

THE AUDSS

ARTICULATING PAPER



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Surviving Clinic

We are well into the year now and I am sure that for some of you it has been a rough few months. It's at this point that some of you are maybe getting a little bit nervous about future clinical sessions – I'm looking at all you BDS3 and 4s with shaky hands and flaky patients. I can't make the patients show up but what I can do is give you some advice for that one session where they do.

1. It's all in your head

It's your first clean, filling, crown, exo, etc. and you're losing it, or you've just had your session and it hasn't gone well. But it's all going to be OK – while the patient may never forget their brutalization at your hands, in time you most certainly will.

2. Dry everything

While I'm sure some of you have itchy triplex trigger fingers, I'm positive that most of you think a light breeze is enough to work with. If the patient can swallow, or they're only mildly uncomfortable then it's just not dry enough! Plus if you don't know what you're looking at, 9 times out of 10 all you need to do is dry it out.

3. Fast & the Furious

You're just too slow, unless you've already graduated and are moonlighting as a student for fun. If you're removing caries, don't stop until you get that characteristic feel and sound. But whatever it is you're doing, just go for it. So what if you get a pulp exposure, we have stuff for that, right?

4. Enter the matrix

Did you honestly think that the bent, damaged, poorly contoured matrix would yield a magically deficiency-free margin and ideal contact area? Now your tutor has sat down to re-do your restoration and you're wondering if you should just strangle yourself with the suction and end it all.

5. Scriptwriter

For the love of God, please write a script for what to say during your appointments. Because not only is the patient weirded out by the gibberish pouring out of you, your tutor now has some entertaining stories to tell their mates.

6. Service code cheat sheet

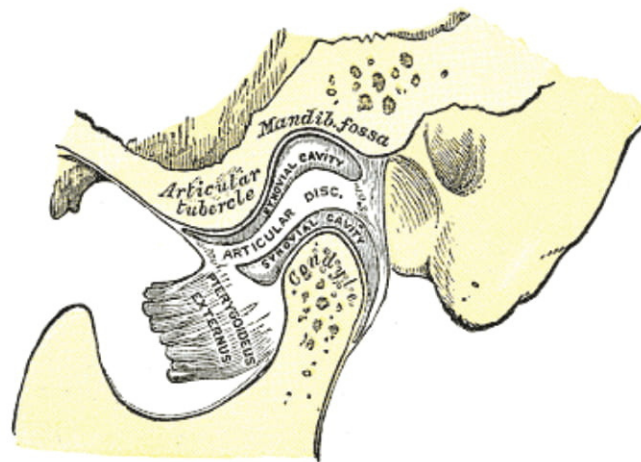
If you haven't already, write up a cheat sheet with all the common service codes. Not only will you trick your tutor into thinking you're a good student, but you might also rediscover your lunch break on those long AM/PM clinic days.

7. Perfect your clinic playlist

There's nothing quite like being roasted to a soundtrack. But in all seriousness, I'm pretty sure my pre-clinic pump-up playlist was single-handedly propping up my mental health during those clinic sessions. Just don't have 'Another One Bites the Dust' in there, take it from me, it won't go down well.



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Cover photograph: Saggital TMJ cross-section showing articular eminence, articular disc and upper and lower joint spaces. This diagram has been reproduced from Gray's Anatomy 20th US edition which has now lapsed into the public domain
<https://wikipedia/commons/9/9c/Gray311.png>

A Student's Guide to Temporomandibular Joint

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1. Background and Summary

Temporomandibular Joint Disorders (TMD) are a major cause of orofacial pain and are associated with significant morbidity and reduction in an individual's perceived quality of life. They are a common presentation in primary care setting, affecting up to 15% of adults, with patients often presenting with a combination of various specific and non-specific signs and symptoms. The proximity of the Temporomandibular Joint (TMJ) to numerous other facial and cranial structures adds complexity to diagnosis and management of this condition.

Patients typically describe pain in and around the TMJ on opening and closing of the mouth, especially during speaking or mastication, with trismus and decreased lateral excursions of the jaw being common complaints. Stress-related parafunctional habits such as night-time bruxism plays a key role in ongoing degenerative destruction of the TMJ, and can result in morning temporal headaches, occlusal attrition and/or masseteric hypertrophy. Patients can also describe periorbital pain, cervicogenic pain and headaches due to pain radiation. Given its anatomical location and shared innervation with the external ear, patients may report otological symptoms such as otalgia, aural fullness, tinnitus,

and subjective hearing loss. A prior history of orthodontics, jaw malocclusion, trauma, and posterior dental height loss should be investigated in the history. Other conditions such as fibromyalgia, obstructive sleep apnoea, and mental health conditions such as anxiety or depression are consistently associated with TMD.

Physical examination should include thorough palpation of the TMJ and masticatory muscles, including intra-oral palpation of the lateral pterygoid muscle. Approximately 50% of all TMD symptoms stem from masticatory myalgia which can be diagnosed by palpation of trigger points at the jaw, temporal and pre-auricular regions. Mouth opening should be assessed by the clinician. The mean (SD) mouth opening in men is 51.3 (8.3) mm and 44.3 (6.7) mm in women, correlating with a width of three fingers. Mouth opening less than 25mm suggests limitation. The clinician should assess for signs of bruxism (incisal attrition, loss of cusp height of posterior dentition), decreased lateral excursions of the jaw, as well a deviation towards one side on opening. Clicking, crepitus and locking of the jaw should also be assessed. Anterior disk displacement is associated with a single click during mouth opening. A second click occurs when the

Table 1: Differential Diagnosis

Dental Conditions	- Caries - Periodontal Disease
Migraine Headache	
Neurogenic Conditions	- Postherpetic Neuralgia - Trigeminal Neuralgia - Glossopharyngeal Neuralgia
Inflammatory Conditions	- Rheumatoid Arthritis - Parotitis/Parotid Stone - Giant Cell Arteritis
Otological Conditions	- Mastoiditis - Otitis Media - Otitis Externa
Other	- Cervicogenic Neck Pain - Sinusitis - Atypical Facial Pain

Table 2: Red Flag Symptoms Necessitating Urgent Investigation

Persistent and uncontrolled pain
Systemic Illness and Fevers
Weight Loss
Cervical Lymphadenopathy
Concerning intra-oral lesions
Asymmetrical facial swelling
Cranial Nerve Abnormalities
Unilateral hearing loss
Vestibular dysfunction

displaced disk is recaptured during mouth closure, termed disk displacement with reduction. If the articular disk blocks translation of the condyle, the patient is unable to fully open the mouth, termed Disc Displacement without Reduction. Crepitus can occur in patients with osteoarthritis and is a sign of articular surface disruption. An otoscopic examination should be also performed to exclude a primary otological cause, along with a thorough examination of the oral cavity, palpation for cervical lymphadenopathy and cranial nerve examination. A Differential Diagnosis is presented in Table 1, with a list of red flag symptoms which may require urgent investigation presented in Table 2. These require urgent Oral Maxillofacial referral.

2. Functional Anatomy

- Temporomandibular joint is a Diarthrodial synovial joint. There are two joint movements (translation and rotation) occurring in two separate compartments and that one joint movement can't occur without the other.
- Covered by synovial membrane, and joint space is filled with synovial fluid for lubrication, nutrient diffusion, and waste removal.
- The articular surface consists of posteriorly, the convexity of the glenoid fossa, and anteriorly, the convexity of the articular eminence. This defines the extent of the condylar movement.
- Within this joint is the meniscus – it has three parts to it. The variable thickness of the band – thinnest in the intermediate part, thickest and widest in the posterior band – allows the meniscus more flexibility and enables it to alter shape from concave to convex during forward moment. The posterior band is connected to the posterior wall of the glenoid fossa above and to the distal aspect of the condyle through a bilaminar zone.
- The lateral pterygoid muscle has two heads, and the inferior head is the one that's active during opening, protrusion and lateral excursion while the superior head is active during closure to stabilise the condyle/disc assembly up against the eminence.
- The lateral ligament (also called the temporomandibular ligament) is a strong band of fibrous tissue that passes obliquely from the root of zygoma down to the posterior margin of the mandibular neck. It also has some deep fibers that blend into the joint capsule.

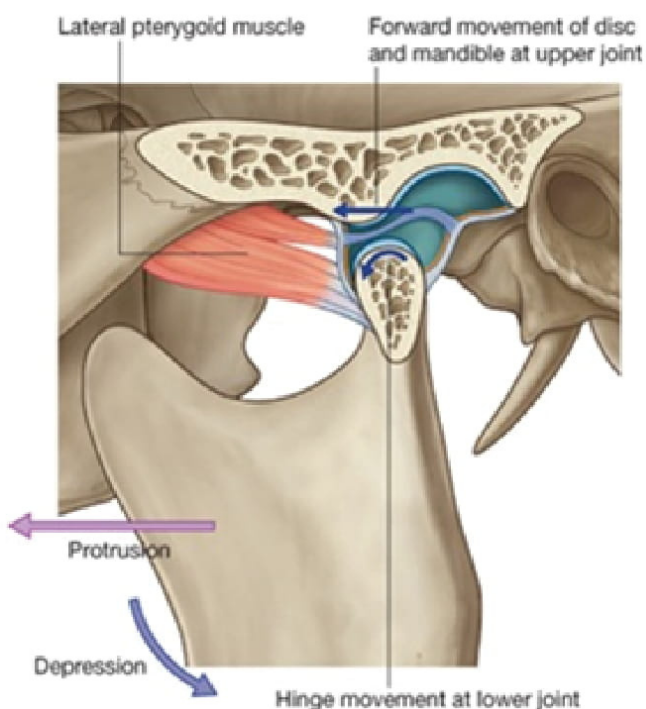


Figure 1: Anatomical relationships in Temporo-mandibular joint⁹

3. Physiology

Physiology - Opening of the Condyle

1

- Inferior lateral pterygoid contracts, causes posterior rotation of mandible (initial 15-20mm of opening)

2

- This increases tension in the lateral ligament

3

- Increased tension in the ligament initiates translation - both disc and condyle moves in the forward and inferior direction against the slope of articular surface. However, the condyle moves faster than the disc.

4

- The limit of forward movement by the meniscus is determined by the bilaminar zone. Limit of forward movement of the condyle is determined by the eminence, meniscus and superficial fibers of lateral pterygoid as they insert into the joint capsule and meniscus.

4. Clinical Examination

Step 1: Pre-examination consultation

- Patient's concerns
- History of complaint
- Medical history
- Explain the steps of today's examinations
- An adapted version of the form for pre-examination consultation is attached in Appendix A

Step 2: Inspection

- Symmetry
- Atrophy of muscles
- Appearance - redness, oedema, scars, visible masses, discolouration

Step 3: Range of movement (ROM)

- Palpation normally follows inspection, but you want to measure the ROM before palpation of associated structures, because palpation causes aggravation of the structures and may limit the ROM.
- Incisal opening:
 - o Seat the patient in the chair
 - o Measure the overbite with Boley Gauge
 - o Ask the patient to open without assistance, and measure from incisal tip of upper central incisor to incisal tip of lower central incisor
 - o Add the overbite to this measurement (lower limit 35mm for females and 40 for males)

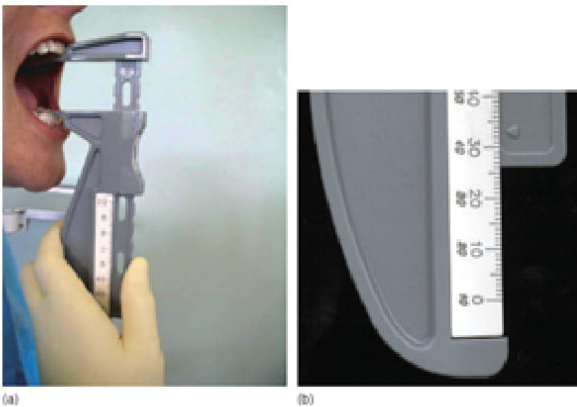


Figure 2: UFO Themes. 2016. 3 Articulatory System Examination | Pocket Dentistry.
[ONLINE] Available at: <http://pocketdentistry.com/3-articulatory-system-examination/>.
[Accessed 11 September 2016].

- Lateral movement:
 - o Seat the patient in the chair
 - o Place the gauge at the midline of upper and lower incisors
 - o Ask the patient to move the mandible to one side to the maximum extent, and measure this movement (lower limit is 7-8mm)

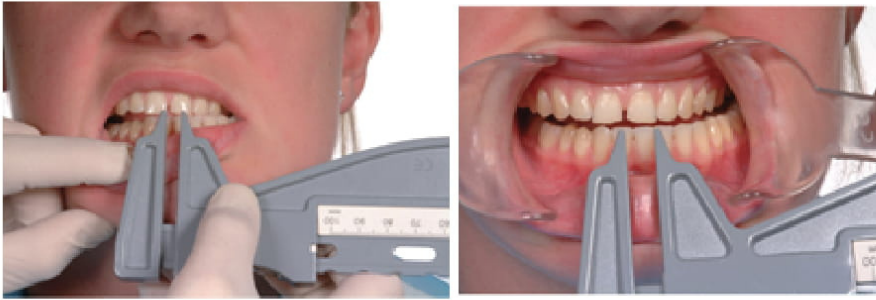


Figure 3: UFO Themes. 2016. 3 Articulatory System Examination | Pocket Dentistry. [ONLINE] Available at: <http://pocketdentistry.com/3-articulatory-system-examination/>. [Accessed 11 September 2016].

▪ Deviation:

o For all recordings, stand in front of the patient to observe for deviation while opening.

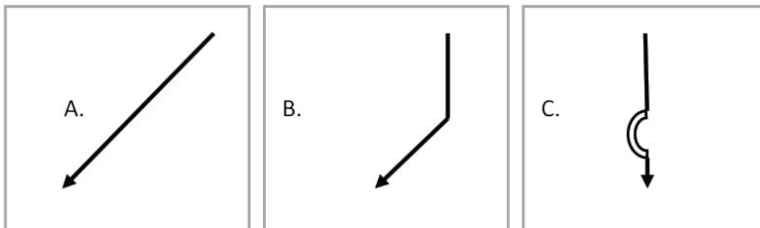


Figure 4: Three types of deviation of Mandible during opening

Figure 4: Three types of deviation of Mandible during opening

A. Adhesions in the joint most likely

B. Vertical until almost the maximum range of opening, antero-medial disc displacement without reduction (this means the condyle cannot move over the disc and slides away from it) most likely

C. Associated with disc displacement with limitation in vertical movement, the condyle having to move 'past the disc' before further opening most likely

Step 4: Palpation

▪ TMJ

- o The disc itself is not well endowed with fibers and joint pain and tenderness relate to problems associated with the bilaminar zone and capsule.
- o Place your little finger in the patient's ear and ask the patient to open and close the jaw. This will ensure proximity to the bilaminar zone and the capsule where most pain fibers are present.
- o Placing your fingers on the lateral surface of the joint has not been found to be as reliable as placing your finger in the external auditory meatus.

▪ Muscles

- o Palpation of muscles is primarily important to identify two things:
 - Whether muscles are referring pain to the head region, especially in the region of temporomandibular joint – Sternocleidomastoid and scalenes due to bad posture of neck
 - As a possible sign of parafunction
- o When you examine the muscles, palpation should be over the origin and insertion of the muscle as the body of the muscle is seldom tender. Muscles have trigger points, and most commonly masseter trigger points can cause referred pain in the maxillary molars, over the angle or body of the mandible and in the supra-orbital region. Palpation of trigger points in the temporalis muscle can lead to referred pain in the supra-orbital region, maxillary molars or in the upper anterior teeth.
- o Masseter and Temporalis are the easiest to palpate comfortably, while medial and lateral pterygoid are inaccessible to comfortable palpation.

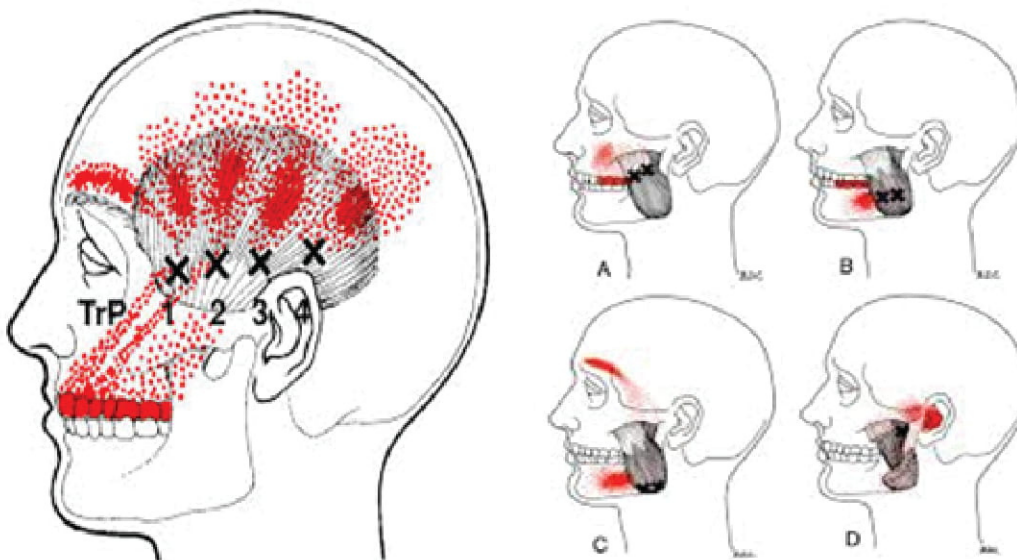


Figure 5: Trigger points in Temporalis and Masseter MyoRehab 2016, Triggerpoints (online), available at: <http://www.triggerpoints.net>, [accessed on 11 September 2016]

o Lateral pterygoid can however be examined by resisted movement.

i. Place your hand under the chin, the other on the head, and ask the patient to open and excurse left and right.

i. Pain on the affected side will be noticed when moving in that direction, especially in pre-auricular region.

o Temporalis is normally tender in those who have bruxism. Other symptoms of bruxism include tooth wear that's unexpected at age, tooth sensitivity, anterior teeth especially. The most reliable signs of bruxism, however, are scalloping of the lateral border of the tongue or ridging of the buccal cheek mucosa along the occlusal line, also known as Oral frictional hyperkeratosis.



Figure 6: Scalloped Tongue - Causes, Pictures, Symptoms, Treatment. 2016. Scalloped Tongue - Causes, Pictures, Symptoms, Treatment. [ONLINE] Available at: <http://heydoctor.org/scalloped-tongue.html>. [Accessed 11 September 2016].



Figure 7: Medscape, 2016 Oral Frictional Hyperkeratosis Clinical Presentation: History, Physical, Causes. [ONLINE] Available at: <http://emedicine.medscape.com/article/1076089-clinical>. [Accessed 11 September 2016].

Step 5: TMJ Sounds

- Stereo stethoscope is the best instrument to listen to clicks and crepitus
- Clicking
 - o Recap – rotation first (no disc movement), then translation (disc moves forward but at a slower pace than condyle)
 - o Antero-medial displacement of disc –
 - i. Causes: hypertonicity of superior lateral pterygoid muscle, injury to bilaminar zone, disc or its attachment
 - ii. The disc is already anteriorly placed stretching the bilaminar zone. When condyle translates, bilaminar zone is stretched further – pressure causes the disc to be pulled backwards suddenly. This sudden opposing movement of condyle and disc produces a click.
 - iii. Reciprocal clicking occurs during both opening and closing phases – due to sudden forward movement of disc due to hypertonicity of superior lateral pterygoid.
 - iv. Earlier the click, milder the displacement.
 - o If clicking is present – the condyle is moving back under the disc and this gives a diagnosis of Disc displacement with reduction.
 - o Multiple clicks – unstable disc, perforations
 - o Normally pain is not associated with clicking. It can be associated with acute disc displacement
- Crepitus
 - o Occurrence of a prolonged continuous noise in the joint during movement
 - o Occurs most commonly in patients with degenerative joint diseases such as osteoarthritis. It could be symptomless or associated with pain
 - o Can also occur with acute inflammation, i.e. after trauma
- Locking
 - o Locking is an ambiguous term. Clinically, it refers to two distinct presentations.
 - o First, in which the patient can open to a limited degree and no further.
 - i. Movement occurs freely up to that point and then the patient will describe a sense of 'sticking' with the joint without pain – Physical obstruction rather than joint pain.
 - ii. In this case, the disc is displaced antero-medially to such a degree that the bilaminar zone is stretched considerably and thinned. The condyle is now situated behind the thick posterior band and the whole disc is bunched up anteriorly. So, locking occurs because condyle is unable to gain access to the under surface of the disc during mouth opening. So, rotation can still occur (initial 15-20mm of incisal opening), but translation is a problem. If this is the case, the joint is called to have no reduction (i.e. the condyle hasn't moved over the disc) hence, the diagnosis is of Disc displacement without reduction.
 - o The second scenario is when the mandible opens and locks temporarily into one position, the patient being unable to open or close the jaw any further. This occurs when condyle gains access to a perforation within the disc and cannot be freed.

Step 6: Occlusion

- The goal of measuring occlusion is to identify problems that may be contributing to the problem and whether there is a need for rearranging occlusion. Rearranging occlusion is a decision that needs to be based on many factors such as the health of rest of the articulatory system, the no. and type of restorations the patient needs, the existing occlusion, your skill and IF you feel the occlusion is interfering with proper functioning of the articulatory system.

- Centric Occlusion (CO): this is the habitual bite, ask the patient to bite like they normally do on the posterior teeth and note the molar class
- Centric Relation (CR):
 - o Patient cannot achieve this by themselves, need passive manipulation by you
 - o In an operator dependent technique, is that you place your fingers on the chin and ask the patient to relax their jaw. You then attempt to close the jaw until the first tooth contact. Repeat this to ensure that you have a reproducible premature contact. Once you find this tooth, note it down. And then observe the movement of mandible from CR to CO and record this.
- Dynamic occlusion includes finding anterior guidance and interferences.
 - o Ask the patient to open the mouth, place an articulating paper on the side from which the patient is moving. The side which the patient is moving to, is the working side. For example, if I'm asking the patient to move the jaw to the right, I'll place the articulating paper on the left side, and ask the patient to move. If the left side teeth show any contact – this is non-working side interference. Next place the articulating paper on the side where the patient is moving. If there is contact in the posterior teeth that is working side interference. We normally are looking for either a contact on canines (Called canine guidance) or anterior teeth (called group function). Any other tooth contact (posteriors) is not ideal.
 - o However, these interferences do not necessarily mean they are a problem for the patient.

Radiographs: Are only warranted when bony problems are suspected. Generally, referral to specialist may be recommended if such is the case.

5. Management

Summary of clinical examination is provided in Appendix C. Diagnostic flow charts from Schiffman et al 2014 are in Appendix D.

First line treatment (conservative management):

1. Reassurance:

- a. Explain the diagnosis and confirm the signs and symptoms (if unable to relate certain signs and symptoms refer appropriately)
- b. Explain what the prognosis of the condition is (90% of patients find relief within 2 weeks of acute symptoms, and 6-12 weeks for chronic pain patients with conservative management, only 10% require surgical intervention)
- c. Explain the 'active' role the patient must play in managing their pain:
 - i. Disciplined routine of exercise
 - ii. Conscious use of jaw
 - iii. Persistence and patience

2. Occlusal splint therapy

- a. Recent Cochrane review found no strong evidence to support its use for TMDs
- b. Limited evidence to compare types of splints
- c. Must only be applied to patients without sleep disorders (Assess patient for risk of OSA using STOP BANG questionnaire and if risks are present, refer for sleep assessment before fabricating this – see Appendix E)
- d. Current understanding (based on Okeson's classic design of splints)
 - i. Type 1: Michigan splint – flat plane, occlusal maxillary splint made with hard material on the outside and soft on the inside, 2-5mm thickness of acrylic, fabricated in the lab.
 1. Take primary impression of maxillary and mandibular arch, as well as RCP bite registration (Refer to BDJ article on centric relation for techniques)
 2. Take secondary impression of maxillary arch and send to lab for articulation and fabrication
 3. Upon insertion, check for retention,

Special note on Imaging & Laboratory Investigations

Imaging studies are organised to assess the integrity of the joint, the dentition and to assess for contributing trauma and rheumatological disorders such as osteoarthritis and rheumatoid arthritis. Initially, TMJ Open and Closed views are organised to assess the relative position of condyle and articular eminence. This does not provide diagnostic value in cases of degenerative changes. In select patients, Magnetic Resonance Imaging (MRI) can be utilised to assess the integrity of the joint, the articular disc, its surrounding structures, and the presence of a joint effusion. Given its high cost, this imaging modality is usually reserved for patients with persistent TMD symptoms where an intracapsular pathology of the TMJ is suspected, and for pre-operative planning purposes organised by specialist Maxillofacial Surgeons¹⁹. When MRI is unavailable, ultrasonography is a non-invasive, cheap investigation to confirm internal derangement of the joint. A rheumatological screen is the most important laboratory investigation to be ordered.

and check for 'discomfort'. Generalised discomfort is normal, however, discomfort around one or two teeth is abnormal and requires relieving as this may actively produce torque and orthodontic movement if not corrected. POI must be given (Example attached in Appendix F)

4. Review patients after 2-3 weeks -> 1 week review is not sufficient as patients will often have discomfort for over 10 days. Review patients for discomfort, sleep pattern, and review of symptoms.

ii. Type 2: Anterior repositioning splint – flat plane, occlusal mandibular splint fabricated with the same material as Type 1, but is placed in a protruded jaw position. Protrusion is 40-60% of maximum protrusion. Do not fabricate this without supervision from an experienced clinician. Suitability includes sleep disorder patients without appliance, disc dislocation.

3. Pharmacotherapy

- a. Topical NSAID treatment supported by Magnesium supplement (in trismus patients) and Glucosamine Succinate supplement (in arthritic patients) is the first line. Topical NSAID allergy is noted and common – in which case Ice pack is the choice of tool.
- b. No other pharmacotherapy currently is approved from TMDs and requires multi-disciplinary assessment before commencing treatment with opioids, and psychoactive drugs.

4. Physiotherapy

- a. Referral necessary for patients with multiple exacerbation episodes
- b. Ensure patient keeps a diary of exercise routine and reassess patient in 2 weeks

Box 6**Patient exercise instructions**

Certain exercises can help to relieve the pain that that comes from tired, cramped muscles. They can also help if you have difficulty opening your mouth. The exercises described here work by helping to relax tense muscles and are referred to as passive stretching. The more often you do these exercises, the more you will relax the muscles that are painfully tense.

Do these exercises 2 times daily:

1. Ice down both sides of face for 5 to 10 minutes before beginning (ice cubes in sandwich bags or packs of frozen vegetables work well for this).
2. Place thumb of one hand on the edge of the upper front teeth and the index and middle fingers of the other hand on the edge of the lower front teeth, with the thumb under the chin.
3. The starting position for the stretches is with the thumb of one hand and index finger of the other hand just touching.
4. Gently pull open the lower jaw, using the hand only, until you feel a passive stretch, not pain. Hold for 10 seconds, then allow the lower jaw to close until the thumb and index finger are once again contacting; it is crucial when doing these exercises not to use the jaw muscles to open and close, but rather manual manipulation only (ie, the fingers do all the work).
5. Repeat the above stretching action 10 times, performing 2 to 3 sets per day, 1 in the morning and 1 or 2 in the evening.
6. When finished with the exercises, moist heat can be applied to both sides of the face for 5 to 10 minutes (heating a wet washcloth in the microwave for about 1 minute works well for this).



Demonstration of a passive stretch using the fingers.

From De Rossi SS, Stern I, Sollecito TP. Disorders of the masticatory muscles. Dent Clin North Am 2013;57(3):449–64.

Role of Botulinum Toxin-A (BTX-A) - after 3-6 months of conservative management

In the past decade, Botulinum Toxin has been increasingly used as an adjuvant therapy for head and neck pain and facial aesthetics, with increasing use in the management of bruxism and myogenic orofacial pain. Botulinum Toxin-A, an exotoxin produced by *clostridium botulinum*, results in decreased muscle contraction by inhibiting acetylcholine release at the neuromuscular junction. The effects are temporary, lasting between 3 to 6 months. BTX-A also has an analgesic effect and a direct effect on peripheral nociceptors and can be used to treat neuropathic pain. A recent Systematic Review concluded that despite showing benefits, clear consensus was lacking on the therapeutic benefit of BTX-A in the management of myofascial TMD. Nevertheless, the review found that BTX-A can improve outcomes in patients with myofascial TMD who have had at least three months of appropriate conservative management.

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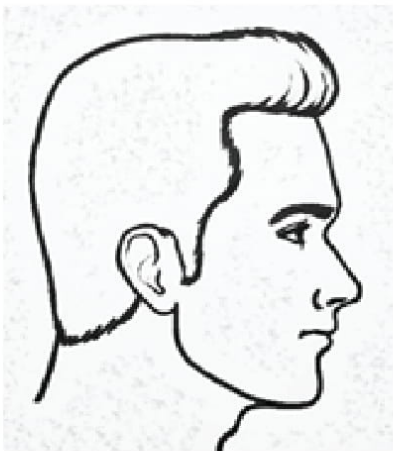
7. Appendices

Appendix A

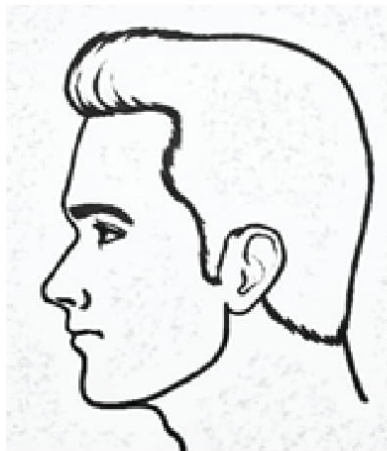
Initial Patient Questionnaire

1. On the diagram, please shade the areas of your pain:

Right



Left



2. When did your pain/problem begin?

3. What seemed to cause it to start?

4. What makes it feel better?

5. When is your pain the worst?

- a. When you first wake up
- b. Later in the day
- c. No daily pattern
- d. Other

6. What describes your pain the best?

- a. Ache - common
- b. Pressure - common
- c. Dull - common
- d. Sharp – Occurs sometimes with lateral pterygoid muscle
- e. Throbbing – Occurs in one of three situations (most often not with TMD)

- i. Dull, ache or pressure escalating to throbbing
- ii. No dull, ache or pressure – may not be associated with TMD
- iii. Referred tooth pain
- f. Burning – may be suggestive of neuropathic pain
- g. Other

7. Does your pain increase when you drink hot or cold beverages?

8. Please circle the number below to indicate your present pain level:

(no pain) 0 – 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10 (Worst pain imaginable)

9. Do your jaw joints make noise?

- a. Right
- b. Left

10. Have you ever been unable to close your mouth?

- a. Opening over 45mm -> condyle was probably in front of eminence
- b. Opening between 10-35 mm -> condyle was probably unable to get under the posterior band of the band
- c. At opening less than 5mm -> lateral pterygoid myospasm is likely

11. How often do you feel stressed in the day?

12. Are you aware of any oral habits such:

- a. Chewing cheeks
- b. Chewing objects
- c. Biting nails
- d. Thrusting your jaw
- e. Clenching
- f. Grinding

Adapted from: Wright EF, 2005 Manual of Temporomandibular Disorders, 1 Edition, Wiley-Blackwell.

Appendix B

TMJ Examination		
Range of motion	(Vertical)	(Lateral)
Tenderness to palpation	(R)	(L)
Joint Sounds		
Clicking	(R)	(L)
Crepitus	(R)	(L)
Locking		
Pain on:	(Opening)	(Closing)
Pathway of opening	(R)	(L)

Muscle Examination	R	L
Lateral Pterygoid		
Origin of Masseter		
Insertion of Masseter		
Origin of Temporalis		
Insertion of Temporalis		
Bruxism signs	(Tongue Scalloping)	(Cheek ridging)
Signs of tooth wear		

Occlusion	R	L
Skeletal Class		
Angle Class		
Is centric occlusion in centric relation?		
If not, premature contact in centric relation?		
Direction of slide?		
Non-working side interferences		
Working side interferences		
Canine guidance/group function?		

Appendix C

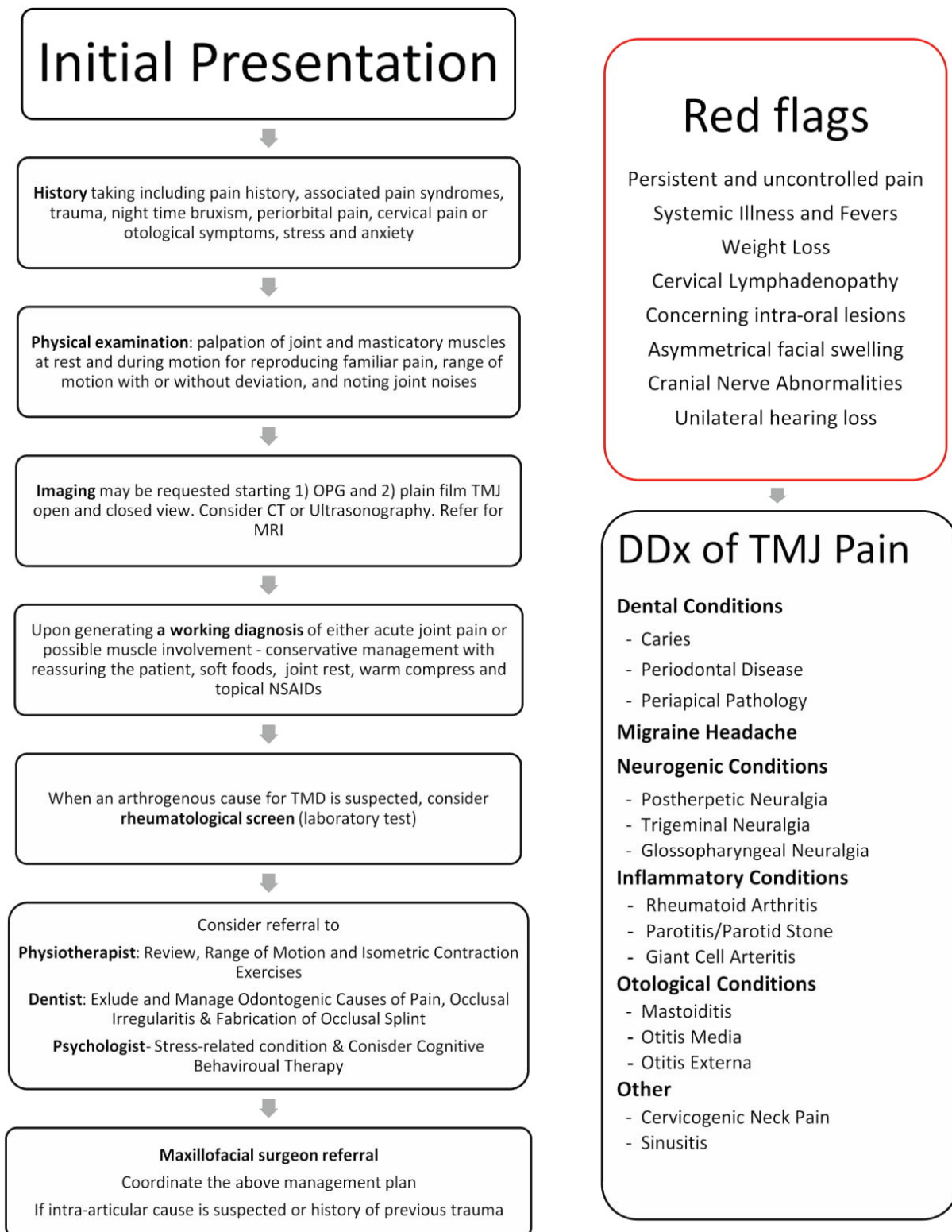
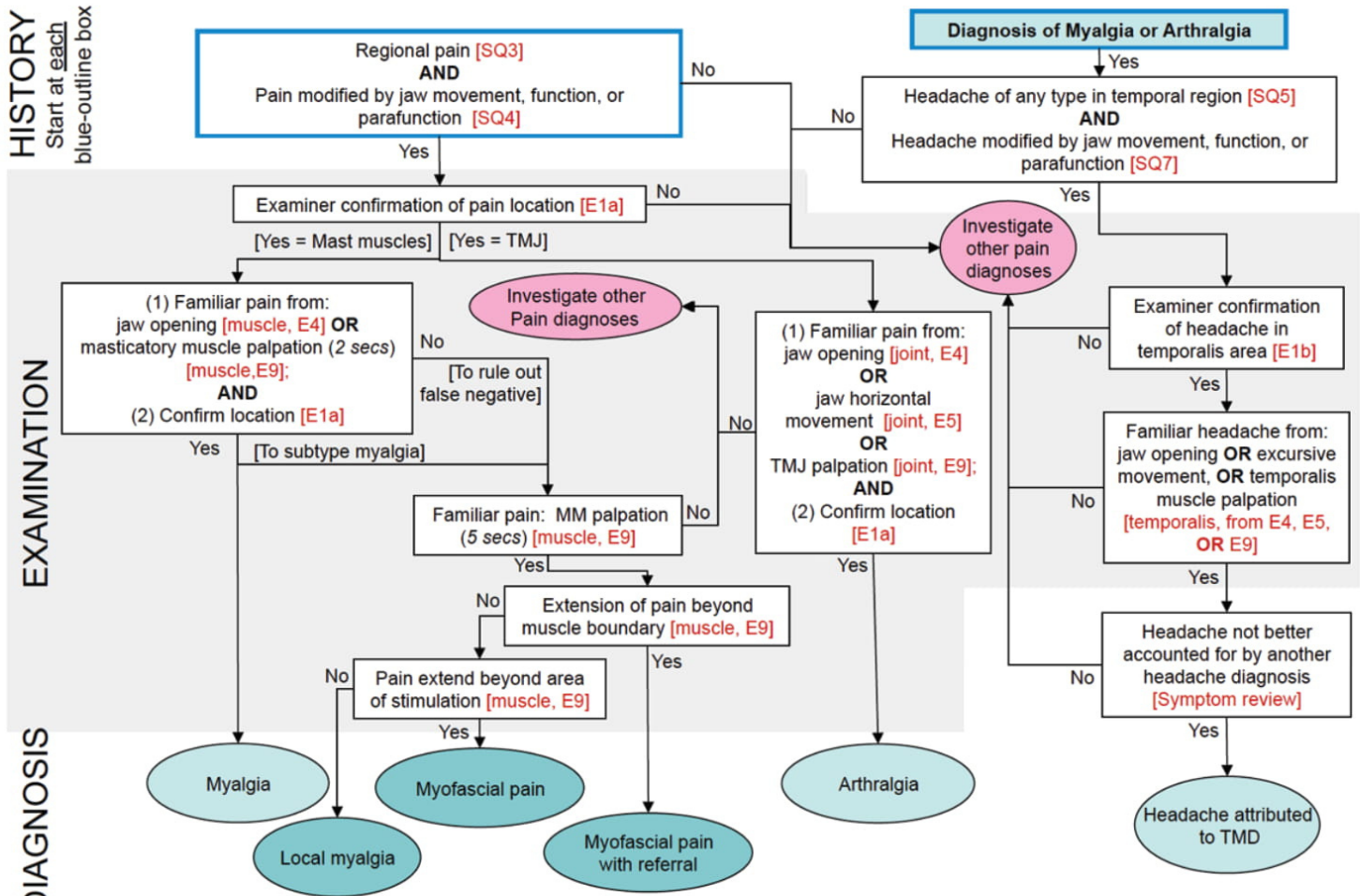


Figure 1: Pathway for patient management for primary care provider - Initial investigations and conservative management options for TMDs are optimally performed concurrently for all patients; Red Flags for Referral & Differential Diagnosis of TMJ Pain

Appendix D

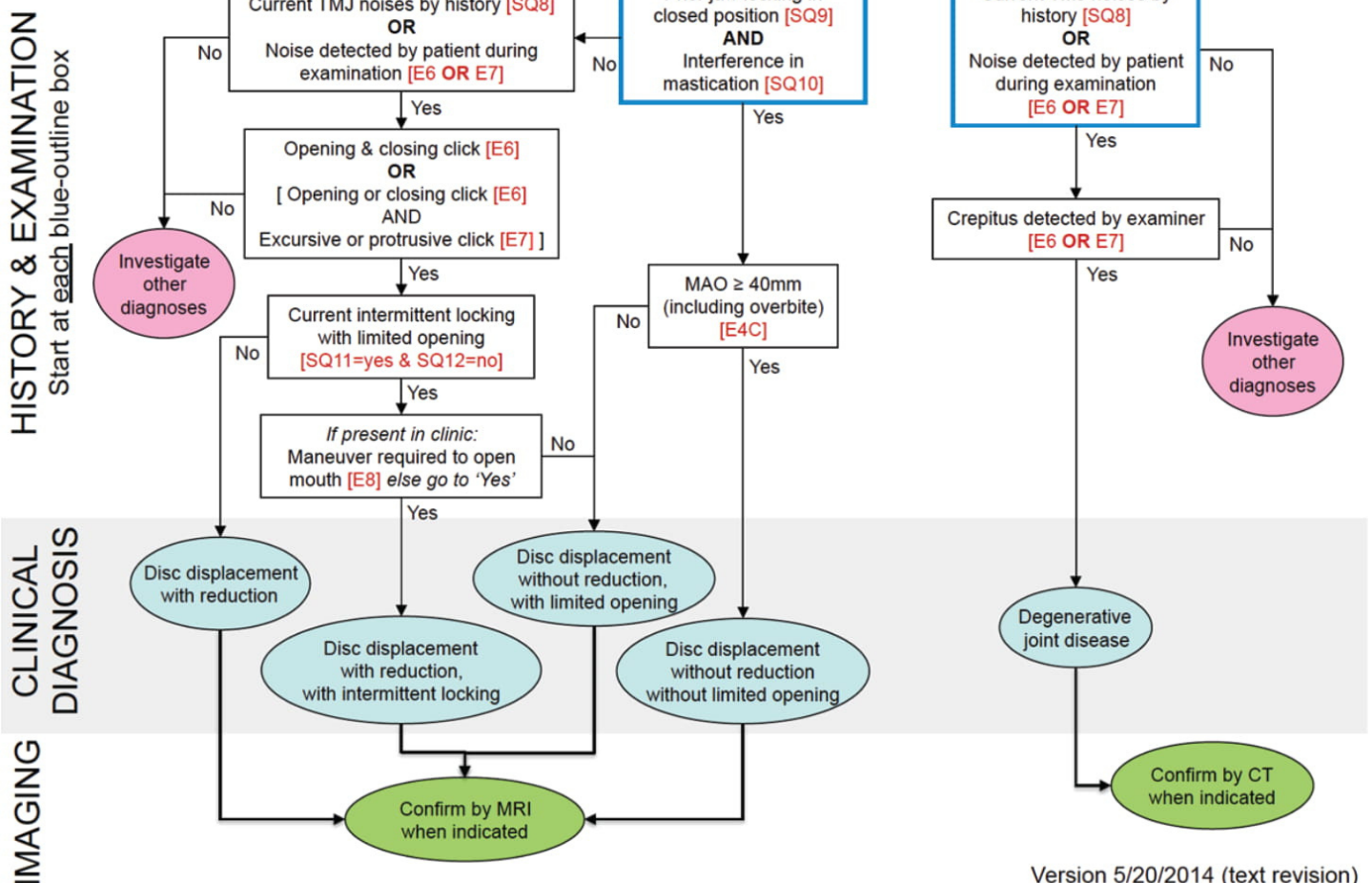
Diagnostic Criteria for Temporomandibular Disorders (DC/TMD): Diagnostic Decision Tree

Pain-Related TMD and Headache



Note: 2 secs palpation is sufficient for myalgia; 5-secs is required for subtypes

Version 5/20/2014 (text revision)



Version 5/20/2014 (text revision)

Appendix F

Occlusal Splint Post-op Instruction Sheet:

- Wear it every night
- You will expect muscle ache for up to two weeks
- If it is tight around any one tooth – kindly ring your Dental Surgery for adjustment
- Clean it with soap/baby toothpaste/polident paste/polident tablet/sterident and water and not toothbrush and toothpaste as they can scratch the surface
- These need to be replaced when sufficient wear has been observed on it – bring it to your routine dental appointments for adjustments/repair
- If you notice them being loose – kindly refrain from use and ring your Dental Surgery for adjustment

Appendix E

Updated STOP-Bang Questionnaire

Snoring?

- Yes No
 Do you **Snore Loudly** (loud enough to be heard through closed doors or your bed-partner elbows you for snoring at night)?

Tired?

- Yes No
 Do you often feel **Tired, Fatigued, or Sleepy** during the daytime (such as falling asleep during driving or talking to someone)?

Observed?

- Yes No
 Has anyone **Observed** you **Stop Breathing** or **Choking/Gasping** during your sleep?

Pressure?

- Yes No
 Do you have or are being treated for **High Blood Pressure**?

Body Mass Index more than 35 kg/m²?

- Yes No

Age older than 50 year old?

- Yes No

Neck size large? (Measured around Adams apple)

- Yes No
 For male, is your shirt collar 17 inches/43 cm or larger?
 For female, is your shirt collar 16 inches/41 cm or larger?

Gender = Male?

- Yes No

Scoring Criteria:

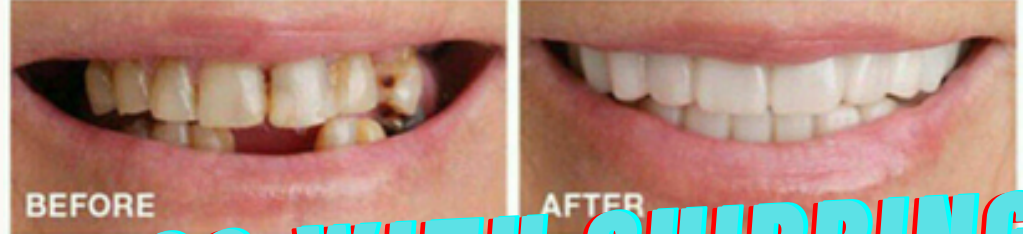
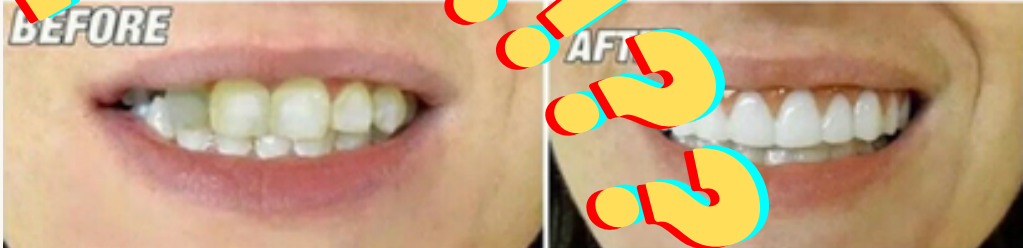
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Manual dexterity.

Manual dexterity is “the ability to use your hands in a skillful, coordinated way to grasp and manipulate objects and demonstrate small, precise movements.”

Manual dexterity combined with visual acuity and depth perception has an undeniable influence on clinical outcomes as most dental procedures require precise work on a small scale. This raises two questions: How important is manual dexterity for clinical outcomes? And, is manual dexterity innate or can it be improved?

It is a common observation that students progress at different rates on clinical tasks and some dentists show an abundance of technical skill. In the book *Hereditary Genius* (1869), Francis Galton proposes that there is an innate limit for our physical and mental capacities, an idea that is quite compelling when looking at elite performance in many domains. Some surgeons in training programs hold the belief that students need to arrive with the baseline skills, both technical and mental, and that they can tell who will not make it. *Is this harsh reality true?*

Luckily, patient outcomes also depend on non-technical skills such as knowledge, decision-making and communication skills. A study¹ that examined the influence of visuospatial ability and manual dexterity on surgical performance across 3 levels of expertise (dental students, surgical residents, and staff surgeons) concluded that “among novices, visuospatial ability was associated with improved performance on spatially complex surgical procedures, but not in advanced trainees and experts, suggesting that practice and surgical experience may supplant the influence of visuospatial ability over time.”

A second study² of applicants to an otolaryngology (ENT) residency who were made to do soap carvings during the interview showed that there was no significant difference between individuals with the best soap carvings and those with the worst soap carvings and both groups had many people go on to become ENT surgeons. Even if manual dexterity is not the sole factor for clinical success, if you want to be the best clinician possible then you will want to have complete control over your hands. *Can manual dexterity be improved?*

Medical and dental schools across the world have reported a marked decline in the manual dexterity of students and residents. Some blame the lack of hands-on courses in schools (drawing, painting and music) while others blame too much time spent tapping and swiping screens. Picking up hobbies such as drawing, painting, sculpting, knitting, or learning a musical instrument, particularly one that requires extensive hand-eye coordination (e.g. piano, violin), can help you fine-tune your motor skills. The development of psychomotor skills occurs more rapidly during childhood which explains why certain people have an easier time in dental school.

Even as an adult, psychomotor skills can be improved. The three-phase theory of motor skill development begins with a cognitive phase (when a skill is being understood and practiced and errors are made), then an integrative phase (when the skill is performed with increasing fluency) and finally an autonomous phase (when the skill requires little conscious effort to perform). This automaticity of motor skills frees up the clinician to multi-task, problem solve and make decisions without compromising care. *How can we reach our potential?*

Deliberate practice makes perfect. That is, identifying flaws and critiquing your technique and then creating strategies to overcome these issues and progress your technical skills. For this reason, loupes which help you look at your work more closely as well as improve visual capacities can be a useful aid. Equally important is being resilient and optimistic, patient and calm, and persevering through difficulties. It is difficult to know where the ceiling of your talent is, but, it is a fact that what makes a great dentist is unrelenting practice.

¹ Wanzel KR, Hamstra SJ, Caminiti MF, Anastakis DJ, Grober ED, Reznick RK. Visual-spatial ability correlates with efficiency of hand motion and successful surgical performance. *Surgery*. 2003 Nov;134(5):750-7. doi: 10.1016/s0039-6060(03)00248-4. PMID: 14639352.

² Tang CG, Hilsinger RL, Cruz RM, Schloegel LJ, Byl FM, Rasgon BM. Manual Dexterity Aptitude Testing: A Soap Carving Study. *JAMA Otolaryngol Head Neck Surg*. 2014;140(3):243-249. doi:10.1001/jamaoto.2013.6456