

Review of Scan: CT/CBCT Guide

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TMJ

Condyle

Fossa

- Normal Size, Normal Shape, Cortex Intact

Condyle is 70% size of the fossa, with an ovoid shape. The condyle and fossa are noncongruent convex surfaces. The outer cortex of bone is a solid continuous line with no breaks. Look for areas of hypercalcification which are indicative of excess load in that area or damage and repair. The right and left TMJs should be the same size.

Condylar Position

- Centered in fossa

The condyle should be centered in the fossa. A distalized condyle is indicative of either joint damage and disc dislocation anteriorly or heavy anterior tooth contact. An anteriorly positioned condyle is indicative of a large CR/CO discrepancy, usually associated with an adapted mandibular retrognathia.

Joint Spacing

- Centered in fossa

There should be room to “draw” a disc between the condyle and fossa.

CR Load Zone (Centric Relation Load Zone)

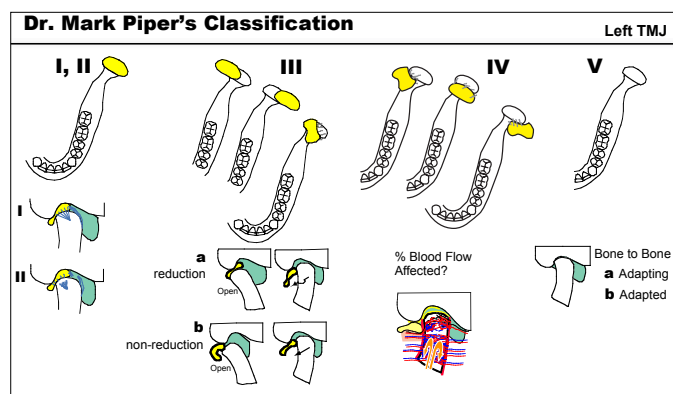
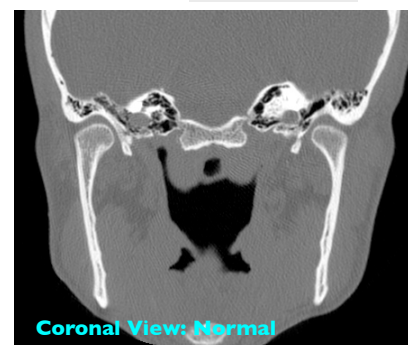
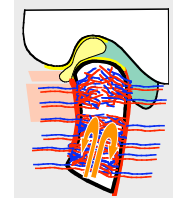
- Superior medial

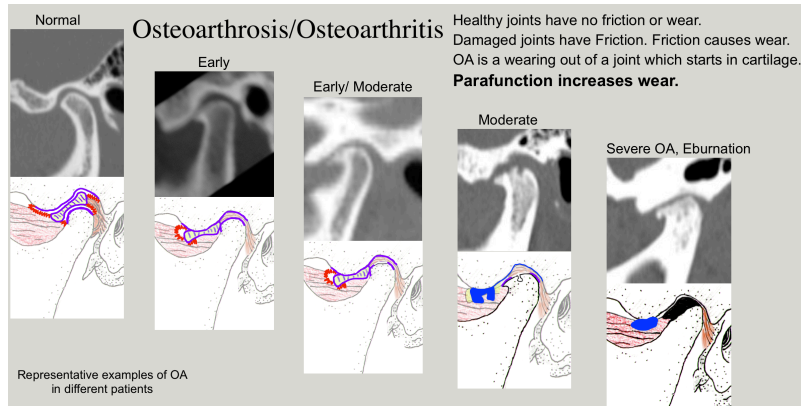
Ideally the condyle in its optimal load bearing position (Centric Relation) should load on the superior medial surface. In the coronal view the area where the condyle is closest to the fossa is the Centric Relation Load Zone. A variant of normal is to have both condyles load on the superior lateral surfaces. If the load zones of the right and left do not match (i.e. one is medial the other lateral) this is indicative of joint damage and disc dislocation. Need to evaluate for joint mechanical stability (joint wobble) with a D-PAS. Clinically these patients may have a hypersensitive “bite”.

Estimate Piper

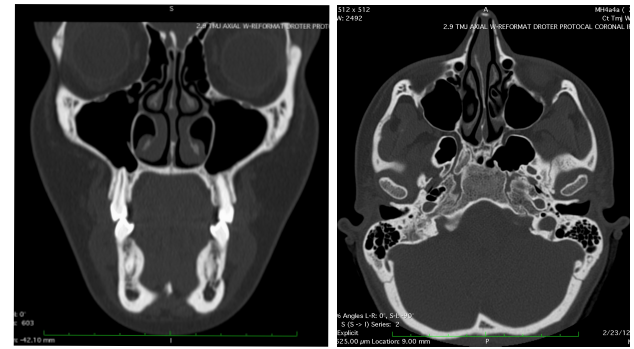
This estimation combines clinical data from the clinical history, exam, joint palpation, stethoscope auscultation, Doppler, JVA (Joint Vibration Analysis) and the CT scan. If you see a left distalized condyle and the left TMJ clinically clicks, my estimation would be a Piper 4a. A left distalized condyle and no clicking is either a Piper 4b or a health joint distalized due to heavy anterior contact (usually iatrogenic). In the case of the 4b, JVA would show some slight “scratch vibrations”, where as a health TMJ distalized due to occlusion would show “smooth vibrations”, and clinically have fremitus on the anterior teeth.

- 1 Normal joint- **MRI and CT are normal** (See all above). No joint sounds, full range of motion. JVA no vibrations, quiet Doppler.
- 2 The TMJ is damaged but disc is still in place so **MRI and CT are normal**. Usually the cartilage is damaged, roughened from parafunctional bruxing. Doppler and JVA will both indicate slight vibrations. A well adapted 4b will also have the same vibratory signals as a Piper 2, but the 4b will show changes in condylar position on the CBCT, and the MRI will show the disc dislocation.
- 3a This is a partial dislocation of the disc, usually in an anterior medial direction with the lateral ligament being torn or stretched. The joint reduces on opening and will make a vibration, either a click or wobble on JVA. If a 3a is opposite a health joint there is not a change in occlusion so **CT is normal**. A Piper 3a is often contralateral to a 4b. With loss of the opposing disc, the mandible shifts coronally, the CR load zone changes in both joints leading to 3a.
- 3b Same as above except nonreducing and therefore no clicking vibration. **CT is normal**
- 4a The disc is fully displaced off the head of the condyle and reduces on opening. There will be a shifting of the mandible which can be seen on the CBCT, **Condyle not centered in fossa**. Clinically there will “click or wobble” vibration as the disc reduces and subluxates. While most vibrations are in the audible range some may not be. These will be detected with JVA.
- 4b The disc is fully displaced off the head of the condyle and does not reduce on opening. This will look the same on CBCT as 4a, **Condyle not centered in fossa**. While limited opening may occur, many can have a full range of motion. Range of motion should not be a sole determine factor on whether a joint is 4b.
- 5a Osteoarthritis: There will be **changes to the condylar shape and cortex** seen on the CBCT. Osteoarthritis is the inflammatory phase of Osteoarthrosis. Look for missing cortex indicative of active degeneration. The joint will be tender to palpation. An MRI is helpful in detecting extent of inflammation.
- 5b Osteoarthritis: There will be **changes to the condylar shape and cortex** seen on the CBCT. The Cortex however will be intact and the joint will not be tender to palpation. Hypercalcification will be seen having reinforced the damaged areas. There is a loss of congruency as the condyle and fossa wear down and become flattened. Parafunctional tooth grinding increases OA bone wear.





Piper 5a Piper 5b



Coronal View: Normal Sinuses

Axial view: Normal; sinuses
Slightly deviated nasal septum

TMJ Health

Joints are either healthy or damaged. If damaged they will be in one of three states: Actively breaking down, Adapting or Adapted. They can adapt either favorably or unfavorably. The majority of damaged joints adapt favorably. Do not become too focused on the disc. Focus more on:

Can they chew? Ask them

Are the muscles comfortable? Palpate the muscles

Are the TMJ and teeth structurally stable? Cortex intact, condyle seated in fossa, solid occlusal contacts.

Scrolling

All Tissues Coronal View, Sagittal View, Axial View

- ☐ Right = Left

Look at all tissue from all three views. Compare the right and left sides. Look at both at the same time as you scroll, they should be the same. Look for tumors in the Brain, Muscle, Parotid Glands, Submand Glands, Hypertrophy of muscles. Adjusting the contrast can help delineate the soft tissue. Set it back to bone for next step.

All Bones Coronal View, Sagittal View, Axial View

- ☐ Right = Left

Look at all bone from all three views. Compare the right and left sides. Look at both at the same time as you scroll, they should be the same. Look for hypercalcified or radiolucent areas, cysts.

Nasal Sagittal, Coronal views

- ☐ Open

Verify air can get from the front of the nasal cavity to the back. Look for a deviated septum. The tissue on the turbinates will be swollen on one side. This is part of the nasal cycle which switches sides every 2 hours. Both sides should not be swollen.

Sinuses Sagittal, Coronal views

- ☐ Clear

Scroll forward and back in coronal view and make there is a clear path for fluid to drain out of each sinus cavity. The maxillary sinus drains from the top. Verify there is not any thickened tissue lining the sinuses. Look for polyps.

Airway Axial

- ☐ Adequate

Follow airway down from the nasopharynx, to the oropharynx, to the laryngopharynx and look for restrictions. At the base of the tongue the airway should be 10mm+, less than 6mm is problematic.

Teeth Sagittal, Coronal

- .. ☐ No PAP

We are so use to looking at teeth statically, it will take a while to get use to seeing them scrolling. 50% of Periapical Pathosises (PAP) are missed with traditional full mouth series. Be sure to look in the sinus for tissue associated with root tips.

Teeth Axial

- ☐ No Caries

Use the axial view to scroll gingival to the tooth contacts.

Perio Thick Sagittal

- ☐ No Bone Loss

3D Views 3D

Atlas Appears Centered, Level with Skull Base
C2, C3, C4 are aligned.

3D Sagittal view: the maxilla and mandible project adequately and relate to each other.

3D Coronal view: the mandible sits beneath the maxilla. The occlusal plane is level, not canted.

