

Internal Derangement of TMJ

Outline:

1. Definition
2. Wilkes Classification
3. Etiology/pathophysiology
4. Physical findings
5. Non Surgical procedure
6. Surgical procedure
7. Summery
8. References

ID was first described by Hey and Davies“ in 1814 as localized mechanical fault interfering with the smooth action of a joint.

“A disturbance in the normal anatomic relationship between the disc and condyle that interferes with smooth movement of the joint and causes momentary catching, clicking, popping Or locking.”

-Laskin DM Oral Maxillofacial Surg Clin N Am 1994

Internal derangement is defined as any interference with smooth joint movement.

-Oral Maxillofacial Surg Clin N Am 20 (2008)

Disc derangement: A malpositioning of the articular disc relative to the condyle and eminence .

With reduction- The articular disc resumes its normal position on top of the condyle on opening

Without reduction- The articular disc remains malpositioned on opening attempts, resulting in restricted mouth opening in acute cases

Disc adherence - A temporary sticking of the disc either to the fossa or to the condyle

Disc adhesion - A fibrotic connection between the disc and the condyle or the disc and the fossa

Subluxation (hypermobility)- An overextension of the disc–condyle complex on opening beyond the eminence.

Joint dislocation- A dislocation of the entire disc–condyle complex beyond the eminence combined with the inability to return passively into the fossa

Wilkes Classification

Wilkes in 1989, classified ID into 5 stages:

Stage I -Early reducing disk displacement

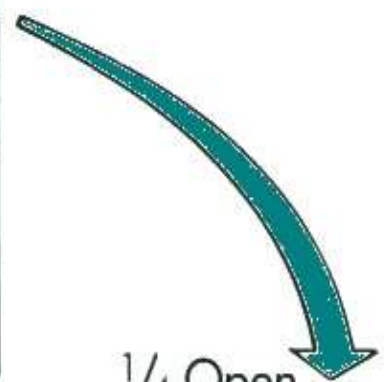
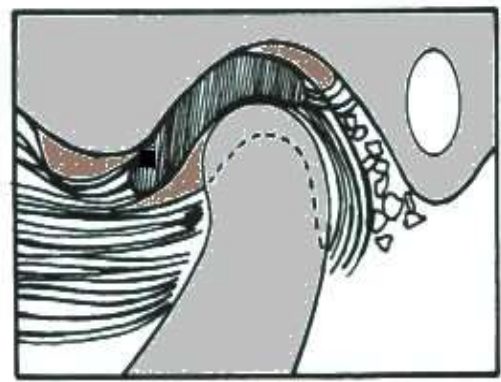
Stage II - Late reducing disk displacement

Stage III - Nonreducing disk displacement—
acute/subacute

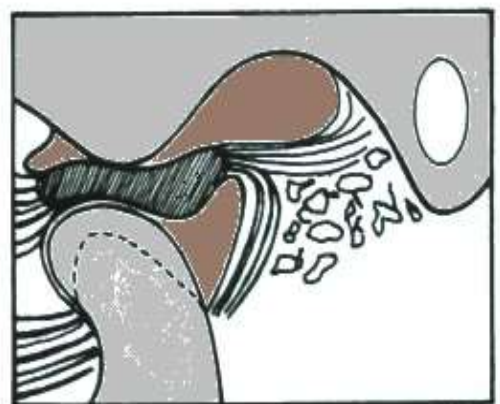
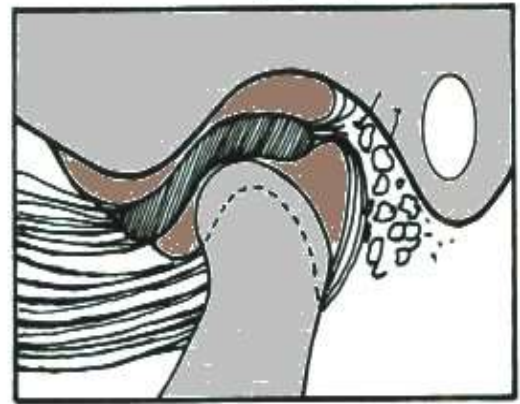
Stage IV - Nonreducing disk displacement—chronic

Stage V- Nonreducing disk displacement—chronic with
osteoarthritis

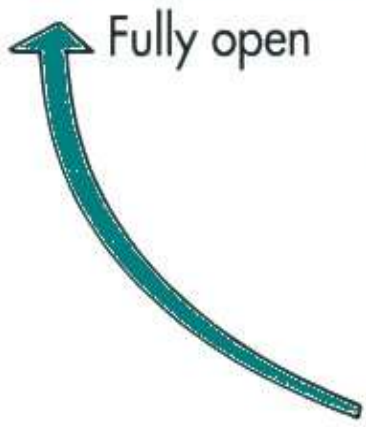
Closed



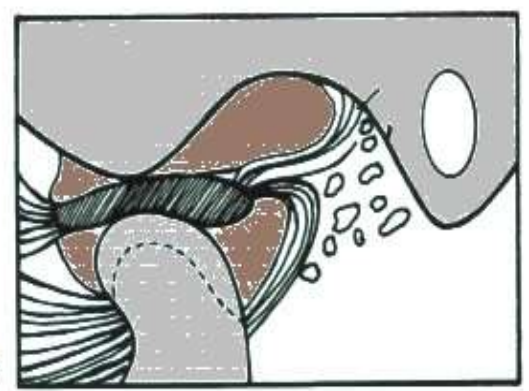
1/4 Open



D



Fully open



3/4 Open

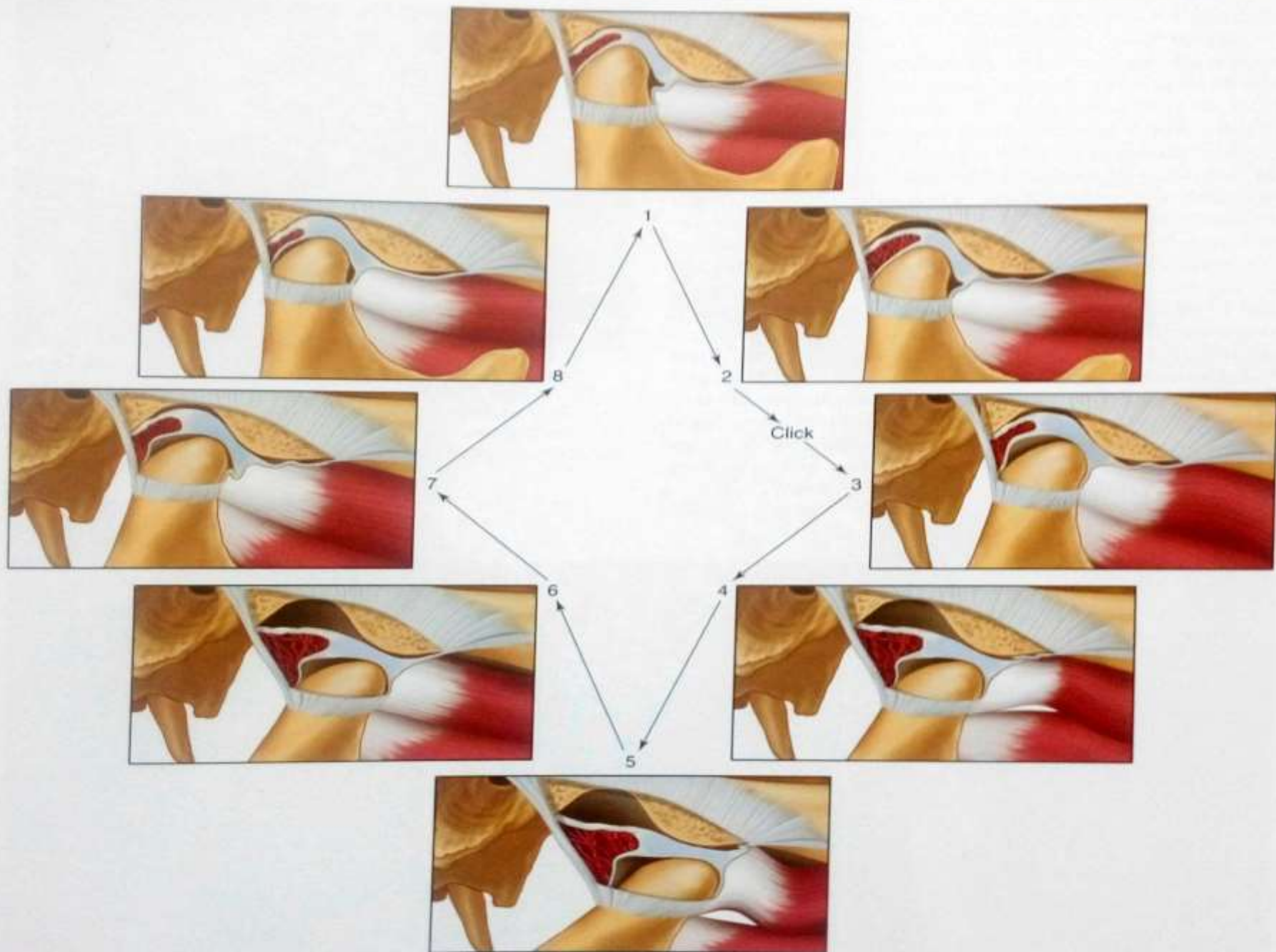


FIGURE 8-8 Single click: Between positions 2 and 3 a click is felt as the condyle moves across the posterior border into the intermediate zone of the disc. Normal condyle-disc function occurs during the remaining opening and closing movement. In the closed-joint position (1) the disc is again displaced forward and

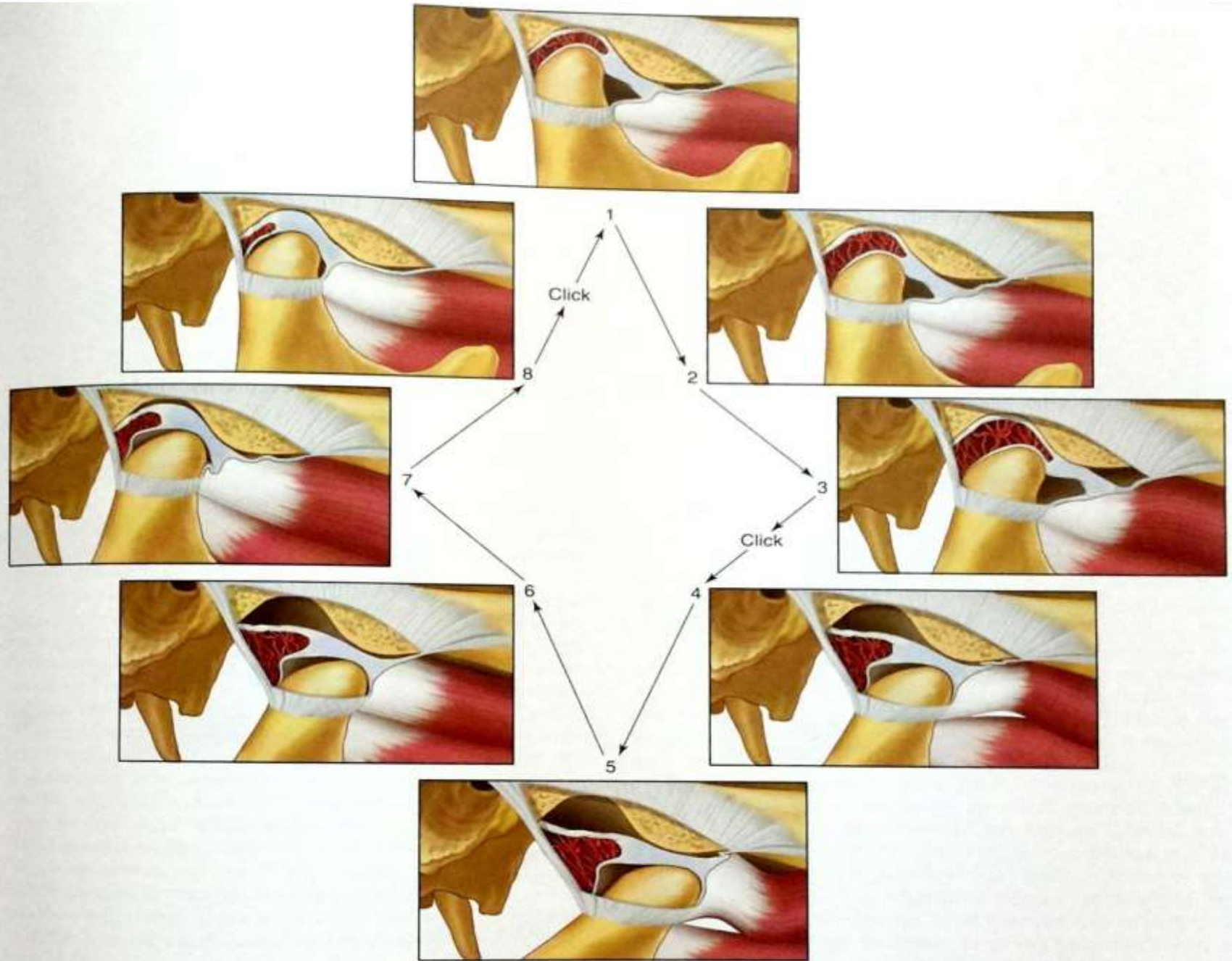


FIGURE 8-13 Functional dislocation of the disc with reduction. During opening the condyle passes over the posterior border of the disc onto the intermediate area of the disc, thus reducing the dislocated disc.

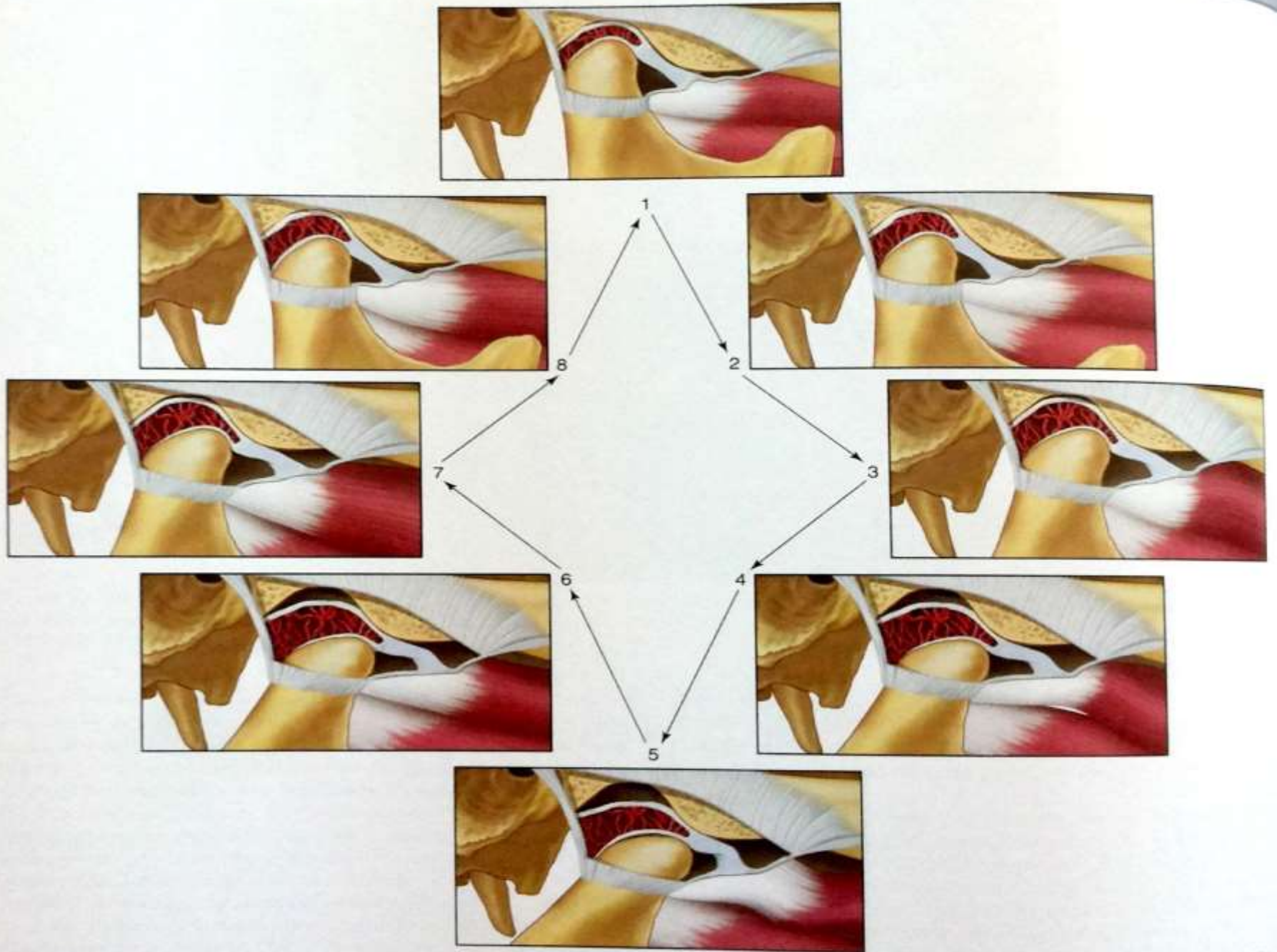


FIGURE 8-14 Functional disc dislocation without reduction (Closed lock). The condyle never assumes a normal relationship on the disc but instead causes the disc to move forward ahead of it. This condition limits the distance it can translate forward.

Etiology/pathophysiology

- Trauma- most common
- **Macrotrauma** -
 - hit or blow to the face,
 - Oral intubation
 - dental/surgical procedures difficult extractions,
 - elongation of ligaments,
 - creating internal joint laxity

Microtrauma

- Application of prolonged repetitive forces, such as in clenching or grinding.
- When the force is within physiologic limits, but is applied to articular cartilage that has a reduced adaptive capability, or when the force exceeds the adaptive capability of normal cartilage, tissue degeneration may ensue.

LOCAL HYPOXIA REPERFUSION THEORY

formation of = neutralizing
free radicals mechanisms

Mechanical loading of the joint

local hypoxia

Reperfusion of hypoxic cells

an explosive increase in free radicals

free radicals may lead
degradation of hyaluronic acid

impair the lubrication of the TMJ

increase friction btw joint
components

adherences or an anchored disc

a disc derangement

crosslinking of fibrinogen and
fibronectin



- **Indirect trauma**
- acceleration-deceleration (whiplash) injuries in the absence of a direct trauma to the face
- **Degenerative joint disease**
- **Lateral pterygoid spasm**
- **Occlusal factors**

Physical findings that may indicate ID are:

1. Opening and reciprocal clicking that do not occur at exactly the same condylar position (stage I or II).
2. Joint tenderness to palpation, especially with function. V
3. Deviation to the affected side until choking occurs. If bilateral clicking is present, deviation may occur to one side until it clicks, and then to the ' other side until it clicks.
4. Deviation of opening (in unilateral cases) with lack of significant palpable translation (stages III—V). -
5. Pain in the affected joint While biting on a wooden tongue depressor.
6. Crepitus, which is often associated with chronic disk displacement, perforation, and degenerative changes (stage V).
- 7- Elimination of pain following local anesthesia of the affected joint.

- The need for imaging confirmation of IDis controversial.
- Panographic imaging is the standard for screening of the jaws, including the general morphology of the condyles.
- The disk-condyle relationship is often obvious from the history and physical examination, especially in stages I and II disease

- The absence of an imaging study may also make it more difficult to identify the disk position in the more chronic cases of stages IV and V, primarily because the mandibular opening is often nearly normal, with minimal deviation or lack of lateralexursions.
- However, it is noted that magnetic resonance imaging (MRI) and arthrography tend to overdiagnose disk displacement.
- Therefore, the clinical diagnosis should be the ultimate determining factor in the decision to perform surgery.

Non surgical treatments

1. Soft diet
2. Application of heat, cold
3. Medications
4. Acupuncture
5. Electromyographic Biofeedback
6. Ultrasound therapy
7. TENS
8. LASER
9. Intraoral appliances
10. Occlusal therapy
11. Patient education

Application of heat and cold

1-Thermotherapy:

It is the application of hot fomentation on the symptomatic area for 10 to 15 minutes, not exceeding 30 minutes.

The primary goal, is to increase blood supply through vasodilatation, leading to decrease pain and joint stiffness.



2-Coolant therapy:

- It is the application of cold fomentation such as ethyl chloride and fluoromethane sprays.
- This intend to decrease pain by numbing the symptomatic area.
- Combination of hot and cold fomentation is helpful.



2. Pharmacologic therapy used to treat symptoms of TMD can be classified into five types:

- 1) analgesics
- 2) Corticosteroids
- 3) muscle relaxants
- 4) anti-depressants
- 5) local anesthetics.

3-Acupuncture:

It is one of the alternative Medicine techniques.

Its action is still unclear, but was successfully used in treating TMD symptoms.



4-Electromyographic Biofeedback:

some emotional states may be associated to muscle hyperactivity, relaxation training assisted by the use of EMG biofeedback, can reduce diurnal muscle activity; thus reducing pain.

5-Ultrasound therapy:

It has the same concept of thermotherapy, but more effective; because it acts on deeper tissues, not just the surface.

Ultrasound not only increases the blood flow in deep tissues but also seems to separate collagen fibers, which improves the flexibility and extensibility of connective tissues, decrease joint stiffness, provide pain relief, improve mobility, and reduce muscle spasm.



6-Transcutaneous Electrical Nerve Stimulation “TENS”:

Electric stimulation devices for treatment of TMD are claimed to have two main purposes; relief of pain and relief of muscle hyperactivity or spasms.



7-LASER “*Light Amplification by Stimulated Emission of Radiation*”:

It has wide application in dentistry.

The only physical risk is eye damage; special eye goggles should be worn for protection.

Manual techniques "Hands on therapy":

These include treatment procedures intended to promote motion and relieve pain in musculoskeletal structures. As

1-Soft tissue mobilization.

2-Joint mobilization.

3-Muscle conditioning.

b) Assisted muscle stretching:

Stretching, to regain muscle length, should be performed with gentle intermittent force that is gradually increased, where pain should not be elicited in this exercise.

Important in management of myofascial pain.



c) Resistance exercises:

Resistance exercises use the concept of reflex relaxation or reciprocal inhibition.

These exercises are useful if the restricted opening is secondary to muscle condition.

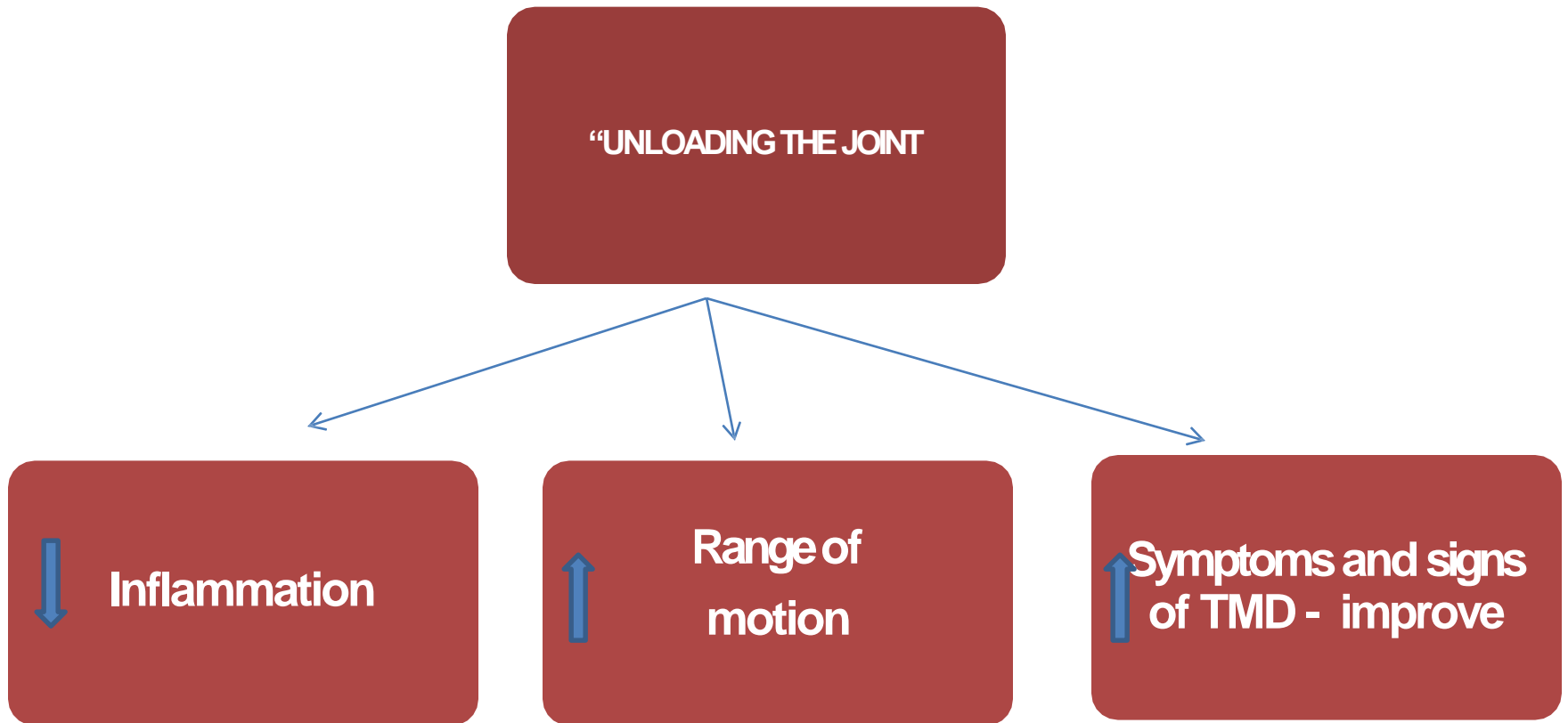
They should not be used for painful intracapsular restrictions; it also should not produce pain which could lead to cyclic muscle pain.



Splint therapy in intracapsular TMD

- **Theory:** mechanically altering the position of the mandible can have two results:
 1. The condylar head being held in a more inferior, anterior position will mechanically persuade the disk to establish itself atop the condylar head in a more favorable position.
 2. The second is that in wearing certain types of splints (i.e., pivotal splint, mandibular anterior repositioning appliance [ARA]) the condyle disk glenoid fossa relationship is “unloaded

The theory hypothesizes:



1- Occlusal Therapy

Types of occlusal splints:

- Although there are many types of appliances, two major types of appliances are commonly used for TMD. **Stabilization splints and anterior repositioning splints.**

a- Stabilization Splint:

- It is a hard acrylic resin, flat plane splint that provides a temporary and removable ideal occlusion.
- Can be made to cover the maxillary or mandibular dental arches; although the former provides more retention & stability.
- patient.

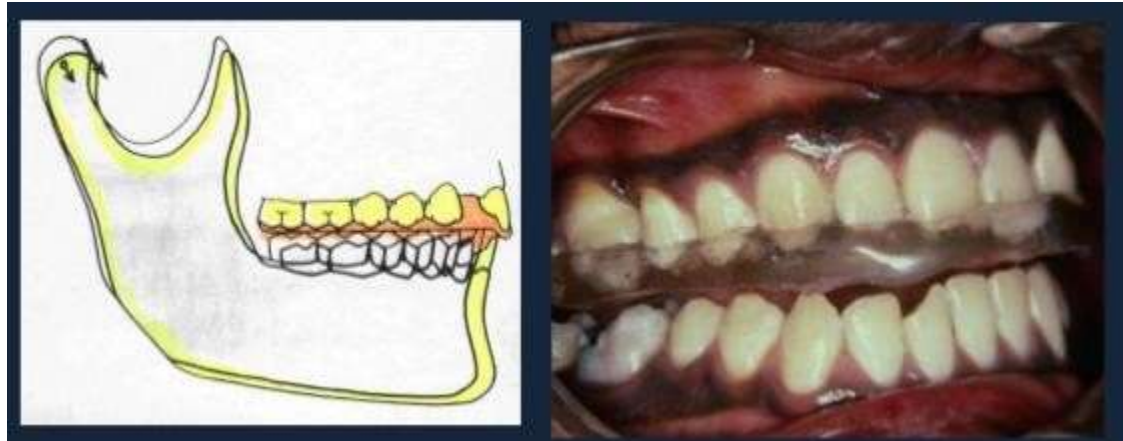


a- Stabilization Splint:

- Stabilization splints are designed to
 - provide stabilization of the joint
 - redistribution of the occlusal forces at the tooth and/or joint level
 - relaxation of the elevator muscles
 - protection of the teeth from the effects of bruxism.

a- Stabilization Splint:

- Myogenous pain disorders respond better to part-time use, so in bruxism it is suggested that patients wear the splint only at night.
- Intracapsular disorders are better managed with continuous use.
- Successful splint therapy needs about two to three months.



b- Anterior repositioning Splint:

It is a full arch hard acrylic interocclusal device that can be used in either arch to encourage the mandible to assume a position more anterior than intercuspatal position.

However the maxillary arch is preferred because a guiding ramp can be more easily fabricated to direct the mandible anteriorly.



Soft or Resilient Splints:

- also known as mouthguard or nightguard.
- It is not as effective in reducing myofascial pain symptoms as is a hard acrylic appliance.



A pivotal type of appliance

- Used to “unload” the temporomandibular joint components and mildly stretch the joint.
- These can be maxillary or mandibular appliances with occlusal contact only in the most posterior tooth.
- They can be designed to be either unilateral or bilateral, depending on the joint components involved in the disorder.



Surgical procedure:

1. Arthrocentesis and lavage
2. Arthroscopy
3. Arthrotomy with disk repair
 1. a. Plication
 2. b. Bilaminar flap repair
4. Arthrotomy with diskectomy
5. Arthrotomy with diskectomy and autologous graft disk replacement
 1. a. Dermis
 2. b. Auricular cartilage
6. Arthrotomy with diskectomy and autologous flap reconstructions
7. Arthrotomy with diskectomy and alloplastic disk replacement
8. Condylotomy

Temporomandibular joint arthrocentesis

- Arthrocentesis consists of TMJ lavage, placement of medications into the joint, and examination under anesthesia.
- It usually is performed as an office-based procedure under local anesthesia assisted with conscious intravenous sedation, although it can be performed with local anesthesia alone

- **success rates - 70% to 90%**
 - Dimitroulis- Br JOral Maxillofac Surg 1995;33:23–6.
 - Hosaka H- Oral Surg Oral Med Oral Pathol Oral RadiolEndod 1996;82:501–4.
 -] Nitzan DW- JOral Maxillofac Surg 1997;55:151–7.
- **primary indication**
 1. painful limited mouth opening
 2. Inflammation in the joint



Arthrocentesis: placement of medication into upper TM joint space after lavage.

The advantages of arthrocentesis

- it is a simple, cost-effective, minimally invasive procedure with little morbidity that can be performed in the office.

No significant complications

- Patients may experience temporary swelling and soreness over the joint area and a slight posterior open bite malocclusion for 12 to 24 hours after the procedure.

Indications for temporomandibular joint surgery

- TMJ surgery is indicated if
 - (1) pain or dysfunction make the condition intolerable,
 - (2) none of the reasonable nonsurgical modalities offers adequate levels of relief, and
 - (3) the intracapsular condition is a major cause of the condition.
- Patient selection seems to be the best determinant of surgical success.

- The first criterion, significant TMJ pain and dysfunction, may be the most important.
- The more localized the pain and dysfunction to the TMJ, the better is the prognosis for a successful surgical outcome
- The more diffuse the pain and dysfunction, the less likely it is that surgical intervention will be successful.

- The second criterion, refractory to nonsurgical treatment.
- Nonsurgical therapy should include some combination of patient education, medications, physical therapy, an occlusal appliance, and possibly, counseling. Most patients respond successfully to this treatment; therefore, surgical consideration is reserved only for patients who fail to respond successfully.
- Surgical treatment is limited to those who have pain and dysfunction that arises from within the TMJ.
- Patients who have pain and dysfunction that arise from the masticatory muscles or other non-TMJ sources are

- The third criterion, imaging evidence of disease, seems to be the most objective; however, imaging findings should not be interpreted in isolation.
- The correlation of imaging findings of disk derangement and osteoarthritis with pain are poor.
- Therefore, imaging evidence should be used to confirm and support the clinical findings. The decision for surgical intervention

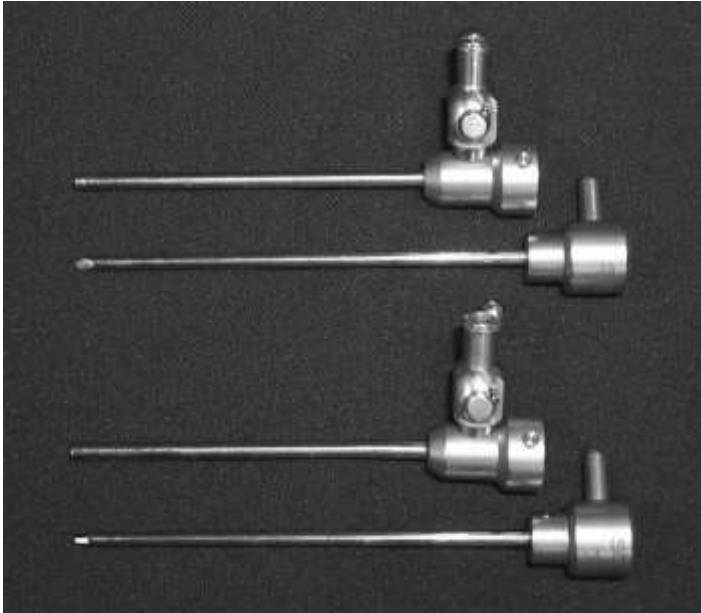
- The procedure that has the highest potential for success with the lowest risks and most cost effectiveness should be chosen for the patient's specific problem.

ARTHROSCOPIC MANAGEMENT

- Arthroscopy simply means “looking into a joint”
- Derived from arthros, which means “joint” and scopien, which means “to view.”
- HISTORY:
- Founder - Dr. Kenji Takagi - 1918, University of Tokyo, first performed in the knee of a cadaver.
- 1937 - presented - poorly accepted.
- 1957 - Dr. Maski Watanabe - atlas of arthroscopy.
- 1970 - Introduction fo fiberoptic light.
- 1971 - Dr. Richard ‘O’ connor - father of modern arthroscopy. - first used as a therapeutic tool - operative arthroscope.

- The first published report of temporomandibular joint arthroscopy was by Professor M. Ohnishi in 1975
- But TMJ arthroscopy did not become popular until reports were published by Dr. Ken Ichiro Murakami in 1981, 1982, and 1985.
- The first published report in the American literature was by Drs. Nuelle, Alpern, and Ufema in an orthodontic journal in 1986
- and the first comprehensive study with results was published by Dr. Bruce Sanders in 1986.
- Arthroscopy is the visualization of a potentially expandable, well confined joint.
- - Diagnostic
- - Operative

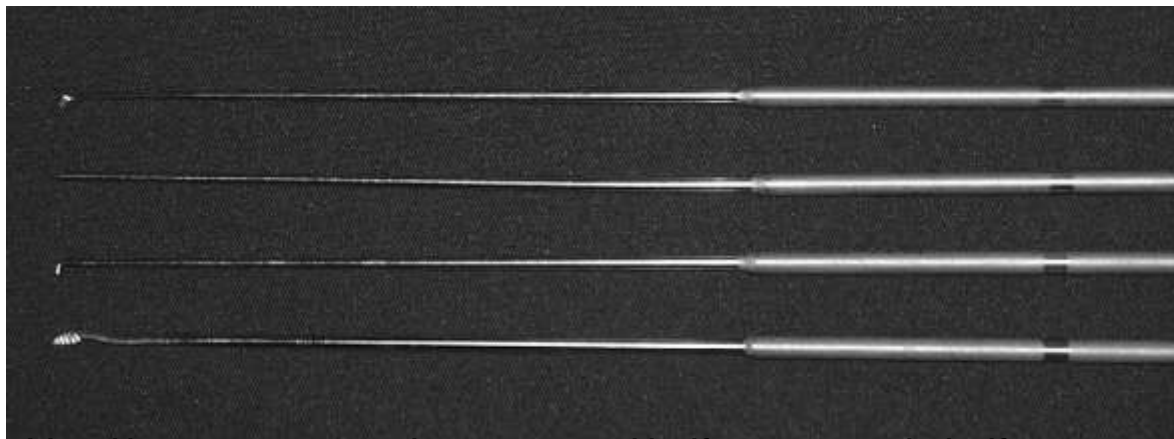
Instrumentation



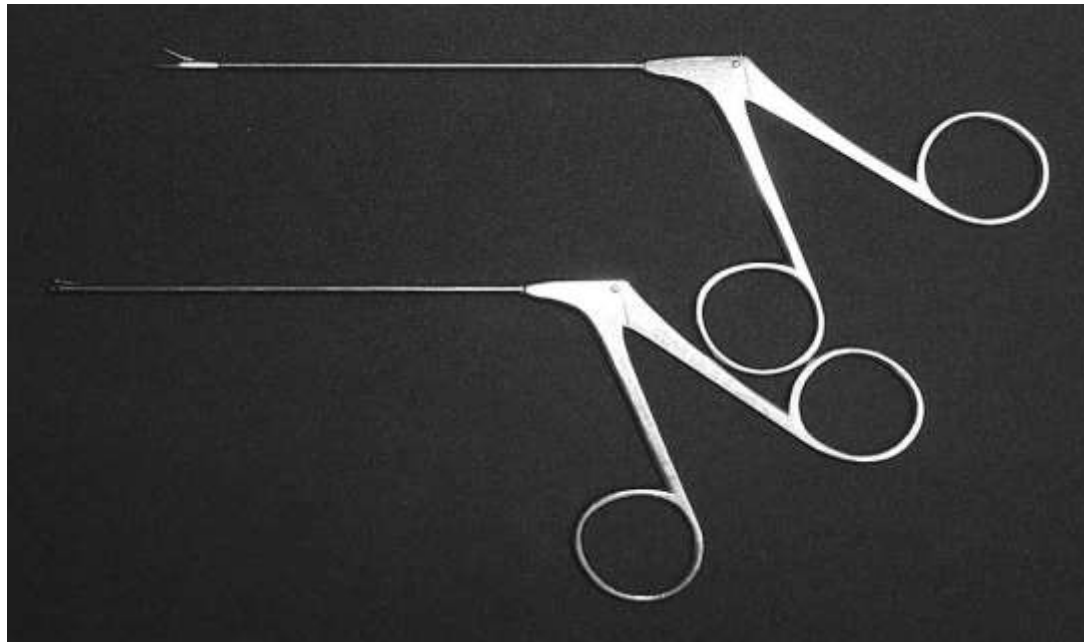
Cannulas with blunt and sharp trocars.



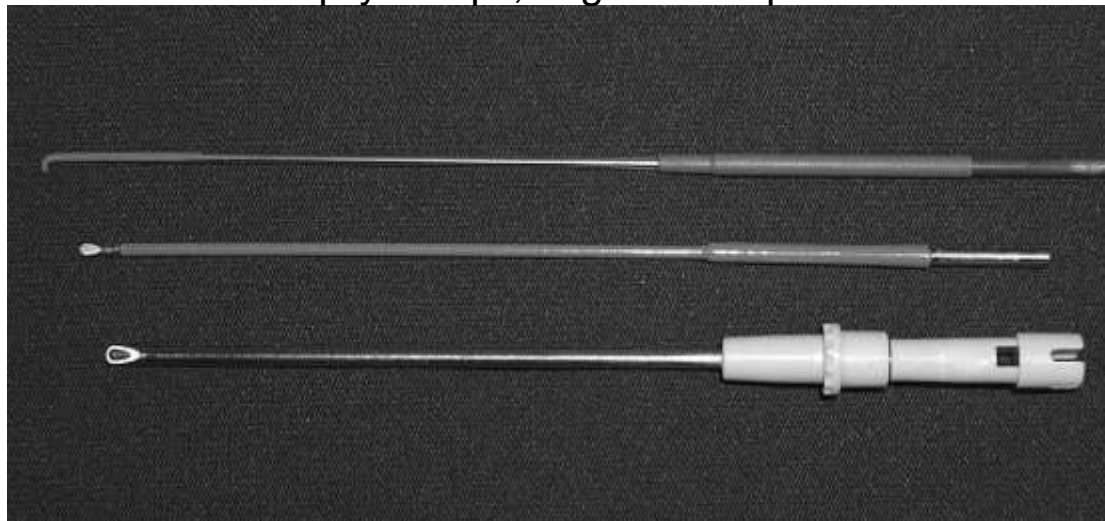
2.3-mm 0 and 30 Stryker arthroscopes.



Hand instruments: probes, serrated knife, retrograde knife.

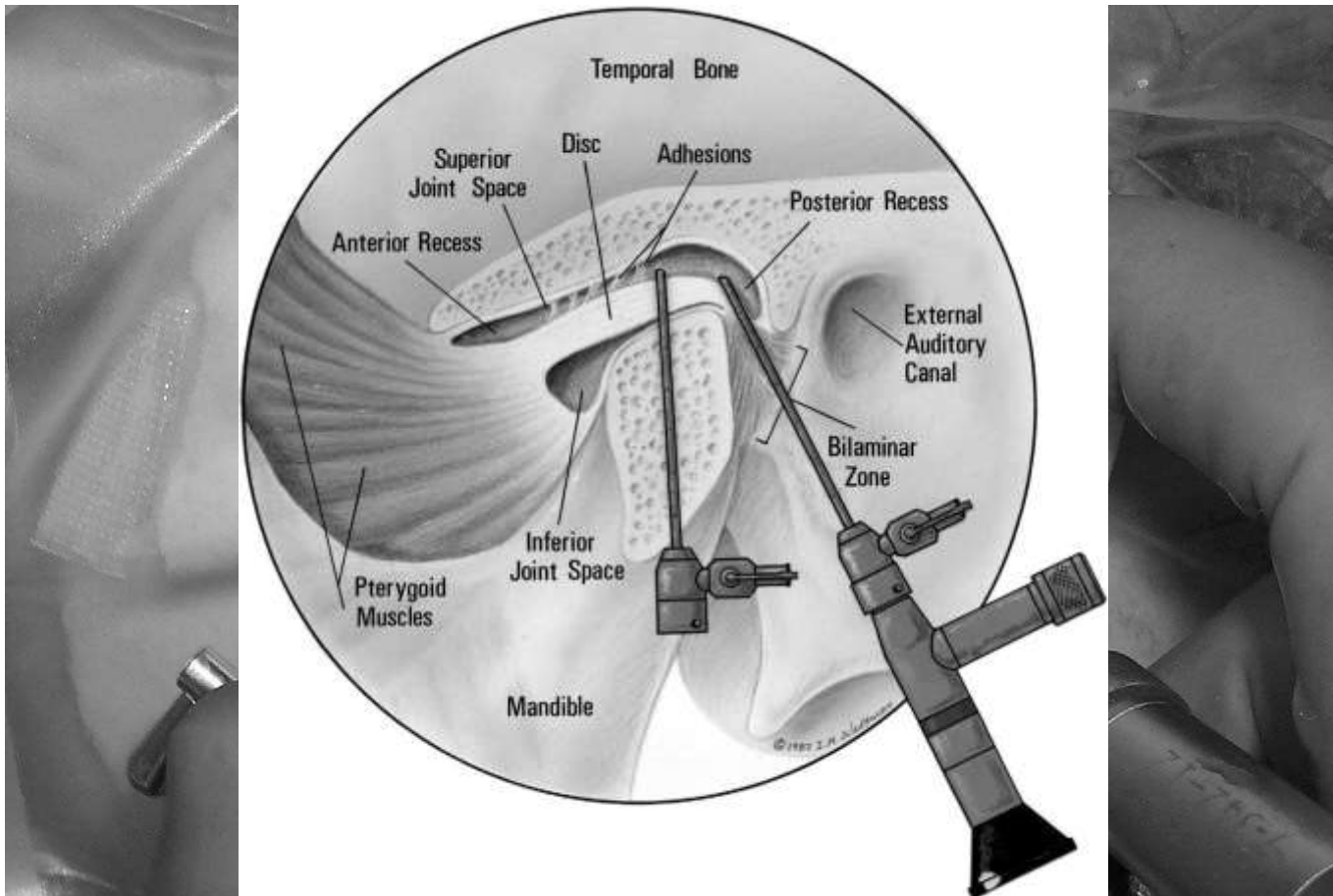


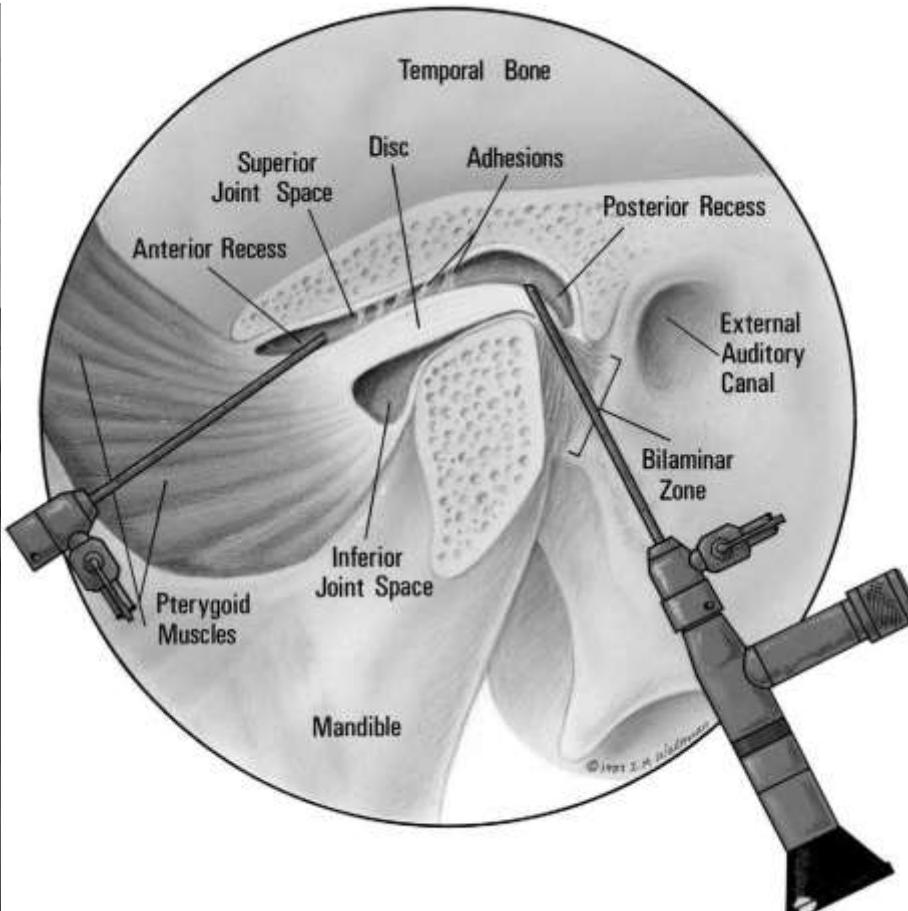
Biopsy forceps, alligator forceps.



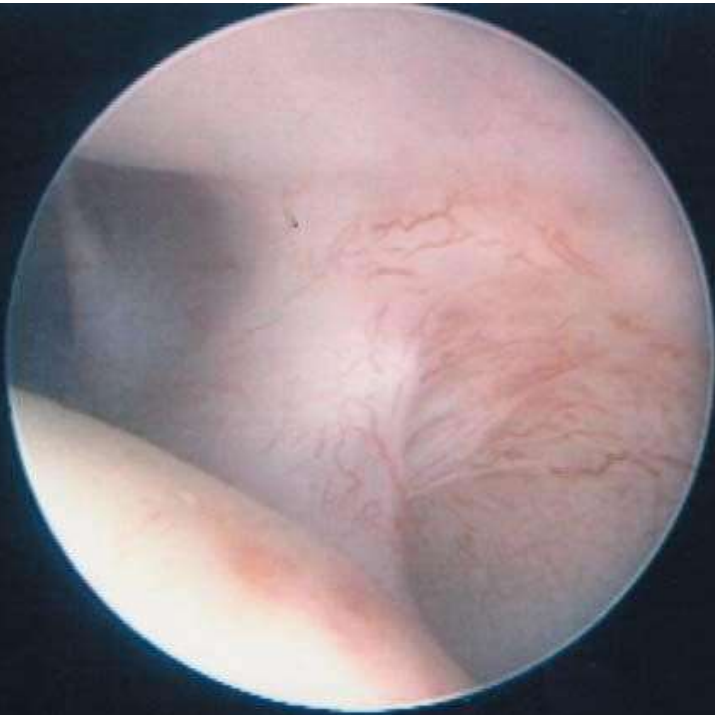
Arthrotome mechanical shaver blade, electrocautery tips with insulation.

Arthroscopic technique





A



B



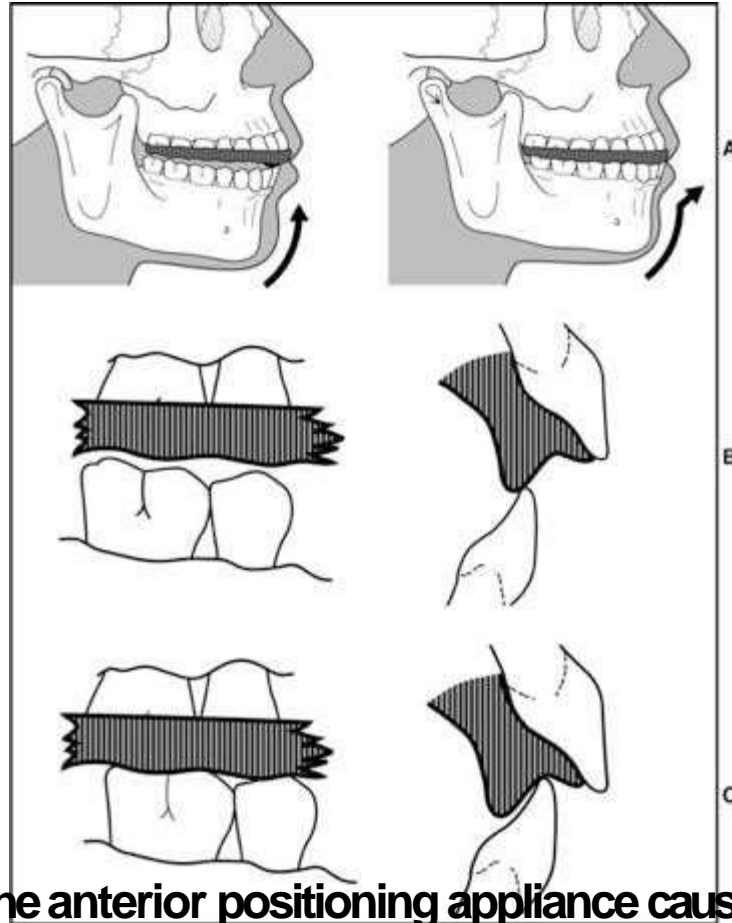


- Wilkes classification
- Flaws:
- JBoundaries between different stages are not lucid JIs it a progressive disorder? JThe criteria used in diagnosis are not provided in measurable forms Li It fails to high lighten the role of psychosocial disorders

- RDC/TMDs
- ■ RDC/TMD is a dual axis diagnostic system for TMDs.
- - It ensures reliable, reproducible and valid criteria with high sensitivity and specificity to define the most common types of TMDs
- RDC/TMDs
- Axis I : psychological status
- ■ Pain intensity • Pain related disability ■ Depression ■ Non specific physical symptoms

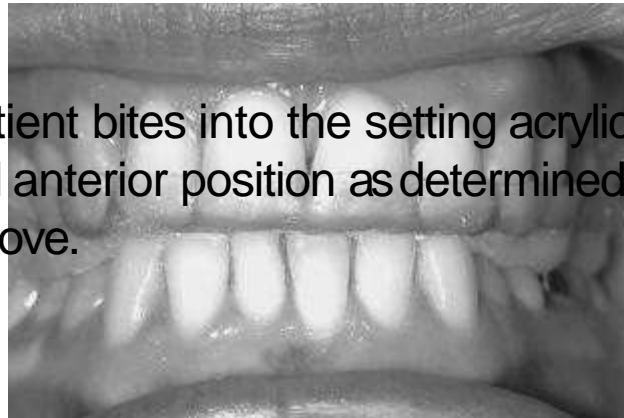


A, Mandibular stabilization appliance. B, Occlusal view of a mandibular stabilization appliance with contacts and eccentric guidance marked with articulating paper. Right (C) and left (D) lateral view in the musculoskeletally stable position. Right (E) and left (F) lateral view during eccentric movement of the mandible. The presence of canine

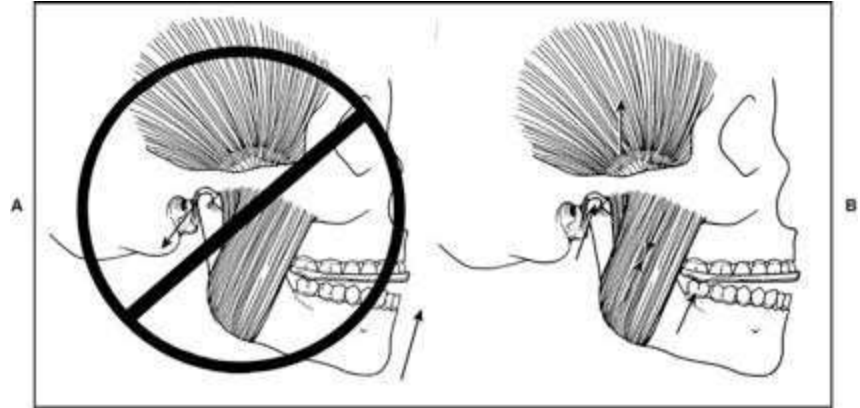


A, The anterior positioning appliance causes the mandible to assume a forward position, creating a more favorable condyle-disc relationship. B, During normal closure the mandibular anterior teeth contact in the

The patient bites into the setting acrylic at the desired anterior position as determined by the groove.



Many clinicians believe that this device will cause condylar distraction; however, this has not been documented. **B, Because the pivot is anterior to the force of the elevator muscles (masseter and temporalis), the joint is seated to the musculoskeletally stable position while force is applied to the posterior tooth contacting the pivot. Studies suggest that such an appliance loads the joints; it does not distract the joints. Distraction occurs only if extraoral force is applied upward on the chin**



A, Clinical photo of a mandibular pivoting appliance. Only the maxillary first molar contacts the appliance. B, The patient wore this appliance continuously for only 2 weeks. When it was removed, the occlusion changed. The maxillary first molar was intruded out of occlusal contact.



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- **Joint dislocation**- A dislocation of the entire disc–condyle complex beyond the eminence combined with the inability to return passively into the fossa

Internal Derangement of TMJ



Presented by:
Dr. Kamini Dadsena
Post Graduate in OMFS
NHDCRI, Sakri, Bilaspur (C.G.)

Outline

- Indication & criteria of surgery
- Arthrocentesis & lavage
- Arthroscopic treatment
 - Disk Repositioning
 - Disk repair
 - Diskectomy
 - Diskectomy and autologous graft disk replacement
 - Temporalis myofacial flap
 - Dermis
 - Auricular cartilage
- Condylotomy

Indications for TMJ surgery

1. Pain or dysfunction make the condition intolerable,
 2. None of the reasonable nonsurgical modalities offers adequate levels of relief, and
 3. The intracapsular condition is a major cause of the condition.
- Surgical treatment is limited to those who have pain and dysfunction that arises from within the TMJ.
 - Patients who have pain and dysfunction that arise from the masticatory muscles or other non-TMJ sources are not surgical candidates and they will be made worse by surgical intervention.

CRITERIA

Significant TMJ pain and dysfunction

- The more localized the pain and dysfunction to the TMJ the better is the prognosis
- The more diffuse the pain and dysfunction, the less likely it is that surgical intervention will be successful.

Refractory to nonsurgical treatment

- Most patients respond successfully to this treatment;
- therefore, surgical consideration is reserved only for patients who fail to respond successfully.

Imaging evidence of disease

- Imaging findings should not be interpreted in isolation
- Imaging evidence should be used to confirm and support the clinical findings.

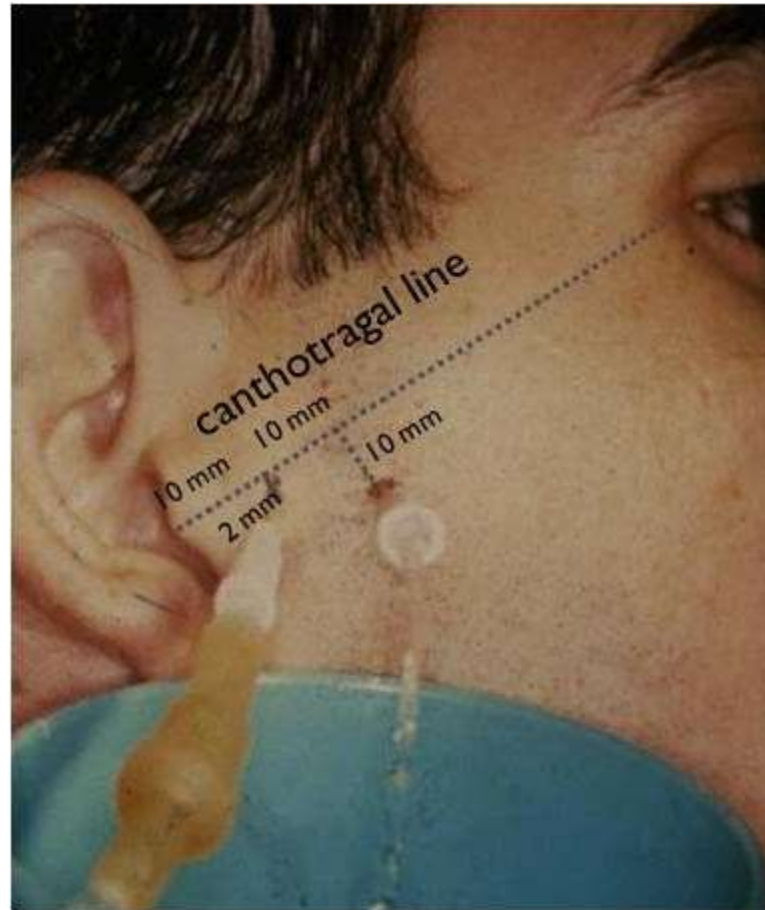
Surgical procedure:

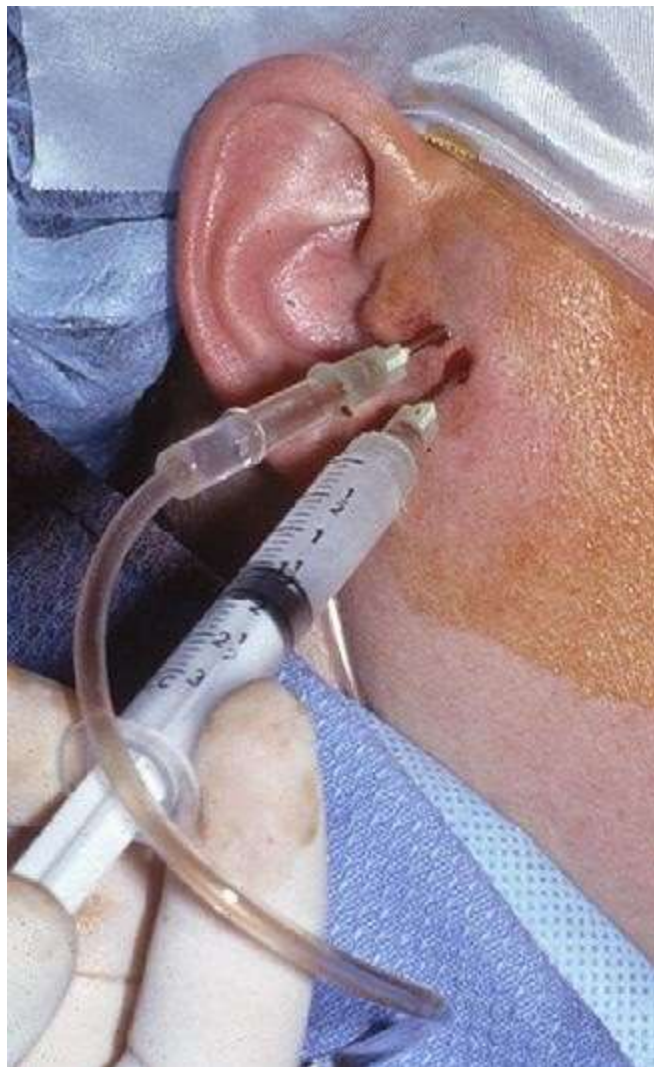
1. Arthrocentesis and lavage
2. Arthroscopic management
3. Disk Repositioning
4. Disk repair
5. Diskectomy
6. Diskectomy and autologous graft disk replacement
 1. Temporalis myofacial flap
 2. a. Dermis
 3. b. Auricular cartilage
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Temporomandibular joint arthrocentesis

- Arthrocentesis consists of TMJ lavage, placement of medications into the joint, and examination under anesthesia.
- It usually is performed as an office-based procedure under local anesthesia assisted with conscious intravenous sedation, although it can be performed with local anesthesia alone

Arthrocentesis and lavage





Arthrocentesis: placement of medication into upper TM joint space after lavage.

- **success rates - 70% to 90%**
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- **primary indication**
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Study done by Dorrit W. Nitzan

year	Sample size	Study	Follow-up	Conclusion
JOMS 49:1163 - 1167, 1991	17 joints in 17 patient s	<i>Temporomandibular Joint Arthrocentesis: A Simplified Treatment for Severe, Limited Mouth Opening</i>	4 to 14 months.	highly effective in reestablishing normal opening and relieving pain
JOMS 55:151 - 157, 1997	Thirty- nine patient s (40 joints)	Long-Term Outcome of Arthrocentesis for Sudden- Onset, Persistent, Severe Closed Lock of the Temporomandibular Joint	6 to 37 month s	Arthrocentesis for sudden-onset closed lock provided sustained normal joint function and marked pain relief.
JOral Maxillofa c Surg 59:1154- 1159, 2001	36 patients 38 joints	The Use of Arthrocentesis for the Treatment of Osteoarthritic Temporomandibular Joints	6 to 62 months	Arthrocentesis is a safe and rapid procedure that in many instances results in the osteoarthritic TMJs returning to a healthy functional state.

Advantages of arthrocentesis

- it is a simple, cost-effective, minimally invasive procedure with little morbidity that can be performed in

Disadvantages

Arthrocentesis is clearly inefficient in disorders caused by factors that cannot be eliminated by lavage, such as disc displacement with reduction, disc displacement without reduction, and fibrous adhesions.

Complication

- Not significant
- Patients may experience temporary swelling and soreness over the joint area and a slight posterior open bite malocclusion for 12 to 24 hours after the procedure.

ARTHROSCOPIC MANAGEMENT



Derived from two greek words arthros, which means “joint” & scopien, which means “to view.”

Arthroscopy simply means “looking into a joint”

HISTORY

- The first published report of temporomandibular joint arthroscopy was by Professor M. Ohnishi in 1975
- But TMJ arthroscopy did not become popular until reports were published by Dr. Ken Ichiro Murakami in 1981, 1982, and 1985.
- The first published report in the American literature was by Drs. Nuelle, Alpern, and Ufema in an orthodontic journal in 1986
- The first comprehensive study with results was published by Dr. Bruce Sanders in 1986.
- TMJ arthroscopy is now an important aid in the diagnosis and treatment of temporomandibular disorders (TMD).

Indications

Diagnostic arthroscopy

- Internal derangement
- Osteoarthritis
- Arthritides
- Pseudotumors
- Post-traumatic complaints

Treatment

- Lavage
- Lysis
- Lateral Capsule Release
- Disk Repositioning
- Synovectomy
- Debridement and Abrasion
- Intraarticular Pharmacotherapy

Contraindications

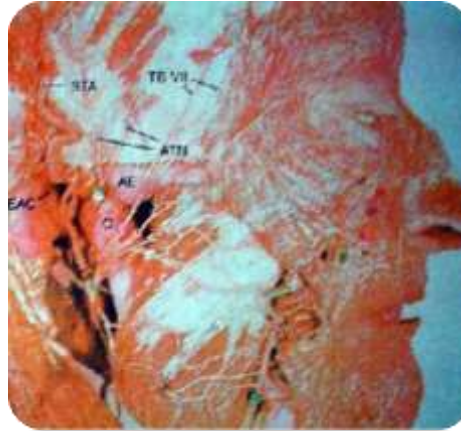
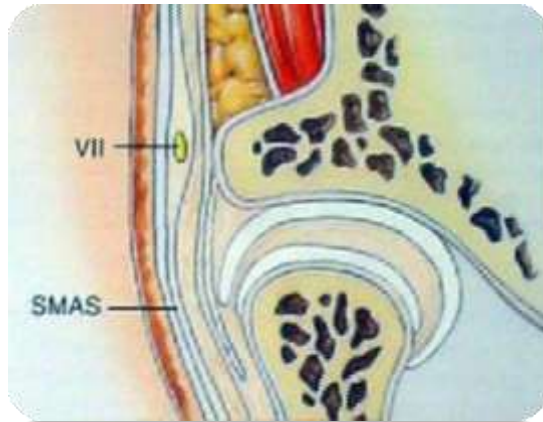
Absolute contraindications

- Bony ankylosis,
- Advanced resorption of the glenoid fossa,
- Infection in the joint area
- Malignant tumors

Relative contraindications

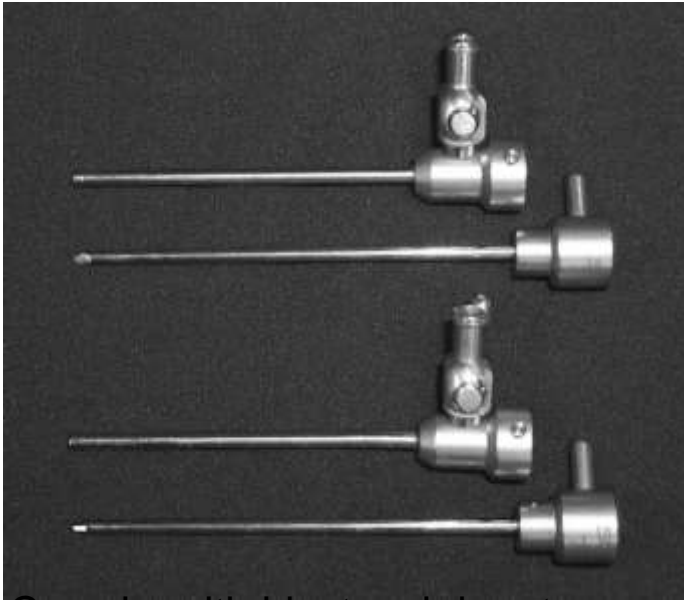
- Patients at increased risk for hemorrhage,
- Patients at increased risk for infection
- Fibrous ankylosis.

Anatomic Considerations



OMFS Fonseca volume- 4
Edward ellis 3rd ed
Grays anatomy

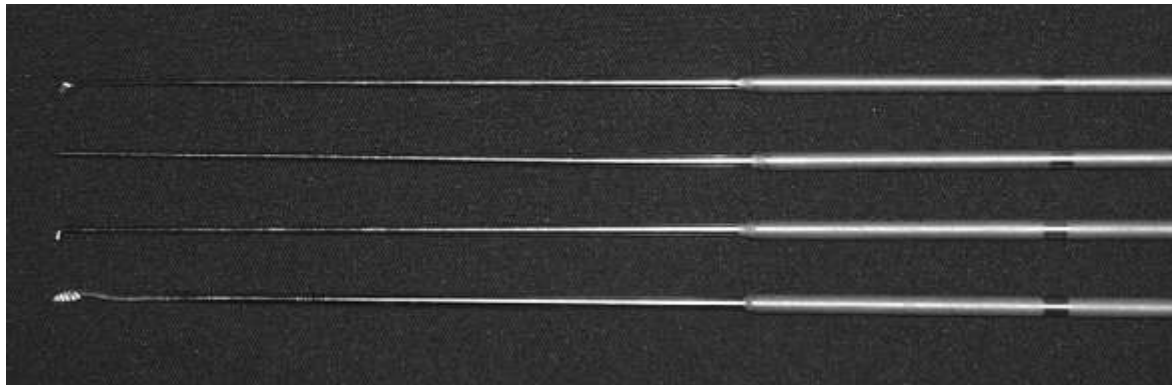
Instrumentation



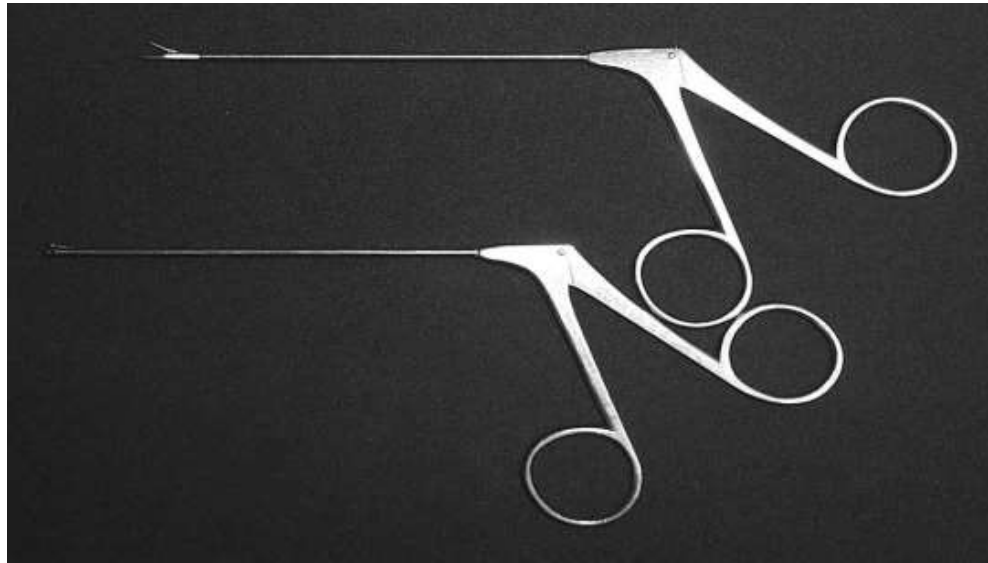
Cannulas with blunt and sharp trocars.



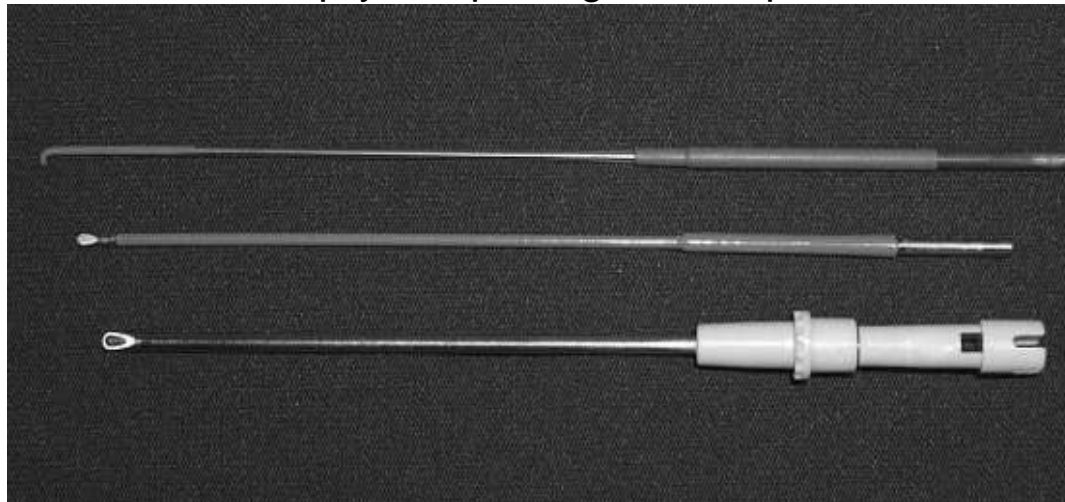
2.3-mm 0 and 30 Stryker arthroscopes.



Hand instruments: probes, serrated knife, retrograde knife.



Biopsy forceps, alligator forceps.



Arthrotome mechanical shaver blade, electrocautery tips with insulation.

Preoperative Care

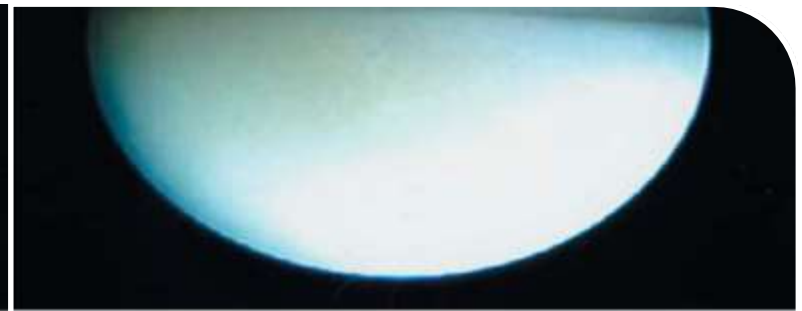
- physical condition of the patient should be reevaluated
- prophylactic treatment implemented.
- Diagnostic TMJ arthroscopy can be performed under
 - local anesthesia
 - intravenous sedation with Midazolam
- Patients should be asked to remove earrings and contact lenses before arthroscopy.
- Preoperative radiographic examination may consist of one or more of the following
 - Axial or frontal projection
 - TMJ orthopantograph
 - Sagittal tomogram (or equivalent)



Puncture directions for the TMJ. (1) Inferolateral.
(2) Endaural. (3) Anterolateral.



normal posterior recess
and posterior ligament.



normal intermediate zone.



normal anterior recess

**Normal arthroscopic
anatomy**



Single fibrous adhesions from midportion of disc to posterior aspect of fossa



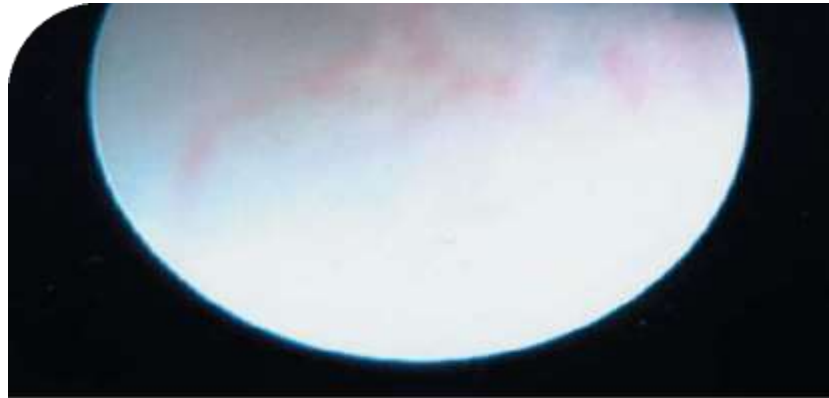
Postop view of adhesions after lysis in the same left joint.



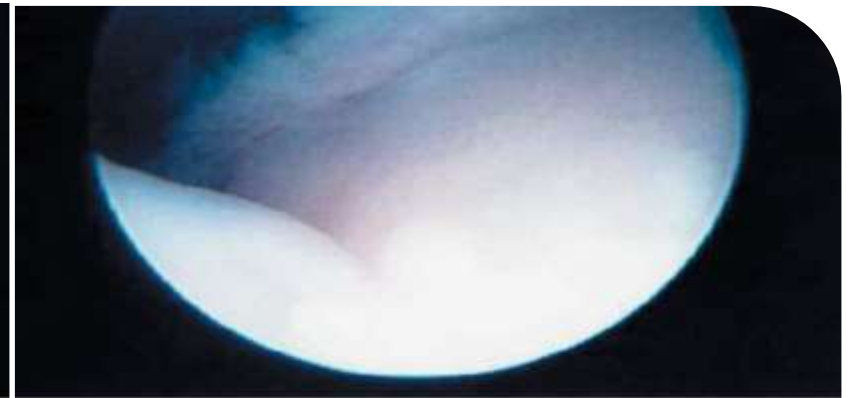
Posterior ligament synovitis of right joint.



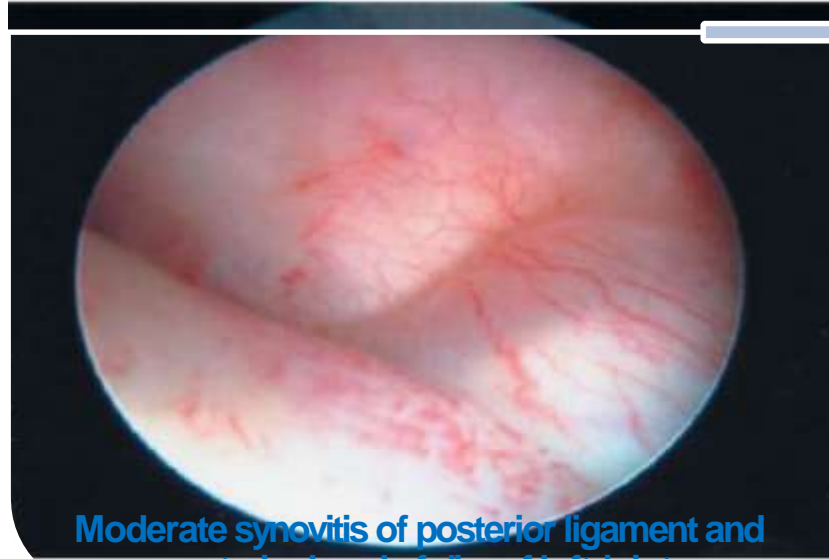
Postoperative view of posterior ligament after cauterization of same right joint



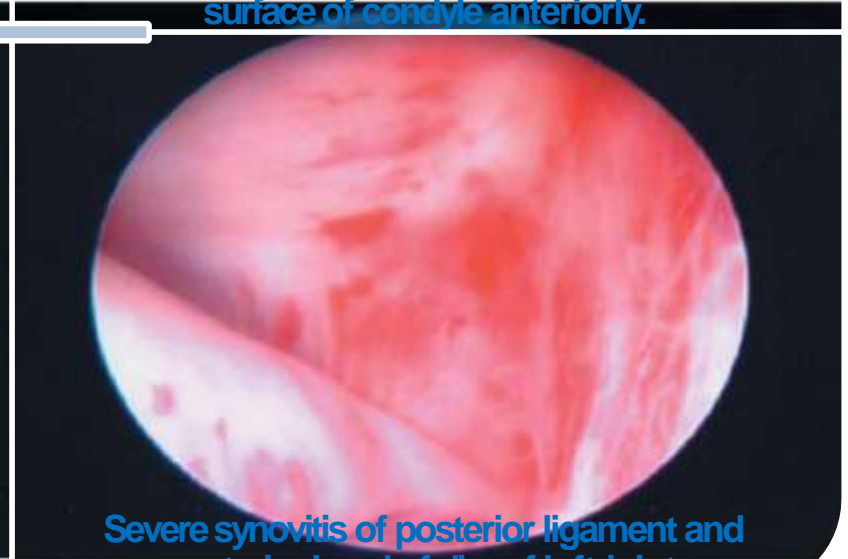
Synovial hyperplasia of left joint.



Disc perforation of right joint. Note smooth surface of condyle anteriorly.



Moderate synovitis of posterior ligament and posterior band of disc of left joint.



Severe synovitis of posterior ligament and posterior band of disc of left joint.

Postoperative Care

- Soft diet
- Nsaids

Complications

- Vascular injury
- Extravasation
- Scuffing
- Broken instruments
- Otologic complications
- Intracranial damage
- Infection
- Nerve injury

Vascular injury

- In about 80%, the temporal vessels were involved.
- The bleeding is usually venous in origin and easily controlled using a tamponade.
- In persistent cases, the cutaneous incision can be extended slightly and the source of bleeding ligated or controlled with cautery.

McCain protocol

- All instruments are removed, and the condyle is moved to the compartment where bleeding has occurred and kept there for about 5 minutes.
- The instruments are then reinserted to irrigate and debride clots that may have formed. If this procedure does not work, the joint must be opened and the bleeding controlled.

Extravasation of irrigation fluid

- In prolonged arthroscopic surgery the risk is greater, and cases of extensive edema in the upper airway with subsequent postobstructive pulmonary edema have been reported.
- If the surgeon continually checks the outflow, this is unlikely.

Scuffing

- The cartilage may be scuffed by the trocar during puncture.
- This lesion can be avoided if the trocar is directed toward the crest of the glenoid fossa until it touches the bone.
- The sharp trocar is then exchanged for a blunt one, which is directed slightly inferiorly to slip into the upper compartment.

Broken instruments

A protocol for arthroscopic retrieval of broken instruments has been recommended by **McCain and de la Rua**

- 1. Stop the procedure and maintain the position of the arthroscope and working cannulas.
- 2. Keep the broken object in view.
- 3. Check the inflow bags to maintain sufficient irrigation and to prevent collapse of the joint from lack of fluid.
- 4. Record and measure the depth of the instrument with a scored cannula.
- 5. Have adequate instruments available for removal.
- 6. Adjust inflow to ensure optimal visibility.
- 7. Radiograph the joint if the object cannot be located.
- 8. Consider fluoroscopic assistance to localize the object if it cannot be found arthroscopically.
- 9. Remove the object.

Otologic complications

- Van Sickels and colleagues reported a case of perforation of the tympanic membrane and partial dislocation of the malleus.
- Applebaum and coworkers described three patients who largely lost their hearing.
- Such serious complications can be avoided only by proper training in TMJ anatomy and practice on cadavers before the clinical use of TMJ arthroscopy.
- studies indicate that the risk of adverse effects on hearing is extremely low.

Intracranial damage

- Damage to intracranial structures during TMJ arthroscopy has been reported.
- In patients whose cartilage and bone show marked destruction (e.g., advanced rheumatoid arthritis), great caution must be exercised, and routine radiographic examination should be supplemented with CT.

Infection

- the frequency of infection was low (15 cases; *0.3%*). (In an extensive review of 3146 patients (4831 joints) by McCain and colleagues in 1992, :12)
- Considering recent reports on the increase in bacterial resistance to antibiotics, routine use of antibiotic prophylaxis is not advisable.
- Arthroscopy is not indicated if an infection exists in the area of intended puncture.
- However, in suppurative arthritis, arthroscopic drainage and lavage can be helpful, and specimens can be taken for culture.

Nerve injury

- A/C McCain and colleagues – 3/4800 (0.06%) with permanent nerve damage.“
- The auriculotemporal and facial nerves are most often involved.
- Excessive extravasation of irrigation fluid may rarely have a transient effect on the infraorbital, inferior alveolar, and lingual nerves.

Disk Repositioning

- In 1979 McCarthy & Farrar 1st reported surgery to reposition the disk into its normal anatomic relationship relative to condyle and fossa.
- The chance of successful repositioning increase if the disk has maintained its normal appearance (white, shiny, firm) and length, and is minimally displaced.
- The posterior aspect: of the disk is positioned over the superior portion of the condyle in a normal, healthy joint.
- If the disk is severely displaced and does not reduce, loading by the condyle increases on the retrodiskal tissues, making them hypovascular.

- Both the condyle and the articular eminence can undergo remodeling, and a “pseudodisc” may eventually form.
- The disk should not be distorted or placed under tension during posterior repositioning.
- Dense adhesions that result from longstanding disk displacement often require releasing incisions in the anterior and/or medial regions of the disc.
- Disc is plicated posteriorly and posterolaterally to return the anteromedially displaced disc to its more normal anatomic location.
- **Hall** describe a partial thickness plication of the disk
- **Dolwick and sanders** describe full thickness plication, if the disc can be repositioned without entering the lower joint space. inferior joint space must be entered like osseous contouring of condyle.
- A/C to **Weinberg** Emenectomy and condylotomy may also facilitate improved disk repositioning.
- Success rate- 80% or more

(McCarty W, Farrar W: Surgery for internal derangements of the temporomandibular joint. JProsthet Dent 1979;42:191.)

Arthrotomy with disk repair

- When indicated, perforations of the disk can be managed by reparative technique
- For smaller perforations, the disk can be undermined from the surrounding soft tissue for a tension free primary closure with a nonresorbable suture.
- Osseophytes and bony overgrowths are commonly found under disk perforations. Any necessary arthroplasty of the condyle can be conveniently performed during disk repair procedures through the perforation.
- Larger perforations of a dislocated disk require a more extensive repair because the disk will unlikely reduce after the margins of the perforation are excised because of the more dense adhesion formation and scarring.
- If the disk cannot be adequately repaired, then the surgeon must make the decision to replace the disk with either an autologous or a homologous graft, or perform a diskectomy.

DISKECTOMY

- If a deformed disk is determined to be unsalvageable, a diskectomy is considered.
- Diskectomy-
 - Partial
 - Total
- First described by **Lanz** in 1909 diskectomy is indicated in several instances:
 1. irreparable disk perforation;
 2. Complete loss of elasticity of the disk;
 3. persistent pain and dysfunction even after disk repositioning

- Recently **Kondoh** described a procedure referred to as disk reshaping, which is a modification of a partial diskectomy.
- Only that portion of the disk and posterior attachment deemed unsalvageable is excised to eliminate diseased tissue and remove any obstacle for smooth condylar movement.
- After the disk and posterior attachment are excised and a smooth motion of the condyle can be consistently repeated intraoperatively, the condyle can be conservatively recontoured to remove any irregularities or osteophytes.
- Intact articular cartilage should not be removed from either the condylar head or the fossa. Excessive removal of articular cartilage may predispose the joint to heterotopic bone formation and subsequent ankylosis.
- **Takaku and Toyoda** followed 39 diskectomy patients over an average of 20 years after surgery. All but two of their patients had no pain and none experienced masticatory disorders. A mouth opening of 35 mm was attained by 38 of the patients.

Diskectomy with Replacement

- **Rationale-**

1. Protect the articular surface from further degenerative changes
 2. Prevent joint adhesion
- The graft material was to create scaffold for synovial tissue ingrowth.

- **Autologous materials-**

1. Temporalis myofacial flaps
2. Auricular cartilage
3. Dermal grafts

Temporalis myofacial flaps

- **Advantage**

1. Avoid a separate, remote donor site morbidity
2. Vascular flap
3. Its ability to be harvested in variable thickness to allow for reconstruction of defects of variable size.

- **Disadvantages**

1. Possible flap necrosis
 2. Adhesion formation within joint space
- A flap of 3-4 cm is sufficient.
 - Zygomatic arch can be preplated before it osteotomized if the surgeon desires to place the myofascial flap under the arch over the eminence.

Auricular cartilage graft

- **Advantages**

1. Auricular cartilage do not induce foreign body reaction.
2. Resist most occlusal loading forces.

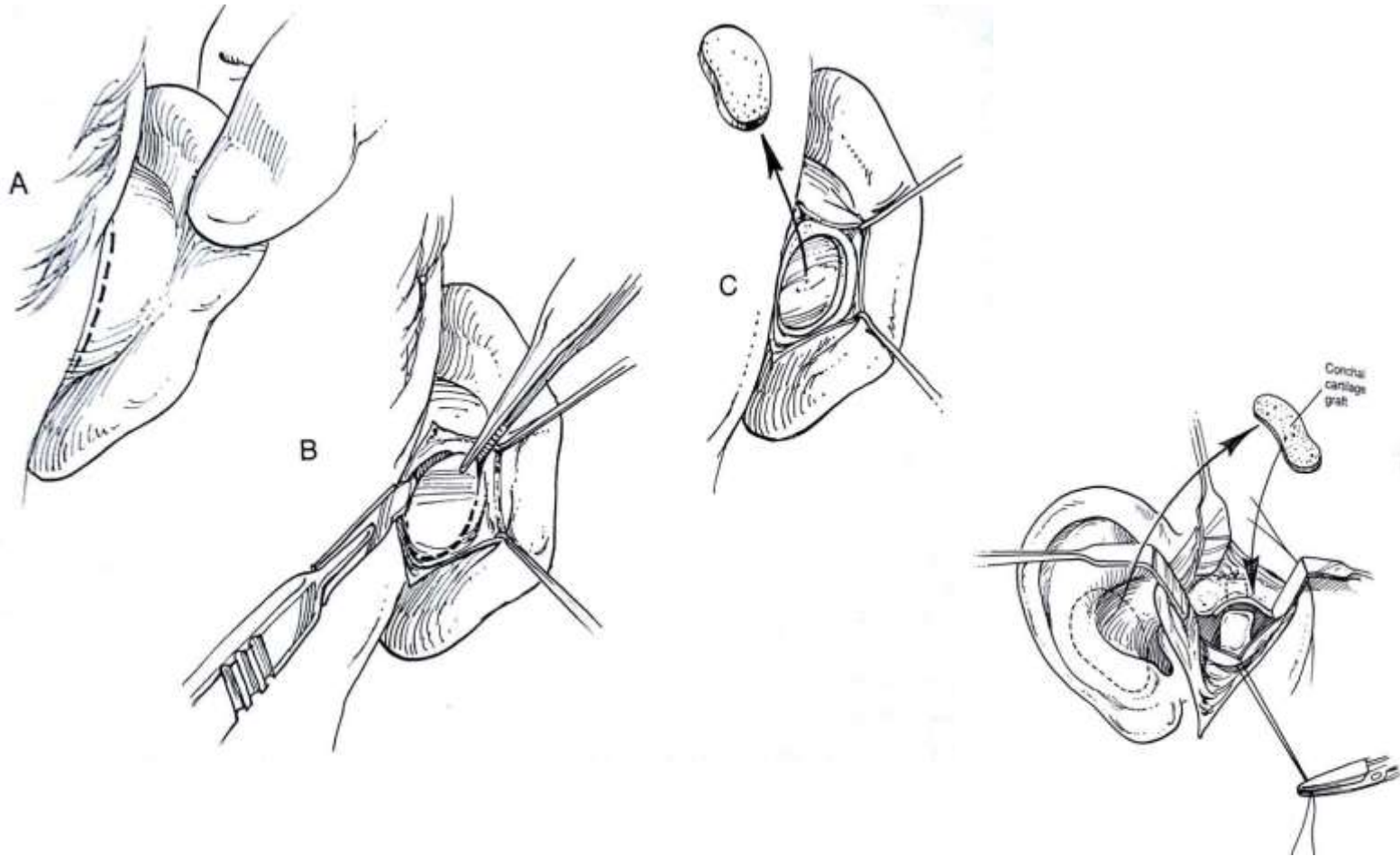
- **Disadvantages**

1. Require second donor site

- **Complications**

1. Prematurely displaced
2. Infection of graft

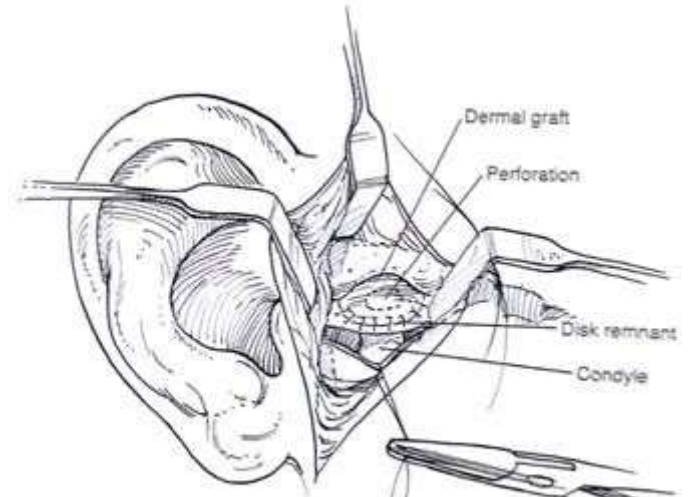
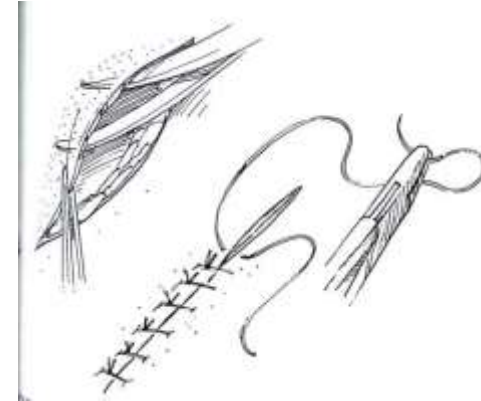
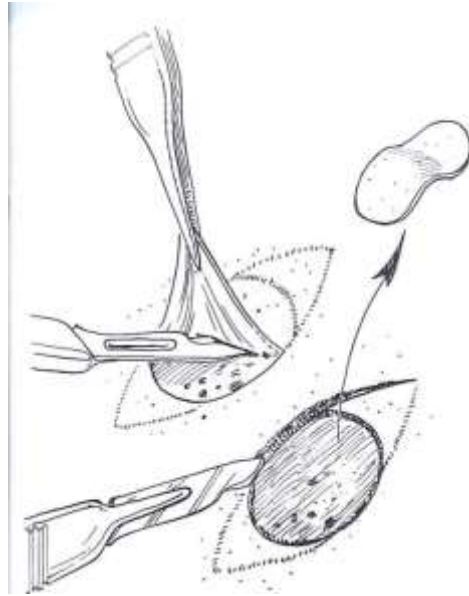
Auricular cartilage graft



Dermal graft

- **Use**
 1. Disk replacement
 2. More commonly disk repair of disc perforation
 3. Interpositional material for TMJ Ankylosis
- **Donor site:**
 1. Upper lateral thigh
 2. Buttock
 3. Groin
- **Dermal graft-**
 1. full thickness
 2. partial thickness
- Complete removal of epidermis from graft should be preferable to avoid leaving epithelial remnant on graft, which may lead to epithelial cyst formation on condyle from undersurface of graft.
- **Disadvantage-**
 1. remote donor site,
 2. fibrous tissue formation

Dermal graft



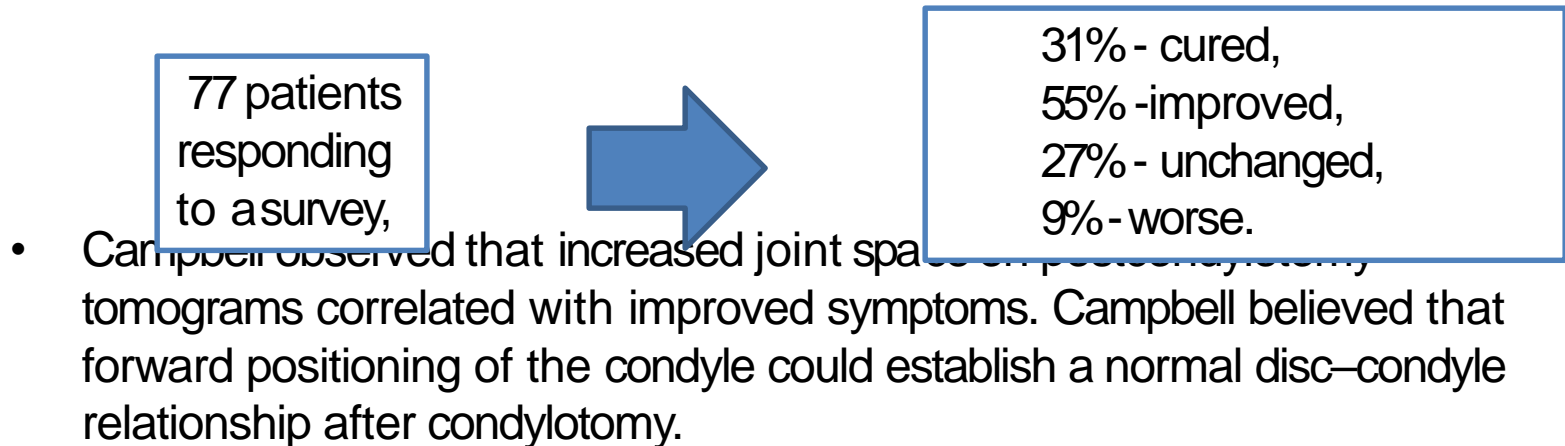
Modified Condylotomy

- Campbell probably conceived the idea of condylotomy in 1949
 - Rhyba performed the first condylotomy in Great Britain.
 - Ward and colleagues suggested the term condylotomy and were the first to publish on the procedure.
 - The concept of condylotomy for managing TMJ disease originated from the early observation that patients who had fracture dislocations of the mandibular condyle rarely experienced joint clicking and dysfunction.
 - Therefore condylotomy was described as a subcondylar osteotomy mimicking a displaced subcondylar fracture.
 - The procedure was performed in a closed manner using a Gigli saw.
- 1983 - converted closed into open procedure.
Modified the relatively new IVRO—named
“modified condylotomy”.

- In 1961 Ward reported on



- In 1965, Campbell reviewed 80 of Ward's patients who underwent condylotomy between 1954 and 1964



- In 1975, Banks and MacKenzie reported that 92% of 141 patients (172 condylotomy procedures) were either cured or improved after condylotomy. They also noted that increased joint space on postcondylotomy imaging correlated with improved symptoms

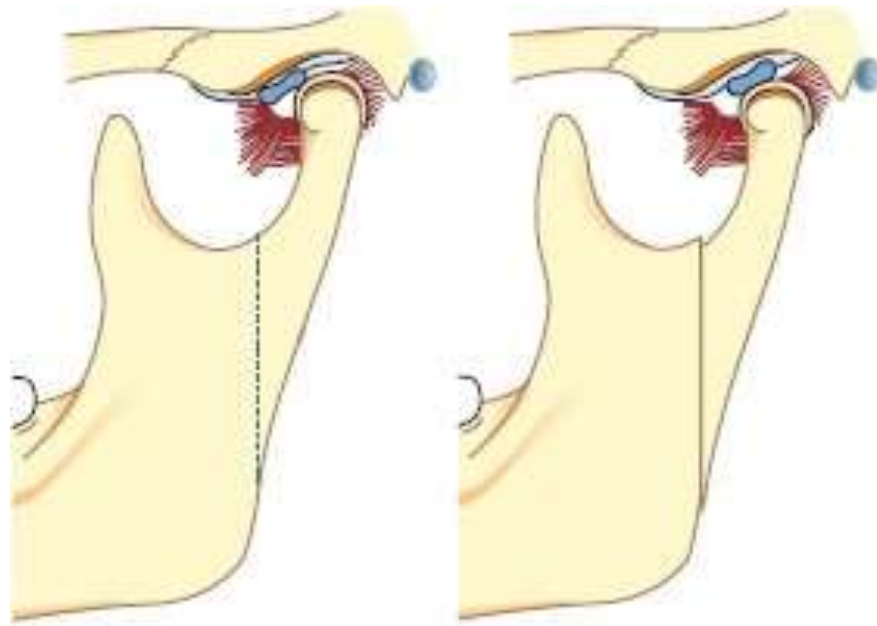


Fig. 56.4 Simplified drawing showing modified condylotomy of the TMJ.

Goals :

- Eliminate pain and dysfunction.
- Reverse the disease process.
- Prevent progression by reestablishing normal disc/condyle relationship.

Indications :

- Painful TMJ with a reducing displacement of the disc.
- Relent progression to a nonreducing disc.

Contraindications :

- Edentulous patients
- patients with poor intercuspation, flat teeth.

Complications

- Wound infection.
- The condyle may displace in some cases and create an open bite on the operated side
- Nerve damage

Disadvantages :

- Period of IMF.
- centric relation - centric occlusion discrepancy.

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THANK YOU

- Mechanism of Action 1. Reduction in pain level: Arthrocentesis reduces pain by removing inflammatory mediators from the joint. The combined treatment of arthrocentesis and Sodium Hyaluronate injection may improve the results due to the long-term lubricating effect of Sodium Hyaluronate, which prevents the onset of inflammatory mediators that are responsible for pain.
- [39.](#) 2. Maximal Mouth Opening: Arthrocentesis under high pressure is an effective method to regain normal mouth opening in closed lock cases. This effect is usually due to elimination of the adhesions around the disc. Also the lubricating effect of Sodium Hyaluronate which either maintains lubrication and minimizes wear and tear mechanically, or plays a role in nutrition of the avascular parts of the disc and condylar cartilage.
- [40.](#) 3. Clicking : Usually disappears due to decreased friction and lubricating effect.
- [41.](#) Technique