

# **INTERNAL DERANGMENTS OF THE TEMPEROMANDIBULAR JOINT**

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## **Definition and Introduction**

Internal derangements are defined as abnormal relationship of the disc with the condyle, articular eminence glenoid fossa as said by Dolwick.

- Internal derangement implies mechanical disturbance of normal function.
- Whether associated with pain or not depends upon adaptive capacity of the patient.
- As described by Moffet degenerative joint disease is a pathological common pathway for all disease injuries and derangements that affect joint during its life cycle.
- Ireland in 1951 described how or disc displacement of the temporomandibular joint could create clicking sounds and progress to locking of joint.
- Internal derangements are irreversible structural changes which take place within the joint.

## **Etiology**

### ***1) Acute macrotrauma***

Mainly, involves an external source of injury to the TMJ such as blow to mandible. With trauma to the mandible the extent of damage depends upon magnitude and direction of source of impact.

### ***2) Chronic microtrauma***

Microtrauma involves source of low grade trauma to the TMJ over a longer period of time. Included in this category are forces that overload the joint complex or disturb normal relationship of the condyle disc and eminence Bruxism and clenching can have a destructive effect on TMJ through excessive overloading.

### ***3) Degenerative joint diseases***

### ***4) Developmental anomalies***

- a. Hyperplastic and hypoplastic, condyles

### ***5) Skeletal fascial asymmetry***

### ***6) Endocrine and nutritional disturbances***

### ***7) Tumors***

## **Classification of Internal Derangements**

### *Deviation in form*

- a. Frictional disc incoordination
- b. Articular surface defects
- c. Disc thinning and perforation

### Disc displacements

- a. Partial antromedial disc displacement
- b. Antromedial disc displacement with reduction
- c. Antromedial disc displacement with intermittent locking
- d. Antromedial disc displacement without reduction
- e. Antromedial disc displacement with perforation of retrodiscal tissue.

## **Adhesive disc hypomobility**

### Displacement of disc condyle complex

- A – Subluxation
- B – Dislocation

## **I. Deviation in Form**

### ***A. Frictional Disc Incardination***

Excessive pressure may exhaust the lubrication on the articular surface of the eminence or disc and may cause roughness on superior surface of the disc or physical adhesions between disc

and the eminence. This condition may result in occlusal disharmony that displaces the disc condyle assembly during clenching. Bruxism, excessive biting force and trauma are also other causes. Thus when translating cycle begins the disc may stick to eminence and become immobile.

### ***B. Articular Surface Defects***

A structural defect located on the articulating surface of the eminence or superior surface of the disc. Both may cause impediment to normal translatory movement of the disc the defect may be caused due to trauma to the mandible when teeth are apart or due to developmental disturbances.

### **III. Disc Thinning and Perforation**

Excessive pressure on TMJ can cause deformation of joint structures. If overloading occurs if teeth are together thinning of central part of disc can occur. Continuous pressure can eventually cause perforation which usually occurs as a circular hole with fragmented borders in midbody of the disc. Also fracture of disc leading to degenerative changes in articular surface of the joint have been reported.

## ***B. Disc displacements***

### 1. Partial antromedial disc displacement:

In a healthy individual the centre of posterior band of disc is in 12 'o' clock position on condylar when teeth are occluded. With partial anterior disc displacement the end of posterior band terminates anteriorly to the position on the condyle in a closed joint position. This defect occurs primarily due to thinning of posterior band in combination with minimum elongation of discal ligaments allowing the disc to slide anteriorly. Elongation of disc itself is a common finding.

### 2. Antromedial disc displacement with reduction

Increased elongation of discal ligaments and posterior attachment can allow disc to be displaced antromedially creating obstruction to normal condylar translation. At the same time deformation can occur in part of disc that is placed anteriorly. Thickening and enlargement of posterior band was most frequent type of disc deformation.

### 3. Antromedial disc displacement with intermittent locking

If disc remains displaced for longer period of time the shape of disc changes from biconcave to biconvex making passage of

condyle under disc more difficult. The patient must learn to move the mandible to opposite side in order to activate the retrodiscal lamina. If this condition is untreated then it progress to anterior disc displacement without reduction.

#### 4. Antromedial disc displacement with perforation of retrodiscal tissue

When patient closes his mouth in centric occlusion condyle is usually displaced posteriorly and superiorly. Hence the anterior part of posterior attachment may be subjected to leading. Invariably this leads to structural changes in the posterior attachment. Initially this change may appear as elongation of retrodiscal lamina.

#### 5. Antromedial disc displacement without reduction

As a result of continuous disc deformation along with elongation of disc ligaments and loss of tension at the posterior attachment the disc may remain antromedially displaced creating a CLOSED LOCK.

Contact is lost between condyle disc and articular eminence and the articular disc collapses trapping disc in front of condyle preventing TRANSLATION. There is restricted mouth opening with the deviation of mandibular midline to the affected side. Crepitation

lateral Tenderness of the TMJ and joint pain were most common features.

#### 6. Adhesive disc hypomobility

This happens mainly due to TRAUMA. If trauma is slight only mild surface damage may occur resulting in frictional disc incoordination. A more severe trauma can cause intercapsular bleeding and effusion leading to disc fibrillation and adhesion. The disc gets fixed to the eminence preventing normal translation.

### **INVESTIGATIONS**

- 1) Radiographs
- 2) CT
- 3) MRI
- 4) Arthrograms
- 5) Arthroscopy
- 6) Fluroscopy

**Wilkie's staging of internal derangements of temporomandibular joint**

<b>STAGE</b>	<b>CHARACTERISTICS</b>	<b>IMAGING</b>
1. Early	Painless clicking. No restricted motion	Slight forward disc. Normal osseous contours
2. Early Intermediate	Occasional painful clicking. Intermittent locking Headaches	Slightly forward disc Early disc deformation Normal osseous contours
3. Intermediate	Pain, Joint tenderness Headaches Restricted motion Painful chewing	Anterior Disc displacement Moderate thickening of disc Normal osseous contour
4. Intermediate late	Chronic pain Headache Restricted motion	Anterior disc displacement Marked disc thickening Abnormal bony contours
5. Late	Variable pain Joint crepitus	Anterior disc Displacement with perforation Degenerative osseous changes

## **NON SURGICAL PROCEDURES**

### ***1) Appliance Therapy***

The goal of repositioning therapy is to maintain a normal relationship of disc to condyle when appliance is worn.

- Splints have decreased joint pain during rest, chewing and protrusion.
- Two types of appliances are usually used for treating internal derangements.
  - I. Stabilization splint made in patients habitual arc of closure. The appliance maintains full contact with the opposing teeth in centric occlusion and allows for movements in all directions.
  - II. The other appliance is a repositioning appliance that is usually combination of upper and lower appliance. Upper appliance is worn at night and frequently has repositioning ramp behind maxillary incisors to prevent mandible from retruding. The lower appliance with occlusal indents to guide mandible in to a protrusive position is worn during day.

## ***2) Pharmacologic therapy***

- i. NSAID
- ii. Antidepressants
- iii. Muscle relaxants
- iv. Soft diet along with heat and cold applications

## ***3) Behaviour modification***

- Can be extremely valuable for reducing emotional tension.
- Longstanding stress has been implicated in musculoskeletal pain

## ***4) Physical medicine***

- Electromodality like ultrasound, TENS and iontophoresis are helpful in controlling pain.

## **SURGICAL PROCEDURES**

- 1) Arthrocentesis and lavage
- 2) Arthroscopy
- 3) Discectomy
- 4) Discectomy
- 5) Discectomy with autologous graft disc replacement
  - a. Dermis
  - b. Auricular cartilage
- 6) Discectomy with autologous flap reconstruction
  - a. Temporalis flap

7) Diskectomy with alloplastic disk replacement

8) Condylotomy

## **ARTHOCENTESIS**

It is a hydraulic distension and lavage of upper joint space with a physiologic solution and lysis of adhesions by jaw manipulation.

### **Objectives**

1. Improve disc mobility
2. Eliminate joint inflammation
3. Remove resistance to condyle translation and return to normal function
4. Early physiotherapy
5. Eliminate pain

### **Indications**

All patients who had proved refractory to conservative treatment

1. Medication
2. Bite appliance
3. Manipulation of joint

## **TECHNIQUE**

- Patient is made to lie on supine position with head turned.

- The TMJ movements are palpated on the affected side.
- Two points are marked over the skin indicating articular fossa and eminence.
- Auriculotemporal nerve block injection is given using 0.5ml of 2% lignocaine.
- A 19 gauge 1.5 inch needle is inserted into superior joint space corresponding to posterior mark.
- First needle is inserted about one inch and depth and stabilized.
- Second needle is inserted at second mark corresponding to articulator eminence.
- 10cc syringe is filled with ringer lactate solution and connected to 1<sup>st</sup> needle.
- Solution should freely flow out of second needle.
- Before injection it is made sure that patients mouth is fully stretched open and mouth prop is inserted to maintain it during the procedure.

- Initially solution that will flow out of second needle will be blood tinged but as more and more solution goes in the flow of clear solution will be noticed.
- 1ml of hydrocortisone is injected in to joint space on termination of procedure.
- The needles inserted are then removed.

### **POST ARTHOCENTESIS MEDICATION**

- 1) Diazepam 2.5 to 5 mg at bed time to be taken for 2 weeks with association of bite appliance at night.
- 2) Patient to be kept on soft diet.
- 3) Procedure to be repeated after a gap of one week at least 3 to 4 times with one weeks interval.
- 4) 80% of patients show improvement in pain.
- 5) Clicking disappears in 50% of cases.

### **ADVANTAGES**

- 1) Simple technique
- 2) Minimum instrumentation
- 3) Inexpensive
- 4) Less invasive
- 5) Highly effective

## **ARTHOSCOPY**

TMJ arthroscopy consists of insertion of a specially designed fibrotic endoscope into the joint compartment mainly for observation and therapeutic purpose.

### **Techniques**

- 1) Single puncture for diagnostic
- 2) Double puncture for diagnostic and surgical purpose

### **Indications:**

- i) Disc dysfunction
- ii) Osteo arthrosis
- iii) Synovial disease
- iv) Hypomobility
- v) Hypermobility

## **CONTRAINDICATIONS**

- 1) Regional infection
- 2) Presence of tumor
- 3) Medical contraindications to surgery

## **INSTRUMENTATION**

- 1) Arthroscope
- 2) Fibroptic light source
- 3) Video camera
- 4) Video recorder

## **PUNCTURE INSTRUMENTS**

- 1) 2 cannulas
- 2) Sharp trocon
- 3) Blunt obturator

## **HAND INSTRUMENTS**

- 1) Biopsy forceps
- 2) Biopsy Scissors
- 3) Probe, curved blunt

## **TECHNIQUE**

- 1) A line is drawn from middle tragus of ear to canthus of eye.
- 2) First point is marked 10mm anterior to tragus and 2mm inferior to canthus tragus line.
- 3) This corresponds to maximum concavity of glenoid fossa and point where first puncture is made.
- 4) Another point is marked 20mm anterior to tragus mid portion and 10mm below the canthus tragus line. This corresponds to second puncture in double puncture technique.

## **SINGLE PUNCTURE TECHNIQUE**

- 1-3cc of LA is injected in to the superior joint space using 18-19 gauge long needle from inferior posterior and lateral approach.

## **SURGICAL HAND INSTRUMENTS**

- 1) Probe – used for palpation and hooking the disc
- 2) Knives – For cutting the adhesions
- 3) Yag-laser – To burn, coagulate or vaporize the tissue
- 4) Forceps – use to grab the loose bodies
- 5) Intra-articular shaver system
- 6) Suturing needle

## **USES OF ARTHOSCOPY**

- 1) Lavage
- 2) Lysis of adhesion
- 3) Disc mobility improvement
- 4) Disc suturing for hypermobility
- 5) Biopsy
- 6) Retrodiscal cauterization

- Sharp tracer is inserted into cannular and inserted at first marking to create a puncture.

- Depth of cannula can vary from 5-10mm then trocar can be with drawn.
- Blunt obturator is then inserted and cannula is advanced to gentle of joint.
- Average depth of insertion ranges from 25-45mm. Blunt obturator is then removed.
- Then joint lavage is carried out using RL solution.
- Arthroscope is then inserted for examination.

### **Double Puncture Technique**

- Operative instruments or an orthoscope or outflow cannula can be introduced through second marking point.
- Arthroscopic surgery like incision resection of tissue can be done.

### **COMPLICATIONS OF ARTHOSCOPY**

- I) Inadequate findings
- II) Costly equipment
- III) Vertigo
- IV) Facial paralysis

V) Instrument breakage

VI) Damage to disc

### **DISKPLICATION**

1) Partial

2) Complete

#### ***1) PARTIAL***

Small pie shaped wedge of tissue is removed to facilitate repositioning.

#### ***2) COMPLETE***

Full wedge of retrodiscal tissue is removed and disc is repositioned by suturing the remaining retrodiscal tissue directly to the posterior ligament.

### **DISCKECTOMY OR MENISECTOMY**

It is the removal of central avascular portion of the disc and the area of perforation through the area of perforation through the posterior ligament.

#### **Diskectomy with Replacement**

Autogenous. Allergic and alloplastic materials have been used to replace disc after diskectomy.

### **AUTOGENEOUS**

- 1) Dermis
- 2) Auricular cartilage
- 3) Temporalis fascia and muscle

### **ALLOGENIC**

- 1) Fascia
- 2) Dura
- 3) Cartilage

### **ALLOPLASTIC**

- 1) Teflon
- 2) Acrylic
- 3) Silastic
- 4) Goretex

### **CONDYLOTOMY**

First described by Ward in 1952. It is an osteotomy through condylar neck which is performed through an extraoral or intraoral approach. This procedure releases condyle and allows it to displace anteriorly and sag inferiorly.

Performed with Giglis saw procedure was designed to induce displaced fracture through condylar neck so that condyle would be

repositioned inferiorly and anteriorly. This allows condylar head to sit under displaced meniscus.

### **PROCEDURE**

Costichs needle is passed posterior to ramus with exit point at the coronoid notch care should be taken to ensure that needle is passed in close proximity of lateral.

Surface of condylar neck to avoid entrapping of internal maxillary artery between giglis saw and condylar neck.

## **CONCLUSION**

- Two important factors must be always considered age of patient and circumstances surrounding onset.
- Patients who have had painless reciprocal clicking for many years do not want treatment as they have adapted to their dysfunction.
- The presence of painless reciprocal clicking in a teenager must be carefully assessed. If patient history reveals clicking is occurring with increasing frequency and clinical examination reveals joint and muscle tenderness immediate treatment should be advised.
- Arthroscopic intervention as an adjunct to conservative therapy should always be done.
- All patients regardless of age should be educated with respect to their cond