and an oral and maxillofacial surgeon. However, the most important person in the team is the patient!

**Complaint:** Jaw locking and jaw pain, can’t chew

**Diagnosis:** Dislocated TMJ disks
Asymmetric jaw growth
  - Lower jaw prognathic to left
  - Upper jaw too narrow
Open bite, Class III

**Treatment:** Splint to stabilize jaw, relieve pain
Bilateral TMJ surgery: Repair disks
Splint during TMJ rehabilitation
Orthodontics: Level and align teeth
Orthognathic surgery to move jaws:
  - Lower jaw, back and to right
  - Upper jaw, widen

**Results:** No pain, chews all foods, stable bone and bite alignment

**Total treatment time:** 2.5 years
TMJ surgery becomes necessary only to repair severe TMJ deformities. When bite and jaw growth deformities are corrected, then the jaws become properly aligned, feel better, remain stable, and TMJ health is improved. These persons had TMJ pain that resolved following correction of bite and jaw problems.
Chewing is best when the jaw bones, the bite, and TMJs are healthy and properly aligned.

Understanding jaw and TMJ problems, and how to correct them, is based upon an understanding of normal jaw anatomy (the parts) and physiology (how the parts work). Successful results are optimized when the patient understands their condition and becomes dedicated to their own care.