Temporomandibular Joint Dislocation

64

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64.1 Introduction

Hypermobility disorders of the temporomandibular joint (TMJ) present in two major forms:

1. Dislocation
2. Subluxation [1]

The differences between dislocation and subluxation have been highlighted in Box 64.1.

The condyle may be displaced either anteriorly, posteriorly, medially, or laterally of which anterior dislocation is the most common [1]. The incidence of TMJ dislocation constitutes about 3% of the dislocations occurring in other joints of the body with female predilection. The reported incidence of TMJ dislocation is 7% with a preponderance in people in the second and third decades [2].

Box 64.1 Definition of Dislocation and Subluxation
Dislocation refers the phenomenon in which condyle is displaced out of the glenoid fossa and traverses in front of the articular eminence. In contrast, subluxation is the condition in which the dislocated condyle can be reduced back into the normal position by patient themselves, without any professional assistance.

64.2 Classification (Box 64.2)

Dislocation has been classified by numerous methods. Rowe and Killey [3] based it on the duration of the dislocation episode as:

Box 64.2 Classification of Dislocation
Based on duration of displacement
- Acute dislocation
- Habitual dislocation/subluxation
- Chronic recurrent dislocation
- Long-standing/chronic protracted dislocation

Based on direction of displacement
- Anterior
- Posterior
- Medial
- Lateral
- Superior

Based on side of displacement
- Unilateral
- Bilateral

1. Acute
2. Chronic

Dislocation recurring more than once is termed as chronic recurrent dislocation. The term *chronic protracted dislocation* is used to describe dislocation persisting for more than 1 month, while dislocation present for more than 6 months is called *extra-long-standing dislocation* [4].

Based on the direction of displacement [2], dislocation may be categorized as:

- Anterior
- Posterior
- Lateral
- Superior

Anterior dislocation is the most common type of dislocation due the weakness of the capsule in the anterior region.

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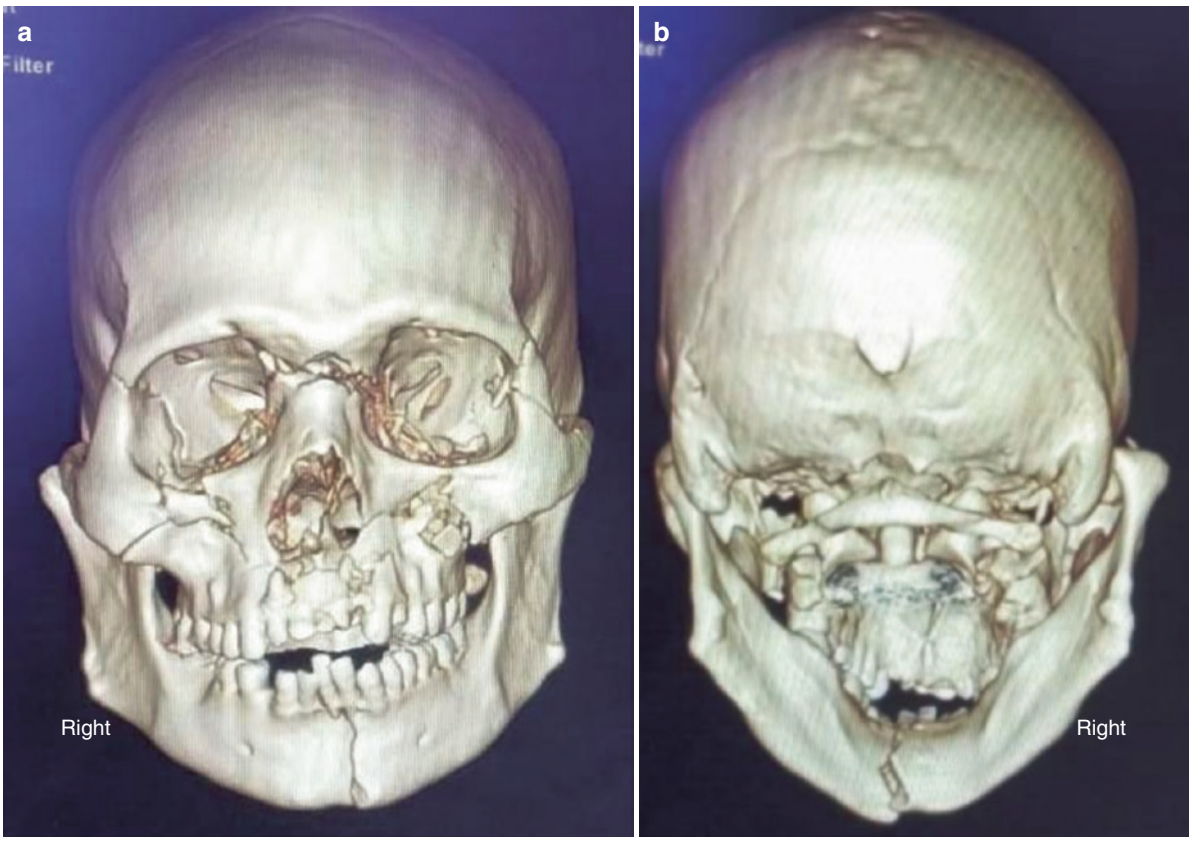

Fig. 64.1 Lateral dislocation of condyle, Post trauma, on the right side. (**a**) Frontal view showing lateral dislocation on right side (**b**) Posterior view showing lateral dislocation on right side

Posterior dislocation occurs following fracture of the external auditory canal and skull base. Allen and Young classified lateral dislocation into Type I and Type II. This type of dislocation occurs in mandibular trauma (Fig. 64.1a, b):

- Type I refers to lateral subluxation.
- Type II indicated lateral and superior dislocation into the temporal fossa [2].

Superior dislocation results when condyle is pushed into the middle cranial fossa accompanied by glenoid fossa fracture. Small and round-shaped condyle is predisposed to this type of dislocation [2].

64.3 Etiopathogenesis (Table 64.1)

A multitude of causes have been described in the etiopathogenesis of TMJ dislocation including congenital, iatrogenic, anatomical aberrations, spontaneous, pharmacological, neurological, neuromuscular, etc. Proper diagnosis of the etiology is important to institute problem-specific treatment.

Table 64.1 Etiology of dislocation

Trauma	
Medical and surgical procedures	Dental procedures which require wide mouth opening for prolonged time Intubation procedures, gastrointestinal endoscopy, laryngoscopy/bronchoscopy ENT procedures
Spontaneous	Laughing Yawning Biting Vomiting Singing Epileptic seizures
Anatomical aberrations	Small condyle Poorly grooved glenoid fossa, shallow/steep articular eminence, laxity of ligaments and capsule for more prone for dislocation
Systemic disorders	Ehlers-Danlos disease Marfan's syndrome Huntington disease Parkinson disease Multiple sclerosis Muscle dystrophies or dystonias
Medications	Antipsychiatric Antiemetic
Occlusal conditions	Edentulous posterior region

Daily activities which involve wide mouth opening such as laughing, yawning, and biting may induce TMJ dislocation. It may also occur spontaneously during epileptic seizures, vomiting, yawning, and singing. Trauma is another cause which might cause posterior, superior, and lateral dislocation in addition to anterior dislocation [5]. Iatrogenic causes include dental procedures which require wide mouth opening for prolonged time, intubation procedures, gastrointestinal endoscopy, and laryngoscopy/bronchoscopy. Anatomical aberrations such as small condyle, underdeveloped glenoid fossa, shallow/steep articular eminence and laxity of ligaments and capsule are more prone for dislocation.

Predisposing risk factors include connective tissue disorders such as Ehlers-Danlos disease and Marfan's syndrome which predispose to laxity of the joint and hypermobility. Muscle spasms occur in neurodegenerative or neurodysfunctional diseases, namely, Huntington disease, Parkinson disease, multiple sclerosis, muscle dystrophies, or dystonias.

Medications which induce dislocation are antipsychiatric (phenothiazines) and antiemetic (metoclopramide) drugs which produce unwanted extrapyramidal reactions which eventually lead to muscular imbalance attributed to dislocation.

Reduced vertical dimension due to loss of posterior teeth in advanced age may also predispose an individual to dislocation [5].

Though various theories of pathogenesis have been described in literature, the most accepted was muscular incoordination during mandibular movements. In the initial stages of mouth closure, elevators are activated prior to the relaxation of depressors mainly lateral pterygoid which pulls the condyle forward. This initial dislocation facilitates the further dislocation [5].

64.4 Clinical Features (Mentioned in Box 64.3; Figs. 64.2a, b, 64.3, 64.4a, b, and 64.5a, b)

Box 64.3 Clinical Features of Dislocation

The classical clinical features of dislocation are:

1. Pain in the preauricular and surrounding region.
2. Preauricular depression/hollowing.
3. Protruding chin.
4. Inability to close mouth.
5. Drooling of saliva.
6. Inability to speak, swallow, or masticate.
7. Tense masticatory muscles are also a characteristic feature [6]

Unilateral dislocation is associated with deviation of chin towards contralateral side.

Fig. 64.2 (**a**, **b**) Bilateral TMJ dislocation. (**a**) Before reduction (**b**) After reduction

64.5 Investigations

- *Orthopantomogram* (OPG) (open and closed) (Fig. 64.6)
  This is the commonly used screening modality for the examination of TMJ. Morphology of condyle, articular eminence, and joint space can be evaluated. Open mouth OPG shows the position of the condyle in relation to the articular eminence.
- *TMJ tomogram*
  Open and closed mouth TMJ images can be obtained in different slices.
- *Computed tomography(CT)*
  Evaluation of the morphology of osseous TMJ components—condyle, articular eminence and the glenoid fossa—are better assessed with CT.
- *Cone beam computed tomography* CBCT
  CBCT facilitates accurate measurement of condylar height, width, and length as well as inclination of articular eminence.
- *Magnetic resonance imaging (MRI)*
  MRI demonstrates the soft tissue morphology, particularly disc shape, displacement, and effusion of the joint frequently associated with dislocation.
- *Electromyography (EMG)*
  EMG evaluates the activity of the muscles which may be hypoactive, normoactive, or hyperactive.
- *Ultrasonography (USG)*
  Thickness and length of the muscles can be evaluated both at rest and clenching by USG.

Fig. 64.3 Bilateral TMJ dislocation showing openbite

Fig. 64.4 (**a**, **b**) Preauricular depression. (**a**) Before reduction. x—Preauricular depression. (**b**) After reduction

Fig. 64.5 (**a**, **b**) Unilateral TMJ dislocation on the right side. (**a**) Before reduction (**b**) After reduction

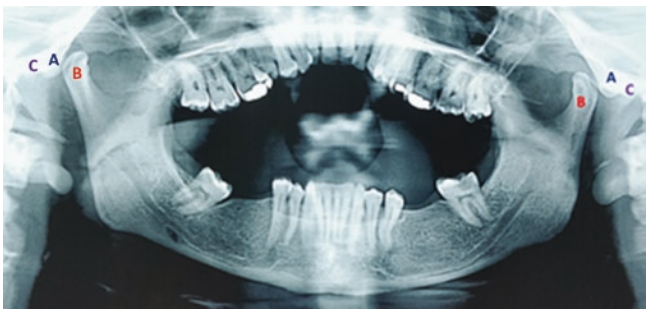

Fig. 64.6 OPG demonstrating dislocation. A: Articular eminence. B: Condyle in front of articular eminence. C: Glenoid fossa

64.6 Management of Dislocation (Box 64.4)

64.6.1 Acute Dislocation

Reducing the dislocated condyle poses a great challenge. Reduction is more complicated with the accompanied muscle spasm persisting for longer duration. In difficult situations, reduction can be facilitated with the help of local anesthesia, conscious sedation, and general anesthesia. Following reduction, a Barton's bandage, chin strap, or intermaxillary fixation is advised for 3–6 weeks to prevent further dislocation. Several reduction techniques have been employed with varying rates of success.

Box 64.4 Management of Acute Dislocation

- Conventional technique—Hippocratic/Nelaton's method
- Wrist pivot technique
- Extraoral technique
- Gag reflex

64.6.1.1 Hippocratic/Nelaton's Technique (Fig. 64.7)

This is the conventional method of reduction of acute dislocation in which physician stands in front of the patient, with the thumb placed either on the external oblique ridge or on the lower molars and other fingers positioned along the lower border of the mandible. A steady downward, backward, and superior force should be given to reduce the dislocated condyle. The thumb should be protected either with a plastic splint or gauze wrapped around it to prevent injury to the thumb while reducing dislocation.

64.6.1.2 Gag Reflex [3]

Gag reflex is induced by probing the soft palate using mouth mirror. In alert individuals, this reflex relaxes the lateral pterygoid muscle through coordinated neuromuscular activities which reduces dislocation in natural way.

64.6.1.3 Wrist Pivot Method [7] (Fig. 64.8)

This method utilizes existing myospasm of the elevators for reduction. The thumb is placed under the chin, while other fingers are placed over the occlusal surfaces of lower teeth.

Fig. 64.7 Nelaton's method. A: Thumb intraorally on the occlusal surface lower teeth. B: Other fingers at the inferior border of body and angle of the mandible

Fig. 64.8 Wrist-pivot method. A: Other fingers intraorally on the occlusal surface lower teeth. B: Thumb on the chin

Then upward movement is applied by the thumb, and concomitant inferior force is given by other fingers with pivoting the wrist. The advantage of this technique is that it utilizes the force created by the muscles of mastication rather than overcoming this force as in Nelaton's technique.

64.6.1.4 Extraoral Method [8] (Fig. 64.9a, b)

Intraoral methods described previously have the risk of human bite in which there are chances of infection transmission. To overcome this, extraoral method has been described. In the dislocated mandible, coronoid process comes forward which is easy to palpate. On one side, the thumb is positioned over the coronoid process which pushes the mandible backward, while the other fingers are located over the mastoid process to deliver counteracting force (Fig. 64.9a). On the other side, the mandible is pulled further forward with the thumb on the malar eminence and rest of the fingers on the mandibular angle (Fig. 64.9b). Pulling the mandible on one side with simultaneous pushing of the mandible on the other side reduces the dislocation on one side first and then subsequently on the other side. This technique is applicable in unilateral dislocation as one side is reduced first and then the other is reduced thereafter.

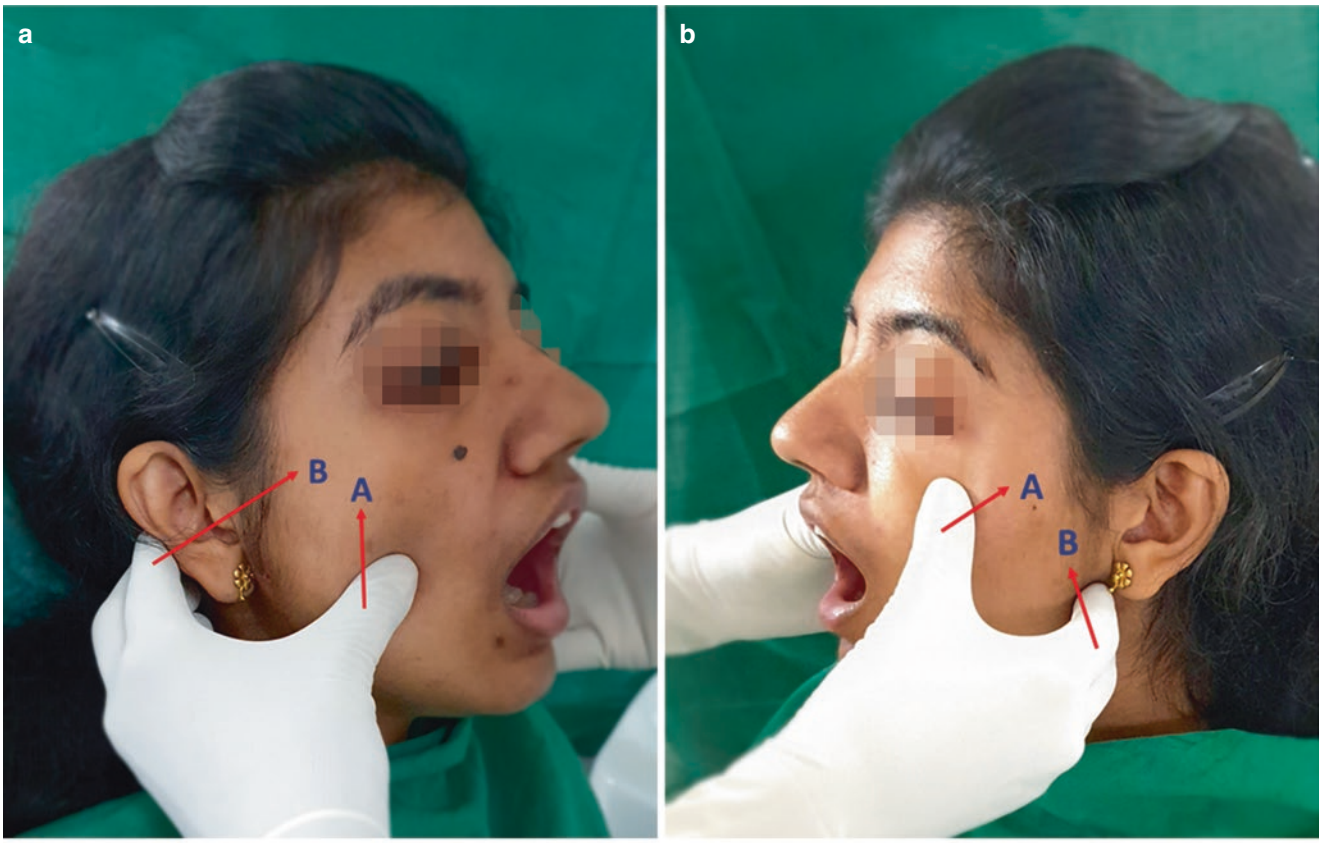

Fig. 64.9 (**a**, **b**) Extraoral method for reduction of dislocation. (**a**) A: Thumb on coronoid process. B: Other fingers on mastoid process. (**b**) A: Thumb on malar eminence. B: Other fingers on angle of the mandible

64.6.2 Management of Chronic Recurrent Dislocation/Subluxation (Box 64.5 and 64.6)

Box 64.5 Management of Chronic Recurrent Dislocation/Subluxation

Conservative

1. Physiotherapy
2. Intermaxillary fixation
3. Chin straps
4. Barton's bandage
5. Kinesio taping

Minimally invasive

1. Injection of sclerosing agents
2. Autologous blood injection
3. Prolotherapy
4. Botulinum toxin injection

Box 64.6 Management of Chronic Recurrent Dislocation/Subluxation

Surgical procedures

1. Capsular tightening procedure
   (a) Capsulorrhaphy
2. Creation of mechanical obstacle
   (a) Dautrey's procedure
   (b) Glenotemporal osteotomy
3. Removal of mechanical obstacle
   (a) Eminectomy
   (b) Condylectomy
4. Creation of new muscular balance
   (a) Temporalis scarification
   (b) Lateral pterygoid myotomy
   (c) Pterygoid dysjunction

Numerous treatment modalities have been described for TMJ dislocation, as it has multifactorial etiology. Miller and Murphy [9] proposed a comprehensive list of treatment options which targeted specific anatomical sites of the joint that exhibited abnormality: the capsule, eminence, and condylar head.

For practical purposes, the types of management may be broadly classified based on the degree of invasiveness as:

1. Conservative
2. Minimally invasive
3. Surgical

64.6.2.1 Conservative Methods

Conservative methods may be used following reduction of dislocation to prevent further dislocation, such as:

1. Physiotherapy
2. Intermaxillary fixation
3. Chin straps
4. Barton's bandage (Fig. 64.10)
5. Kinesio taping

Fig. 64.10 Barton's bandage

Intermaxillary fixation, chin strap, and Barton's bandage are done for 4 weeks to induce fibrosis of soft tissues around the joint so that further dislocation is prevented. Physiotherapy including ultrasound and infrared therapy are advised to reduce pain. Isotonic and isometric exercise are advised to strength the muscle involved in TMJ function [9].

Kinesio Taping (Fig. 64.11)

In the year 1970, Dr. Kenzo Kase, a Japanese chiropractor, first described the techniques of Kinesio taping. The thin elastic tape acts by lifting the skin which increases the blood and lymphatic flow, thereby reducing inflammation and accumulation of pain mediators. It also helps in better muscle function and joint realignment which is utilized in reduction of TMJ dislocation.

64.6.2.2 Minimally Invasive Treatment

Injection of Sclerosing Solutions [9]

This procedure involves repeated injection of sclerosing solution into the capsule aimed at fibrosis of the capsule which would eventually limit the mouth opening. The solutions commonly used to perform the procedure are:

- Sodium psylliate
- Sodium tetradecylsulfate
- Sodium morrhuate
- Ethanolamine oleate 5%
- Tincture of iodine
- OK-432 (Picibanil)

Fig. 64.11 Kinesio taping

These injections are usually given intra-articularly and in pericapsular region and can be repeated every 2–3 weeks till the fibrosis occurs. However, the outcome of this technique is not satisfactory and is also associated with complications such as TMJ ankylosis and facial nerve injury [9].

OK-432 which is a streptococcal derivative inactivated by penicillin G is used as sclerosing agent for the treatment of TMJ dislocation. A 21-gauge needle is used to inject 1.25 KE/ml concentration of OK-432 into the superior joint space and pericapsular region. 2 ml of the solution is injected in each region. This produces fibrosis in and around the joint by inducing local inflammation and formation of granulation tissue. Mouth opening is restricted for 4 days following injection by elastic bandage.

Autologous Blood Injection [1]

This procedure works by producing fibrosis which restricts the opening of the mouth wide. It involves injection of patient's own blood into the superior joint space and pericapsular region following two puncture arthrocentesis. Prior to the injection of blood into the joint, lavage should be done using two needles in the superior joint space, and then one needle is removed. Blood is injected through the other needle into the joint and around the joint. It may be injected either unilaterally or bilaterally. It can be given as a single or multiple injections with intervals.

Injection of Platelet Rich Plasma (PRP) (Refer suggested reading at the end of the chapter)

Platelet rich plasma is a yet another minimally invasive technique used to treat various Temporomandibular joint disorders. It is prepared from 10 ml of patient's own blood which was centrifuged at 3200 rpm for 12 minutes. The 2ml solution was then injected it to the superior joint space which was located 10 mm forward and 2 mm downward on the canthotragal line. Another 1ml of the solution was injected into the pericapsular tissues. Patients were advised for various mandibular movements for a minute following injection for the equal distribution of PRP in the joint. Elastic bandage is given for a week followed by mandibular exercise advised. PRP has 3-8 folds concentration of platelets and various growth factors such as platelet derived growth factor, transforming growth factor beta and vascular endothelial growth factor which helps in healing of the tissues. In a comparative study between autologous blood injection and PRP for TMJ dislocation demonstrated both groups were equally effective in decreasing mouth opening in TMJ dislocation.

Prolotherapy [1]

It is also called as regenerative injection therapy. This involves injection of solutions into the joint to stimulate regeneration potential. Various prolotherapy solutions are available such as psyllium oil, glycerin, phenol, etc. of which dextrose is the most commonly used solution. 2 ml of 10–50% dextrose can be injected in and around the joint space. Either single or multiple injections are needed based on severity of dislocation. This technique is indicated in laxity of the ligaments and capsule. It induces low-grade inflammation which releases growth factors. These growth factors stimulate fibroblasts which deposit new collagen fibers that strengthen ligaments and tendons.

Fig. 64.12 Injection sites for prolotherapy. A: Posterior joint space. B: Anterior attachment of disc to lateral pterygoid muscle. C: Most tender point of masseter muscle

Landmarks—prolotherapy solutions are given in the following three points (Fig. 64.12):

A. Posterior joint space—palpate the depression posterior to condyle when mouth is opened.
B. Attachment of disc to lateral pterygoid muscle—depression felt anterior to the condyle when mouth is closed.
C. Tender spot in the masseter tendon.

Injection of Botulinum Toxin [1]

The first reported use of botulinum toxin for TMJ dislocation was described by Daelen et al. in the year 1995. Botulinum toxin type A weakens the skeletal muscle when injected by preventing the release of acetylcholine at the neuromuscular junction. It can be injected into any of the masticatory muscle, but injection into lateral pterygoid muscle is effective because forward movement of condyle is prevented. The dosage used is 25–50 units of botulinum toxin. It can be injected either by extraoral or intraoral route with or without EMG guidance (Refer Chap. 33 on Botox injections).

Extraoral Technique

A 30-gauge needle is inserted into the skin 1 cm below the central zygomatic arch to the depth of 3–4 cm based on the measurements obtained from computed tomogram of the patient. The 25–50 units of toxin is deposited into the lateral pterygoid muscle following aspiration.

Intraoral Technique

Hypodermic needle electrode is inserted in the mucobuccal fold of distal root of upper second molar directed superiorly and posteriorly to the depth of 25–30 mm; the position of the needle in the lateral pterygoid muscle is confirmed by EMG reading. After aspiration, 25–50 units of toxin is deposited into the muscle.

The injection should be repeated every 3–6 months as the action of this toxin lasts within 6 months. Complications of this technique included dysphagia, dysarthria, and hemorrhage.

Arthroscopy [1] **(Refer** Chap. 63 **on Internal Derangements of TMJ)**

Arthroscopic capsulorrhaphy is done by using either laser or cautery which produces contractions. Sclerosing solutions may be injected into the joint and capsule under direct visualization using arthroscopy.

Arthroscopic Capsulorrhaphy

A 1.7 mm TMJ arthroscope is introduced into the fossa portal following the double puncture technique described by McCain. Once the arthroscope reached the anterior recess, the second puncture is done using triangulation technique. Deep lesional burns are created in the oblique protuberance, laterally and the posterior wall using either bipolar cautery or holmium laser which causes shortening of the capsule.

Arthroscopic Eminectomy

The arthroscope is introduced into the joint through infero-lateral approach, and then the articular eminence is reduced by electronic shaver which is introduced by triangulation technique.

64.6.2.3 Surgical Treatment

The following is a brief description of surgical procedures which are commonly employed for treating TMJ dislocation.

Capsular Tightening Procedure

Temporomandibular joint is completely covered by capsule which is attached superiorly from all around the rim of the glenoid fossa and inferiorly till the neck of the condyle. This capsule holds the joint components in position, which is later-

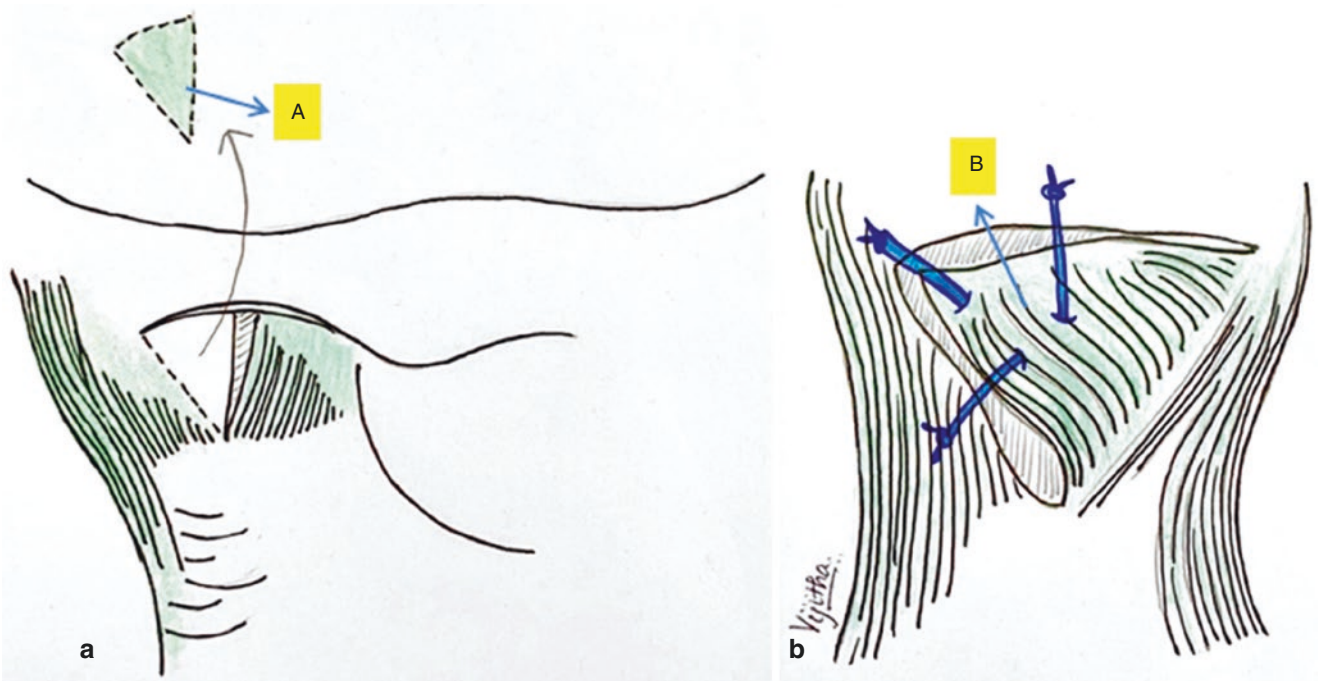

Fig. 64.13 (**a**–**b**) Capsulorrhaphy. Excised margin of the capsule. (**A**) Capsule is tightened by suturing it to the adjacent soft tissues (**B**)

ally strengthened by lateral ligament. Lax capsule is considered as one of the reasons for TMJ dislocation. So, capsular tightening procedures are done to address this problem.

Capsulorrhaphy (Fig. 64.13a, b)
This procedure was first implemented in the year 1907 by Perthes who excised a portion of the lateral capsule and sutured it together to increase the tautness of the capsule and thus restrain condyle. Later on, many modifications had been proposed including suturing of the capsule to zygomatic arch and overlapping of the capsule after making vertical incision on the capsule [9].

Creation of Mechanical Obstacle

Excessive translation of the condyle which is observed in dislocation is prohibited by creating impediment in the path of the condyle. Konjetzny (1921) had used articular disc as a mechanical impediment by bringing it forward and suturing it anteriorly. Lindemann and Mayer used articular tubercle to prevent condylar dislocation by either bending it down or placing a graft obtained from zygoma [9].

Dautrey's Procedure [10] (Fig. 64.14a, b)
Mayer (1933) created a mechanical obstacle by dislocating a part of the zygomatic arch down, in front of the articular eminence. Vertical osteotomy of the zygomatic arch and repositioning the osteotomized arch downward as a mechanical impediment has been described by LeClerc and Girard in the year 1943.

In 1967 Gosserez and Dautrey made an oblique osteotomy of the arch in front of the articular eminence extending from posterior-superior to the anterior-inferior direction. With gentle pressure towards inferior direction, a greenstick fracture was created at the zygomatico-temporal suture. The segment was then pushed downwards to create obstruction for the condylar movement. If this downfractured segment is unstable, plating can be done to prevent displacement (Fig. 64.15).

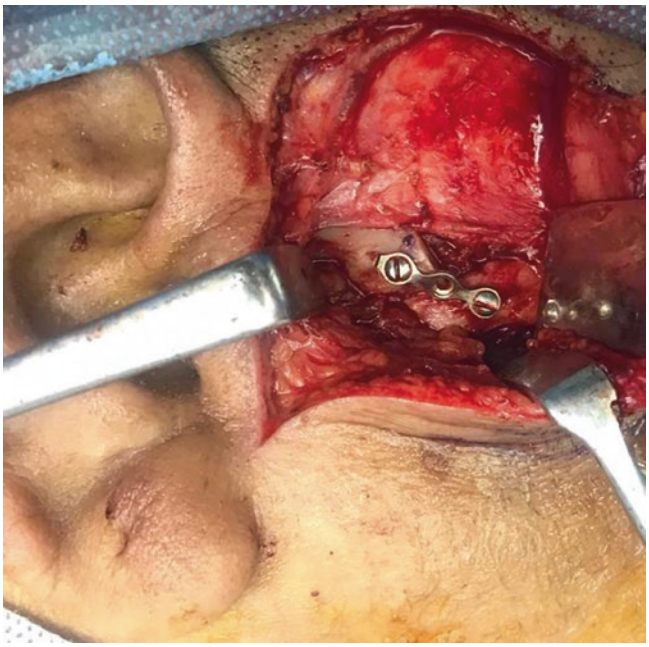

Fig. 64.15 Fixation of downfractured zygomatic arch segment using miniplates

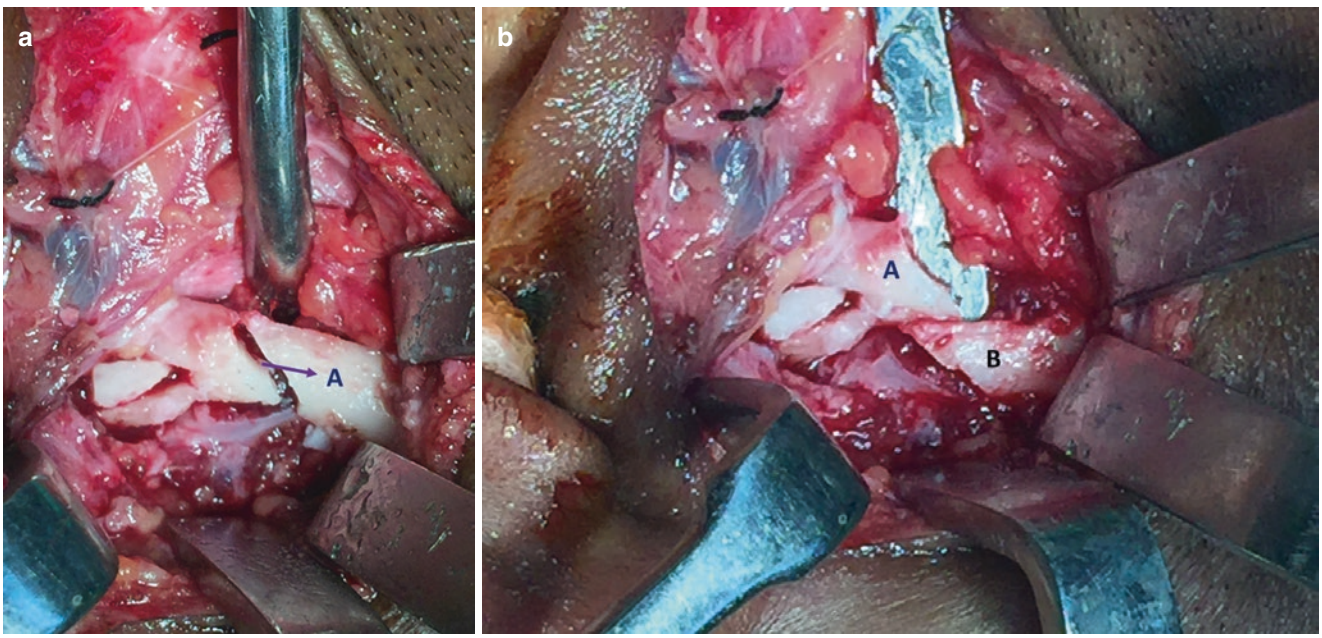

Fig. 64.14 (**a**, **b**) Dautrey's procedure. (**a**) A: Osteotomy of zygomatic arch (**b**) A: Proximal segment of zygomatic arch. B: Downfractured distal segment of zygomatic arch

The limitations of the technique include the following:

1. Not suitable for elderly individual as it may cause fracturing of the arch instead of greenstick fracture at the zygomatico-temporal suture.
2. Relocation of the fragments after repositioning [10].
3. Medial escape of the condyle as the width of the zygomatic arch is narrow.
4. Presence of a small condyle.

Glenotemporal Osteotomy (Fig. 64.16a, b and c)

Norman [10] described glenotemporal osteotomy as a definitive technique for dislocation. TMJ is exposed through any of the open surgical approaches described for TMJ, without violating the capsule. An oblique osteotomy on the articular eminence is made, following which the fragment is gently moved downwards to create a wedge-shaped defect which is grafted using bone taken from ilium, calvarium, symphysis, etc. Usually it is not necessary to fix these grafts as they stay in that wedge-shaped space created by osteotomy. Miniplates or screws can be placed on the eminence so that excessive condylar translation is prevented. Long-term results of this technique showed screw loosening and fracture of the plate.

Modifications of Norman's Procedure

Sharma et al. [11] added two modifications to the conventional glenotemporal osteotomy. Temporalis fascial flap was used to strengthen the capsule, and pterygoid dysjunction was performed to address the TMJ pain due to internal derangement which coexists with dislocation.

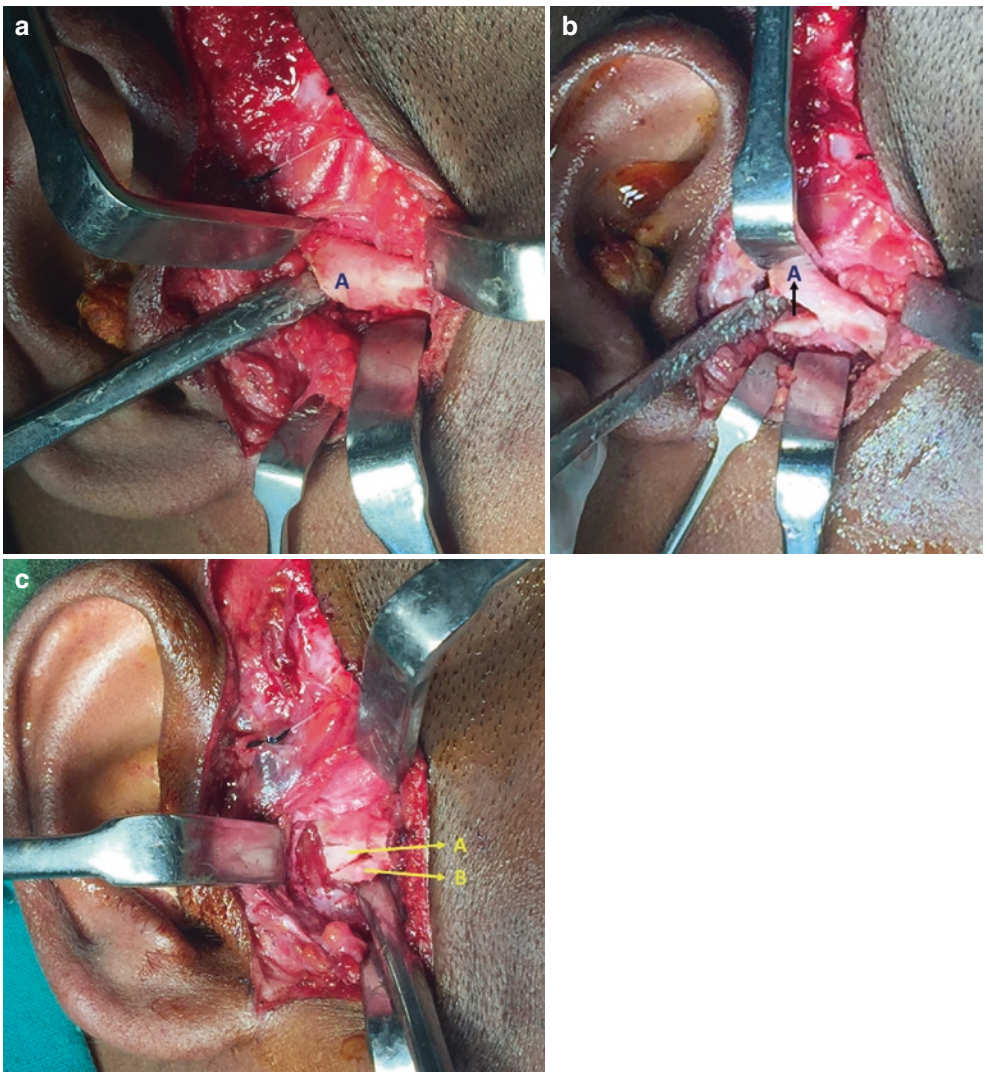

Fig. 64.16 (**a**, **b**, **c**) Glenotemporal osteotomy. (**a**) A: Articular eminence. (**b**) A: Osteotomy of articular eminence. (**c**) A: Chin graft in position. B: Downfractured articular eminence

Removal of Mechanical Obstacle

Eminectomy (Fig. 64.17a, b)

The first reported evidence of eminectomy for the treatment of TMJ dislocation was performed by Hilmar Myrhaug in the year 1951. This procedure is generally accomplished under general anesthesia or local anesthesia, or conscious sedation has also been used for patients with systemic conditions that prohibit general anesthesia. Though there are many techniques available to address this condition, this particular technique may be considered for those patients with neurological disorder, epilepsy, and advanced age [12].

Hall et al. [13] had studied the eminence configuration using 38 cadavers. The observations included the following:

1. Anteroposterior width of eminence—9–18 mm
2. Latero-medial width of eminence—16–25 mm
3. Articular tubercle to temporal bone measurement—5–14 mm
4. Deepest portion of the glenoid fossa thickness—0.1–8 mm

Articular eminence thicknesses in anterior and posterior regions were also mentioned [6]. These measurements provide guidelines while performing eminectomy procedure to avoid complications.

According to this technique, the joint may be approached through any of the incisions indicated for TMJ surgeries. Following exposure of the eminence, rotary instruments, osteotome, chisel, or piezo surgery device can be used to reduce the height of the eminence. Either total eminectomy or partial eminectomy may be done. Irregular bony surfaces and edges should be smoothened well. Segami et al. [14] described arthroscopic eminectomy where double puncture technique has been used. Motorized shaver was used to reduce the eminence.

Navigation system has also been used for accurate reduction of eminence especially on the medial side and superior surface to avoid intracranial exposure [6].

Eminectomy works by allowing free movement of the condyle over the eminence so that locking of the condyle is prevented. There are observations of reduced mouth opening following eminectomy that might be due to adhesions formed in and around the joint. This can be performed unilaterally or bilaterally [6].

The major problem associated with this technique is the excessive forward movement of the condyle than what is actually needed which leads to stretching of muscles and ligaments which is potentially injurious to the articular structures [11].

Condylotomy and Condylectomy (Fig. 64.18a, b)

Closed condylotomy is a blind procedure in which Gigli saw is used to cut the condyle as described by Kostecka [2].

Part of the condyle is removed to prevent the obstruction; at the same time, it allows the free translation of the condyle along the articular eminence.

Preauricular incision is used to approach the condyle, and then the condyle is sectioned at the inferior level of the articular eminence.

Creating New Muscular Balance

- *Temporalis Scarification* [1]
  A portion of the temporalis muscle is removed by this technique so that the scarring and fibrosis induced by surgery restrict the mouth opening.
- *Lateral Pterygoid Myotomy* [1] (Fig. 64.19a, b)

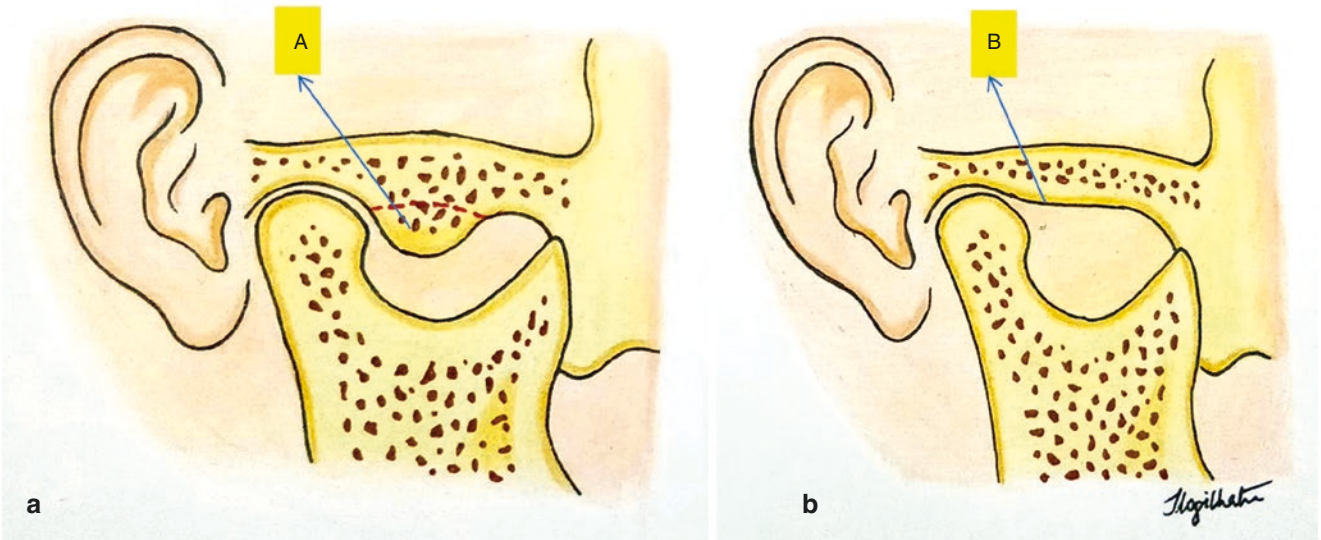

Fig. 64.17 (**a**–**b**) Eminectomy. (**A**) Articular eminence (**B**) Eminence removed

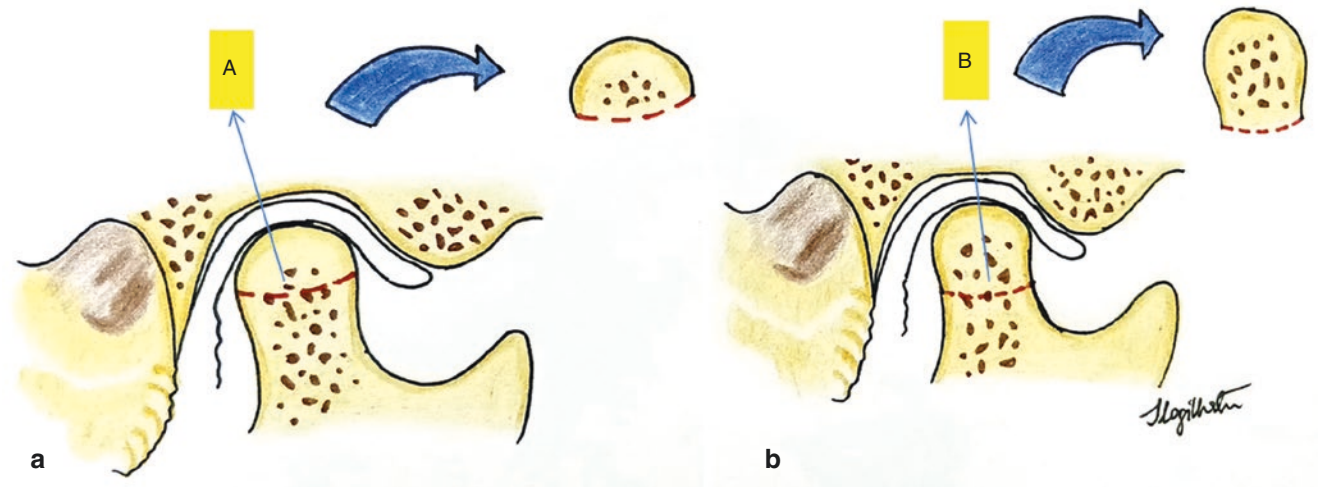

Fig. 64.18 (**a**–**b**) Condylectomy. (**A**) High condylectomy (**B**) Low condylectomy

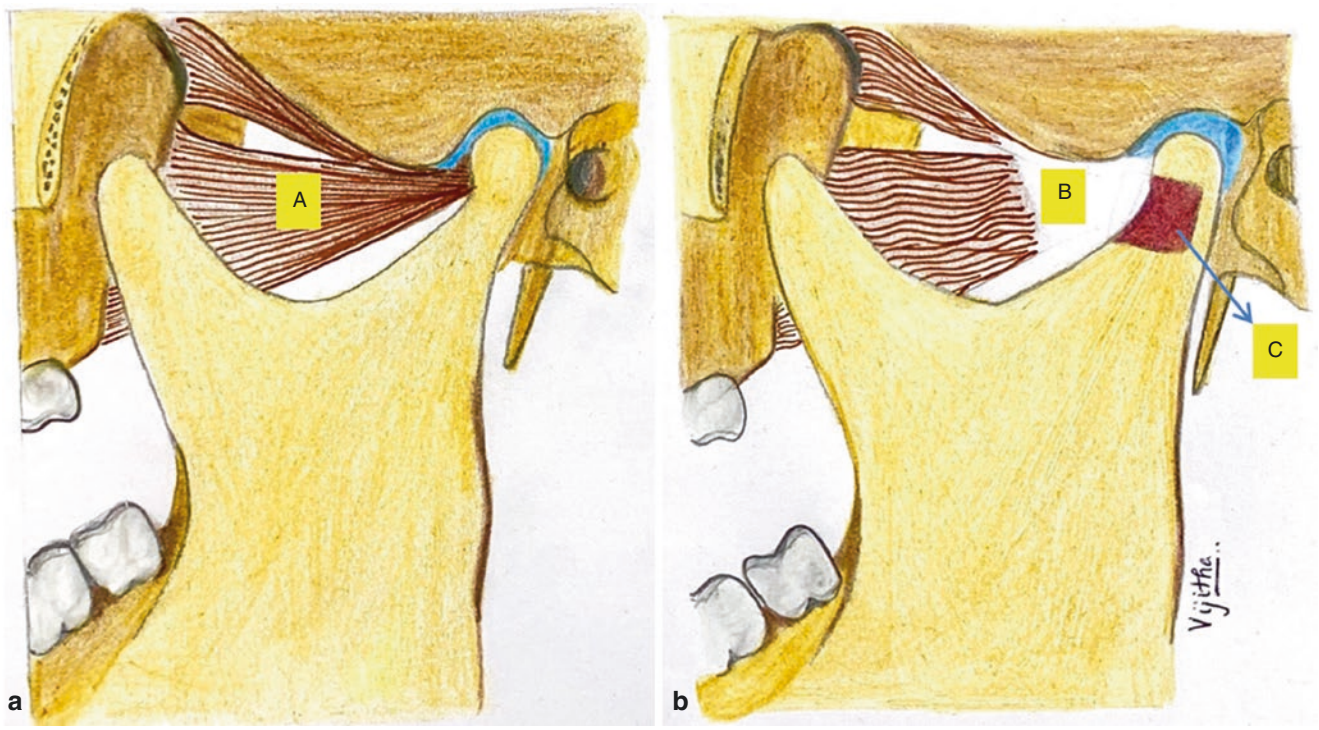

Fig. 64.19 (**a**–**b**) Lateral pterygoid myotomy. (**A**) Lateral pterygoid muscle (**B**) Part of the lateral pterygoid muscle excised (**C**) Barrier is placed

This technique was described by Bowman in 1949. This procedure may be performed through either intraoral by making incision along the anterior border of the ramus from coronoid to the third molar region or extraoral route through preauricular approach. Dissection is carried out to visualize the attachment of lateral pterygoid to condyle and capsule, and the attachment is then severed and then silastic sheet fixed to the anterior surface of the condyle. This results in restriction of mouth opening for short period of time.

Pterygoid Dysjunction

It is an intraoral procedure done to reduce the activity of the lateral pterygoid on the condyle so that forward movement of the condyle is reduced [11].

Intraoral vestibular incision is made in relation to the upper molars, and dissection is done to expose the posterolateral wall of the maxilla and pterygomaxillary suture. Pterygoid chisel is used to separate the pterygoid plates from maxilla, so that lateral pterygoid muscle along with pterygoid plate is detached.

64.6.3 Chronic Protracted Dislocation (Box 64.7)

Box 64.7 Management of Long Standing Dislocation

Conservative

1. Manual reduction
2. Continuous elastic traction using bite block
3. Indirect reduction
   (a) Using a wire passing in the mandibular angle region
   (b) Using a hook in the sigmoid notch

Surgical procedures

1. Joint procedures
   (a) Condylotomy, condylectomy
   (b) Myotomy
   (c) Joint prostheses
2. Procedures not involving the joint
   (a) Sagittal split osteotomy
   (b) Vertical ramus osteotomy
   (c) Inverted L osteotomy
   (d) Midline mandibulotomy

Initially conservative method is employed to reduce dislocation. Manual reduction is attempted either using local anesthesia, sedation, or general anesthesia. Continuous elastic traction may also be applied with the bite block in the posterior region which might reduce the dislocation [15].

Indirect reduction can be performed by inserting wire into the mandibular angle region, or bone hook is passed into the sigmoid notch through a small incision made on the angle region (Rowe and Killey 1968) [4]. Lewis in 1981 used Bristow's elevator for the reduction by giving downward and posterior force.

In long-standing persistent dislocation, patient might have functional movement due to pseudo joint formation in front of the articular eminence. In this scenario, the goal is to establish the occlusion by osteotomy procedures such as sagittal split osteotomy or vertical ramus osteotomy.

Adekeye (1976) [4] suggested inverted L osteotomy instead of vertical and horizontal osteotomies due to the coronoid hindrance. Lateral and medial surface of the ramus is exposed either through submandibular incision or intraoral incision extending from the coronoid process along the anterior border of the ramus to the vestibule of second molar region. Medial osteotomy (horizontal cut) is performed 4–5 mm above and posterior to the lingula and parallel to the occlusal plane. Vertical cut is performed from the distal aspect of the horizontal cut to the mandibular angle. Then the dentate segment is manipulated to get the desired occlusion. Proximal and distal segments are fixed with miniplates.

Other methods such as condylectomy, condylotomy, and myotomy (as described in previous sections) and TMJ prostheses are proposed to treat this condition [4].

Ratten et al. described midline mandibulotomy to reduce the dislocation [16].

Through the intraoral approach, the mandible is sectioned in the midline, and then each hemimandible is manipulated to reduce the dislocation on each side separately. Following reduction, mandibular midline is fixed with miniplates.

64.7 Recent Advances

64.7.1 Raja's Coronoid Repositioning Technique [17]

This is a new technique performed for the management of TMJ dislocation. Intraoral vertical incision extending from the coronoid process to the molar region is made, and the coronoid and anterior border of ramus is exposed, and then coronoid is osteotomized and inferiorly pulled along with temporalis muscle and fixed with miniplates on the lateral surface of the ramus. The advantage of this technique is that the temporalis is stretched to give new muscle balance and restricts the excessive opening of the mouth.

64.7.2 Wolford's Anchoring Technique [18] (Fig. 63.15)

This technique prevents the dislocation by using two Mitek screw with attached suture material. One screw is attached to the zygomatic arch and another to the posterolateral surface of the condyle, and the sutures are tied together to get the desired mouth opening. These suture materials act as artificial ligaments that control condylar movement.

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64.8 Case Scenarios

Case 1 (Fig. 64.20a–d)

Patient A 24-year-old male, with complaints of locking of the jaw after wide mouth opening

Preoperative open mouth OPG revealed bilateral TMJ dislocation (Fig. 64.20a)

OPG demonstrates:

- Displacement of condyle out of the glenoid fossa bilaterally
- Condylar head is antero-superior to articular eminence on both sides

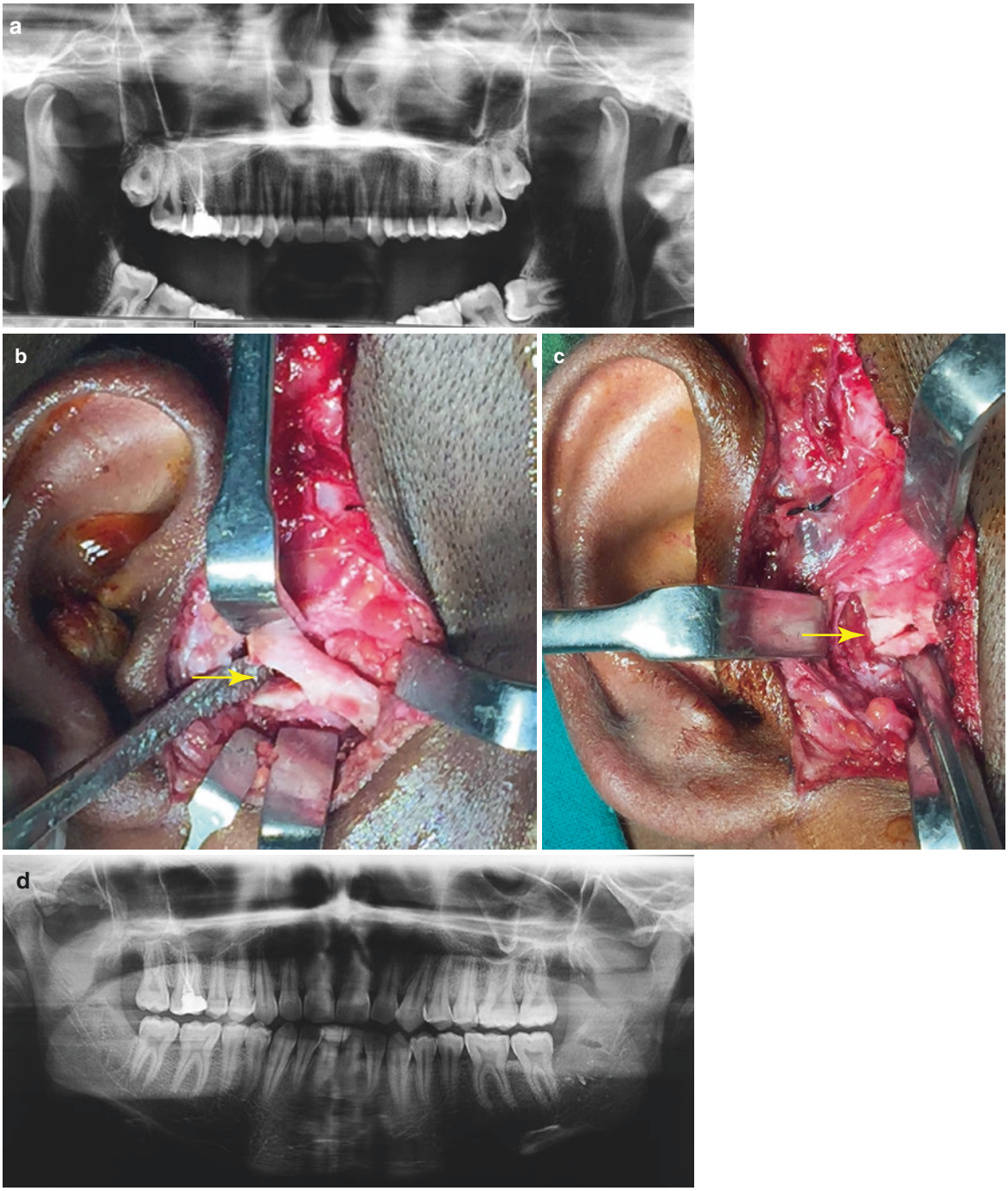

Fig. 64.20 Case scenario 1 (**a**) Pre op "open mouth "OPG showing bilateral dislocation of TMJ. (**b**) Osteotomy of articular eminence (yellow arrow). (**c**) Chin graft sandwiched between segments (yellow arrow). (**d**) Post op OPG showing increase in the height of articular eminence on right side

Surgical plan Augmentation of articular eminence by glenotemporal osteotomy on the right side. The right side was chosen for intervention as the symptoms were pronounced on that side

Surgical procedure

- Right TMJ was approached through preauricular incision with temporal extension
- Osteotomy of articular eminence (Fig. 64.20b)
- Wedging the chin graft between the osteotomy cut of articular eminence (Fig. 64.20c)

Postoperative OPG
OPG demonstrating increase in the height of articular eminence on the right side of TMJ (Fig. 64.20d)

Case 2 (Fig. 64.21a–d)

Patient A 54-year-old female, with pain in front of the ear and difficulty in closing the mouth following yawning

Preoperative open mouth OPG demonstrated bilateral TMJ dislocation (Fig. 64.21a)

OPG demonstrates:

- Displacement of condyle out of the glenoid fossa on both sides
- Condylar head is antero-superior to articular eminence

Surgical plan Inferior repositioning of the coronoid on the right side. The right side was chosen for surgery as the patient complained of more pain on that side

Surgical procedure

- Right coronoid was exposed through vestibular incision extending from lower second molar to anterior border of the ramus.
- Osteotomy cut was made from sigmoid notch to anterior border of the ramus (Fig. 64.21b).
- Trough was created on the lateral surface of the ramus just below the osteotomy cut.
- Coronoid was pulled down over the trough and fixed with miniplate (Fig. 64.21c).

Postoperative OPG (Fig. 64.21d)
Open mouth OPG demonstrating the condyle within the glenoid fossa on both the sides and coronoid fixed inferiorly on the right side

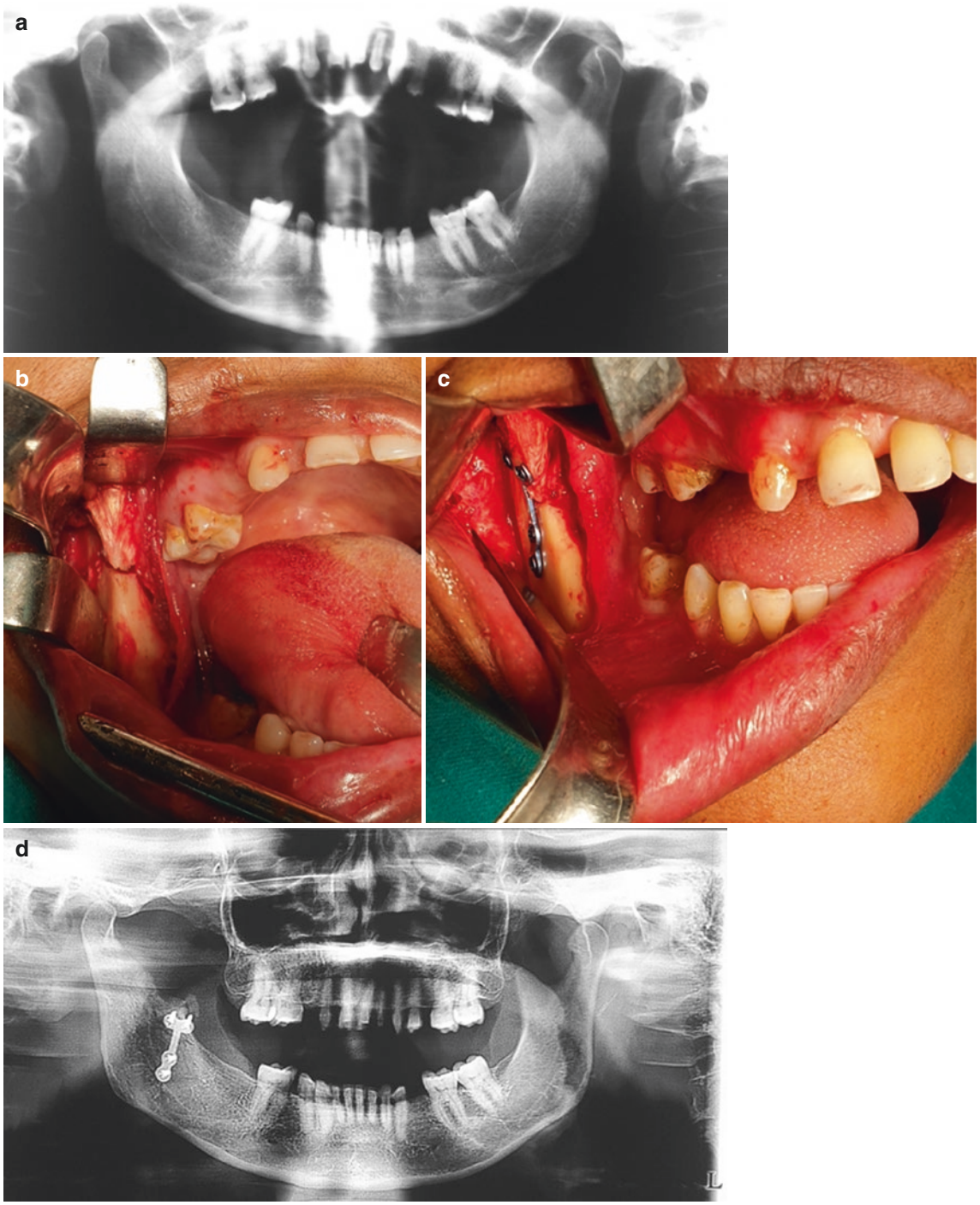

Fig. 64.21 Case scenario 2 (**a**) Pre- op "open mouth" OPG showing bilateral dislocation of TMJ. (**b**) Osteotomy of coronoid. (**c**) Inferiorly positioned coronoid fixed with 2 mm miniplate. (**d**) Post -op "open mouth" OPG showing normal positioning of condyle in relation to articular eminence

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Suggested Reading

Yasso MM, Fahmy MH, Mohamad NS. Comparative study between Autologous Blood and Platelet Rich Plasma in Treatment of Recurrent Temporomandibular Joint Dislocation. Alex Dent J. 2018;43:101–107.