

Insight Into Temporomandibular Joint Dislocation And Treatment Perspectives - Review Of Literature

Abstract

All the articles in literature addressed only a specific type of dislocation. The aim of this review is to summarise and review papers relating to the temporomandibular dislocation and to concise changing trends in the treatment options that are currently popular as discussed in literature. A thorough computer literature search was done using the medline database. Key words like temporo-mandibular joint dislocation were used for the search. Case reports/series, and reviews that documented the type of dislocation, treatment done and outcome of treatment were included in the study. A total of 163 articles were reviewed out of which 64 were found relevant. Of these, 29 were case reports, 19 were case series 11 were original articles and 5 were review articles. 19 percent of the cases included were unilateral dislocation while rest were bilateral in nature with more predilection for females. We have seen a changing trend of treating temporomandibular joint dislocation which range from the conservative management for acute dislocations while autologous blood injections to osteotomy followed with graft insertion. It was concluded in the study that the surgical treatment of temporomandibular joint dislocation is left entirely to discretion of the surgeon.

Key Words

TMJ Dislocation, Temporomandibular Joint, Surgery

Introduction

If the luxation be left unreduced the patient will remain a living memorial of the surgeon's ignorance or inattention-Sir Astley Cooper^[1]

Temporomandibular joint (TMJ) dislocation is defined as an excessive forward movement of the condyle beyond the articular eminence with complete separation of the articular surfaces and fixation in that position.^{[2],[3]}

Dislocation is the complete separation of the articular surfaces with fixation in an abnormal position. The facial profile changes while the ligaments around the joint often stretch with intra-articular effusion, causing severe discomfort and difficulty with speech and mastication from muscle spasms and joint pain.^{[4],[5]}

While subluxation or habitual luxation refers to excessive abnormal excursion of the condyle secondary to flaccidity and laxity of the joint capsule, recurrent dislocation is characterized by a condyle that slides over the articular eminence, catches briefly beyond the eminence, and then returns to the fossa.^{[6],[7]}

Dislocation of the temporomandibular (TMJ) represents 3% of all reported joint dislocations. Acute dislocation is not a cause of concern to the surgeon, as almost always this can be reduced by manual

reduction under local anaesthesia or sedation.^[8]

There is significant literature relating to the surgical treatment options of TMJ dislocation, considering one or the other type of treatment without comparison of treatment option.

The aim of this article is to review, analyze, summarize the management options and the changing trends available for the different types of TMJ dislocation reported in the literature in last decades.

Methods and Materials

A thorough digital search in literature was performed using the Pubmed search. Key words temporomandibular joint dislocation was used for the search. The reference list of the reviewed articles was also searched from medline and google scholar search engines for cited and related literature. Case reports/series, and original articles that documented the type of dislocation, number of cases treated in the series and original articles were taken into account.

Results

A total of 163 articles were reviewed out of which 64 were found relevant. Of these, 29 were case reports, 19 were case series and 11 were original articles and 5 review articles. 34 cases were acute, 13 cases

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were chronic longstanding and 132 cases were chronic recurrent TMJ dislocations (Table 1). Etiology was predominantly trauma in 57% of cases, other causes like

Article Type	Total
Case Reports	29
Case Series	19
Original Articles	11
Review Articles	5

Etiology	Percentage
Trauma	57
General anesthesia	32
Ass systemic disease	11

Type Of Dislocation	Percentage %
Unilateral	19
Bilateral	81

Type Of Dislocation	No. Of Cases Reported
Acute	34
Chronic Longstanding	13
Chronic Recurrent	132

Treatment Options
• Prophylactic
• Conservative
• Surgical

First author	Dislocation	No. Of patient	Sex	Treatment	Follow Up	Side effects & complication	Recurrence
Olga Vazquez ⁹	Neurogenic TMJ	4	3 Male, 1Female	Botox 25 Iu	5month - 1year	None	2
Vladimir Machon ¹⁰	Chronic dislocation	25	6 Male , 19 Female	Autologous Blood Injection	1 Year	None	9
Kummoona ¹¹	Chronic recurrent dislocation	7	7 Male	Eminectomy	1 - 3 Yrs	Temporary facial weakness -1 pt	Not reported
G.Undt ¹²	Chronic recurrent dislocation	3	1 Male , 2 Female	Eminectomy Dautrey ¹⁴	1 - 2 Yrs	None	None
Gadre ¹³	Chronic subluxation	20	12 Male, 8 Female	Procedure	19 - 60 Month	None	None
Segami ¹⁵	Habitual dislocation	11	4 Male, 7 Female	Arthroscopic Eminoplasty	(6 ± 36 Months)	None	1
Kobayashi H ¹⁶	Recurrent dislocation	12		Dautrey Procedure	1.5 - 8 Years	None	None
Lawlor MG ¹⁷	Recurrent dislocation	10		Dautrey Procedure		None	Not reported
Poirier F ¹⁸	Recurrent dislocation	94	26 Male, 78 Female	Dautrey Procedure	14 Month	None	Not reported
Shibata ¹⁹	Habitual TMJ Dislocation	9	4 Male, 5 Female	Miniplate Eminoplasty	9 To 54 Months.	Mental retardation Cerebral infarction	Miniplate fracture-1
Hasson O ²⁰	Chronic subluxation	3	3male	Autologous Blood Injection		Not reported	1
G.Undt ²¹	Chronic subluxation	9	9 females	Le Clerc Blocking Procedure	2.5 - 5years	Clicking associated with pain-3 patient	3
I-Y. Huang ²²	Chronic recurrent dislocation	6	5 Male, 1 Female	Closed Manipulation And Imf	6month - 1year	2 patient didn't respond well, declined further treatment	None
Farlane M ²³	Chronic dislocation	7	4 Male, 3 Female	Lateral Pterygoid Myotomy	1 -2 Year	None	None
A.M. Medra ²⁴	Chronic dislocation	60	40 women & 20 men	Modified Genotempor-al OsteotomyWith Bone Graft Insertion	1-8 Years	Temporary paralysis of the frontal branch of the facial nerve in 5 patients	1 None
Kuttenberger J. ²⁵	Chronic dislocation	20	Not mentioned	Miniplate Eminoplasty	2 To 7 Years.	7 patients miniplate fracture	6
Emad T. Daif ²⁶	Chronic recurrent dislocation	30	20 Male, 10 Female	Autologous Blood Injection	1 Week - 1 Year	Severe Post operative pain	None
Kai-Yuan Fu ²⁷	Chronic recurrent dislocation	5	-	Injection Of Botulinum Toxin Type A	3 Months - 2 Years	None	None
Vasconcelos BC ²⁸	Chronic recurrent TMJ dislocation	18	10 Male, 8 Female	Eminectomy	3 - 63 Months	Temporary post operative pain	None
		10	7 Male , 3 Female	Miniplate	48-63 months	Fracture of plate -2 patient	

excessive mouth opening from yawning, laughing, singing, prolonged mouth opening dental procedures, forceful mouth opening under the general anaesthetic procedure like laryngeal mask airway insertions in 32% cases and 11 % accounted for those under effect of medications secondary to systemic diseases (Table 2).

Discussion With Review Of Various Treatment Modalities:

Dislocation can be partial (subluxation) or complete (luxation), bilateral or unilateral^{[28],[29],[30]}, Acute, chronic long standing, chronic recurrent. Also, it can be anterior-medial, superior, medial, lateral or posterior dislocation and the cause is either spontaneous or induced by trauma^{[31],[32],[33],[34],[35],[36],[37]} forceful mouth opening from endotracheal intubation with laryngeal mask or tracheal tube, dental procedures, endoscopy^{[38], [39], [40], [41], [42], [43], [44], [45], [46], [47], [48]}, excessive mouth opening from yawning^{[49],[50]} laughing, vomiting^[51] and also during seizures from the effect of major tranquilizers / neuroleptics^{[52],[53]} used for neuro-psychiatric diseases or secondary to systemic diseases like Marfans syndrome, Ehlers danlos syndrome.^[54]

Diagnosis:

Diagnosis of temporomandibular joint dislocation is based purely on clinical

findings and clinical history which can be aided by the radiographic findings. The patients commonly present with a chief complaint of inability to close the mouth/mastication, severe pain, deviation of chin, unilateral occlusion.^{[55],[56]}

As described by Sir Astley Cooper(1837)^[1] “the appearance is just that of a person when yawning. There is a depression just before the meatus auditorius, from the absence of the condyloid process from its cavity, and there is a projection of the cheeks, from the coronoid processes being advanced towards the buccinators”.

In case of chronic & long standing dislocation, patient would present with any of the signs mentioned above but with more frequency of dislocation. The patient do not present with severe pain, which is in contrast with that of acute dislocation. It generally results from the undiagnosed or inadequately reduced acute dislocation cases. TMJ hypermobility is noted only when it interferes with smooth mandibular movements. Hypermobility was found to be present in 70% of population, may predispose to dislocation and subluxation.^{[57],[58]}

Boering et al found incidence of subluxation as 1.8% in population of 400 patients with symptomatic TMJ disorders.

Treatment Perspectives

Typically, the management of TMJ dislocation depends on whether it presents as an acute, chronic or recurrent condition, accordingly all the available treatment options given in the literature have been categorized as conservative or surgical.

The choice of treatment ranges from simple closed reduction, intraoral splint and traction to a complicated osteotomies with bone grafts.

The term acute refers to untreated dislocation upto 72 hrs from the time since it got dislocated.

Recurrence in dislocation is been used synonymously with chronic in literature^[58]. Dislocated joint left untreated for days to years is referred as long standing. In terms of position the antero- superior dislocation of the temporomandibular joint is reported most commonly in the literature.

Posterior dislocations typically occur secondary to a direct blow to the chin. The mandibular condyle is pushed posteriorly toward the mastoid. Injury to the external auditory canal from the condylar head may occur from this type of injury.^{[58],[59]}

The term anterosuperiorly and superolaterally are used interchangeably in the literature and in agreement with

Worthington^[60], the correct nomenclature should be anterosuperior dislocation as the condyles were placed anterior to the fossa and superiorly into the temporal fossa.^[10]

Prophylactic Methods

Prolonged rest for TMJ for at least 1-2 months aided by painkillers and soft diet for the joint to overcome the stress it has suffered during dislocation episode.

Conservative Methods

Hippocrates in 5th century B.C first described mandibular dislocation and its treatment, his method of reducing a dislocated temporomandibular joint has survived ages and is still universally accepted.^[61]

In case the hippocrates traditional method of manual reduction fails, the wrist pivot method which is slight modification of the original one as suggested by Lowery et al has been quite effective.^[62]

Appliance therapy has also been used with fulcrum in the molar region and extra oral extension for elastic traction in case the traditional methods tends to fail to relocate condyle in normal anatomical position as suggested by Adekeye et al^[63]

Treatment with botulinum toxin offers the option of minimal invasive therapy under outpatient conditions. Toxin prevents the release of acetylcholine at neuronal synapses. The resulting neuromuscular blockade causes paralysis of skeletal musculature and smooth muscles supplied by the parasympathetic system. Potential contraindications for treatment with botulinum toxin include neurological conditions affecting the motor endplate such as myasthenia gravis or Eaton- Lambert syndrome. Due to passage across the placenta, the use during pregnancy is also contraindicated.^{[64],[65],[66]}

Surgical Procedures:

These can be broadly classified into basic principles of A) Anti translatory procedures B) Obstructing C) Obstruction clearance D) Reduction of muscular forces Anti translatory procedures basically refers to the prevention of the forward translatory movement of the condyle which included capsular plication, capsulorrhaphy, anchoring of the coronoid process to zygoma, these treatments are of out of date with better promising techniques now replacing them.^[58]

Obstructing procedures included soft tissue and bony procedures to cause hindrance to abnormal movements from its normal path. Soft tissue procedures included Konjetzny^[67] method of surgically creating a closed lock and others followed were by bony procedures included one devised by Dautrety^[14] and later modified by Le Clerc^[68] in which the zygomatic arch was cut vertically in front and lowered aiding in resistance to the forwardly gliding of the condyle, a procedure still followed universally.

Obstruction clearance procedures had been devised to remove the obstacle's in the condylar paths that may evoke the dislocation of condyle 1) Discectomy using interpositional adipose tissue. 2) Eminectomy - popularized by Myrhaug,^[69] which is still one of most accepted modality or chronic recurrent dislocation.

Eminectomy though widely being used these days it does not address the uncoordinated muscle activity and the lax capsule or ligament, and this had made some surgeons to adopt a modified mini-invasive eminectomy and relocation of the lateral pterygoid muscle or redirection of the temporalis muscle which aims to act on both the obstacle and the cause with respect to restoration of TMJ biomechanical constraints .However, about 95% success rate have been recorded after eminectomy and use of metallic implants on the articular eminence.^{[70],[71],[72]}

Combined procedure eliminating the blocking and limiting translation procedures included a) Lateral pterygoid myotomy b) Condylotomy c) Condylectomy procedures.

Release of the lateral pterygoid muscles will directly alter the musculature.^[73] This procedure involves excision of the insertion of the lateral pterygoid muscle at the condylar neck and joint capsule. The operation attempts to disable the lateral pterygoid muscles, allowing only rotational movement of the condyle.

When temporalis muscle is short and contracted in nature, Laskin had proposed an intraoral surgical approach to the muscle via a coronoid incision to do a temporalis myotomy^{[74],[75],[76]}. Where access is difficult, when there is fibrosis or adhesions of muscle and cases where reunion of the muscles may occur, coronoidotomy with or without condylotomy^{[77],[78]} is advocated

Gotlieb advocated condylectomy and coronoidectomy procedures in cases where there is ankylosis but there is possibility of entering the base of the skull and excessive bleeding from pterygoid plexus, internal maxillary and middle meningeal vessels.^[79]

Shorey and Campbell et al^[80], classified the treatment for temporomandibular joint dislocation depending upon the alteration in the stability factors being ,integrity of ligaments associated with the joints , activity of the musculature on the joint , bony architecture of the joint surfaces. The article summarizes the validity of treatment option eminectomy as the treatment of choice as far as long term resolution of recurrent dislocation is desired.

In another review article by Wijmenga J.P.H. 40 cases of long standing dislocation of temporomandibular joint has been discussed in relation to the treatment modalities devised. Surgical method suggested were open reduction, condylectomy and osteotomies sometimes extended with coronoidectomy, in difficult cases condylectomy was preferred. Post condylectomy if neararthrosis was formed with a good range of mandibular movement and malposition , some form of osteotomy was indicated.^[81]

V. I. Ugboko presented a review dealing with the aetiology prevalence and treatment of tmj dislocation in the Nigerians with a sample size of 96 patients and this study has shown that excessive mouth opening while yawning is the commonest cause of temporomandibular joint dislocation in Nigerians, and conservative approaches to management remain quite effective irrespective of the duration and clinical subtype. The best choice of surgical technique had been unanimously mandibular osteotomy.^[82]

Shou Shan Bu et al reported that manual reduction is the first choice for Anterosuperior dislocation which was followed by manual reduction with forcep mouth gag and in case close reduction not possible , one has to go for the open reduction, condylectomy with or without arthroplasty.^[83]

Author had suggested the manual reduction with ferguson mouth gag under local anesthesia , when the

conventional manual reduction had failed to relocate condyle along with chin cup and head gear to exert a continuous posterior traction on the condyle, in case of anterosuperior dislocation^[84]

Kummoona et al described surgical reconstruction of TMJ for seven patients suffering from chronic subluxation & dislocation in which conservative methods have failed and reported successful outcome after long term followup.^[11]

Undt G described treatment of recurrent mandibular dislocation in patient who underwent blocking procedures of Leclerc and Girard as modified by Gosserez and Dautreuil and reported high incidence of clicking and pain on long term follow up, which was not present pre operatively.^[21]

Vasconcelos B C et al has reported a rare case of posterior dislocation in intact mandibular condyle which was reduced under general anesthesia using zygomatic hook placed in mandibular notch.^[55]

Deng M et al had discussed the use of endoscopically assisted reduction of long standing TMJ dislocation, which sounds promising to medically compromised individual, as it is a minimally invasive procedure, who cannot tolerate open procedures.

Güven O presented a retrospective study on management of chronic recurrent TMJ and compared the free excursions of the condyles achieved in the patients treated by two different techniques and found that maximum interincisal openings were higher in the patients treated by eminectomy when compared with the patients who had eminoplasty.^[85]

Inverse temporomandibular joint dislocation is a rare and unique entity reported by R M Aleman, with symptoms apposite to conventional dislocation, where the patient has inability to open the mouth with a concave profile. A successful closed reduction was achieved under sedation.^[86]

B C Vasconcelos et al conducted a study to compare two types of treatment for chronic mandibular dislocations, eminectomy and miniplates and concluded that the eminectomy had less chance of recurrence without creating articular damage, and with miniplates, the chance of recurrence increased because there is always the possibility of the miniplate fracturing.^[28]

Spanio et al has reported the intracranial dislocation of condyle wherein the temporal craniotomy was performed and condylar head was successfully tracted downward on to the glenoid fossa which was inserted into the mandibular angle.^[87]

Subhas Chandra Debnath et al reported a case of a long-standing dislocation of the temporomandibular joint which was successfully treated in our department by bilateral vertical-oblique osteotomy of ramus extraorally without internal fixation when number of conventional modalities failed to reduce displaced condyle.^[88]

Lee S et al had reported prolonged bilateral dislocation of the mandibular condyle which was simply reduced by a midline mandibulotomy without any complications compared to other surgical techniques which were often associated with the complications.^[89]

A.S.R. Pinto et al reported the use of autologous blood and adjunctive face lift bandage in the management of recurrent temporomandibular joint dislocation^[90]

A.M. Medra reported management of chronic recurrent dislocation and hypermobility of the temporomandibular joint with glenotemporal osteotomy and bone grafting with success.^[24]

Conclusion

It was seen that female had a greater tendency for dislocation as compared to males in our study. Change of trend was seen in the management of TMJ dislocation. The more complicated and less known of treatment may does not offer best treatment outcome, therefore conservative management must always be kept in mind before opting for the more invasive surgical techniques which should be done after thorough assessment and treatment planning. Surgical treatment must therefore be based on the etiology, duration, symptoms and the experience of the surgeon. It was observed unanimously in review that all surgeons prefer closed reduction for dislocation primarily failing which open reduction is done as far as acute dislocation are concerned. For chronic recurrent dislocation the trend has been changing from condylectomy in '80's to eminectomy in 90's and osteotomies along with autologous injections in 21st century. Hence we conclude the surgical treatment of TMJ dislocation is left

entirely to discretion of the surgeon.

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