

MANAGING TEMPOROMANDIBULAR JOINT DISLOCATION IN IBADAN: A REVIEW OF 11 CASES

V.N. Okoje, T.O. Aladelusi, and T.A. Abimbola

Department of Oral and Maxillofacial Surgery, University College Hospital, Ibadan

Correspondence:

Dr. T.O. Aladelusi

Dept. of Oral and Maxillofacial Surgery,
University College Hospital,
Ibadan
drtimmylee@gmail.com

ABSTRACT

Aim: The study presents a case series which evaluates the presentation, management and outcome of TMJ dislocation in a tertiary health centre in Nigeria.

Materials and methods: Case review of 11 patients with TMJ dislocation seen in the University College Hospital (UCH) Ibadan over a period of 10 years. The criteria for the diagnosis of TMJ dislocation were based on history, clinical examination and radiologic findings.

Results: Mean age of patients was 44.4 years (SD +/-15.9years); age range was 25-65 years with 4 males and 7 females. Aetiology was trauma in 4 cases, wide mouth opening in 6 cases and unknown in a patient. There were 7 acute presentations, 2 recurrences and 2 chronic presentations; bilateral anterior presentation in 10 cases, unilateral (right) anterior presentation in 1 case. 4 of the acute cases were successfully managed using the Hippocrates manoeuvre, 1 had the manoeuvre under GA, and 2 had spontaneous reduction. All recurrent cases were successfully managed with the Hippocrates manoeuvre and IMF. Fifty percent of the chronic cases were successfully managed with the Hippocrates manoeuvre. Follow up was ≤ 2 weeks in 7 of the cases.

Conclusion: The pattern of presentation of TMJ dislocation in the above named hospital was anterior dislocation, the female gender predominance, aetiology of wide mouth opening, as well as early presentation. A conservative method of management – the Hippocrates manoeuvre – was effective in most cases irrespective of duration of dislocation. Most patients had a poor attitude to follow up.

Keywords: Temporomandibular joint, Dislocation, Conservative management

INTRODUCTION

Temporomandibular joint (TMJ) is a bilateral synovial articulation between the condyle of the mandible and glenoid fossa of the temporal bone. It is a bi-articular hinge joint that allows the complex movements necessary for mastication, deglutition, talking and yawning. It is one of the most complex as well as most utilized joints in the human body.¹

In certain situations, when the condylar head goes beyond the glenoid fossa in either an anterior, posterior, medial, lateral, or superior direction, a TMJ dislocation results. The principles for diagnosis and treatment of TMJ dislocation were proposed by Sir Astley Cooper who introduced the terms complete dislocation (luxation) and imperfect dislocation (subluxation) in 1932.² These terms have been further explicated upon or discussed by several authors. TMJ dislocation (“Open lock”) is a painful condition in which

there is complete displacement of the mandibular condyles from its articulating surface within the glenoid fossa, this displacement is not reduce-able by the patient, hence necessitating presentation in the hospital³. Subluxation, however refers to a condition in which the joint is transiently displaced without complete loss of the articulating function, and is usually self-reduced by the patient². TMJ subluxation and dislocation though uncommon, accounting for less than 3% of all reported dislocated joint in the body,² and are very unpleasant and distressing conditions to patients.⁴

Despite a variety of classification systems, temporomandibular joint dislocation is most commonly divided into three categories: acute, chronic persistent, and chronic recurrent.³ Acute dislocations could be spontaneous but it is usually associated with aetiologies, including excessive mouth opening during

vomiting, yawning, laughing and singing; forceful mouth opening for endotracheal intubation; and prolonged mouth opening during a lengthy dental/ENT procedure and endoscopy. There have also been reports of acute dislocation following seizures, trauma and spasm of the masseter, temporalis, and internal pterygoid muscles resulting in trismus thus preventing return of the condyle to the temporal fossa.

Patients with TMJ dislocation often present with inability to close the mouth, depression of the preauricular area, severe pain in the TMJ region and associated muscles, hypersalivation, elongation of facial profile, tension of muscles of mastication, amongst others.² Acute TMJ dislocation is associated with more severe limitation in jaw functions. This is alarming to the patients prompting early presentation usually within the first day of occurrence, as seen in majority of the patients in this study. Patients with history of recurrence also presented very early probably due to an awareness of where to seek health care services. This finding is similar to reports by Ugboko *et al* which suggested that early presentation is due to the discomfort and disfigurement encountered by the patients.⁴ Acute dislocations are typically isolated events, which when managed appropriately, usually have no long-term sequelae.⁵

Acute dislocations may however predisposes an individual to progressing to the spectrum of chronic dislocations. Chronic dislocations include acute dislocations that are not self-limiting and progress without treatment (usually referred to as chronic persistent), and chronic recurrent dislocations, wherein individuals experience multiple, recurrent dislocations as a result of everyday activities. Chronic recurrent dislocations can create significant interference in a patient's everyday life, and can become both physically and emotionally distressing.⁵

Frequent dislocation may be seen in patients with altered structural components of the joint which include lax capsule, weak ligaments, small/short and atrophic condyle, atrophic articular eminence, elongated articular eminence, hypoplastic zygomatic arch and small, poorly grooved glenoid fossa and in patient with connective tissue disease, such as Ehlers-Danlos syndrome (EDS), Marfan's syndrome or muscular dystonias^{3,5}. Factors associated with the onset of habitual dislocation include excessive yawning, singing, sleeping with the head resting on the forearm, manipulation of the mandible while the patient is under general anaesthesia, excessive tooth abrasion, severe malocclusion, edentulism (leading to overclosure), trauma and drugs, especially the anti-emetics

(metoclopramide) and phenothiazines (compazine), which produce extra pyramidal effects.⁴

TMJ dislocations could also be classified based on site (unilateral or bilateral) and direction of displacement of the condylar head (anterior, posterior, medial, lateral, superior). The most common type of temporomandibular joint (TMJ) dislocation is anterior dislocation, dislocations may however occur in any direction especially when associated with condylar fractures^{3,6}.

This article presents a case series and discusses the aetiology, types, presentation, management and outcome of TMJ dislocation seen in a tertiary health care centre in Nigeria. It also discusses the initial management, including techniques for reduction of the acute anterior dislocation of the TMJ.

MATERIALS AND METHODS

A retrospective evaluation of patients with TMJ dislocation seen in the emergency department and the dental centre of the University College Hospital (UCH) Ibadan over a period of 10 years (2004-2013) was carried out. Data retrieved from patient case files included patients' demographic data, aetiology and duration of dislocation, number of episodes, underlying illness, drug history, radiographic findings, treatment for previous and/or current episodes, and outcome including complications. The criteria for the diagnosis of TMJ dislocation were based on the history obtained from the patient and clinical examination substantiated by radiologic findings. Descriptive variables were analyzed using the Chi-square test.

RESULTS

During the study period 11 patients presented at the Accidents and Emergency unit and the Dental clinic of the UCH Ibadan, consisting of 4 males and 7 females. The patients' ages ranged from 25-65 years with a mean age of 44.4 +/- 15.9 years SD and a modal age of 25 years. Seventy five percent of the males presented at ages below the mean age as compared with 28.6% of the females. Aetiology was trauma in four cases, wide mouth opening in six cases (Table 1). A patient with background psychosocial disorder on Thioridazine (Mellenil) and diazepam had idiopathic TMJ dislocation. Two other patients had a medical history of hypertension (one on moduretic), one had a history of peptic ulcer disease (PUD) and another had been diagnosed with HIV but was yet to commence antiretroviral drugs. None of the other cases had a background medical disorder (Table 2).

Majority of the cases (6) presented in the clinic within 24 hours of occurrence, two were recurrences and

Table 1: Aetiology of TMJ dislocation

Clinical grouping	Aetiology			Total
	Trauma	Wide mouth opening	Unknown	
Acute	4 (36.4)	2 (18.2)	1 (11.0)	7 (63.6)
Recurrent	0 (0.0)	2 (18.2)	0 (0.0)	2 (18.2)
Chronic	0 (0.0)	2 (18.2)	0 (0.0)	2 (18.2)
Total	4 (36.4)	6 (54.6)	1 (11.0)	11 (100.0)

Table 2: Presence of systemic disease

Clinical grouping	Systemic disease					Total
	Psychiatric	Hypertension	HIV infection	Peptic ulcer disease	None	
Acute	1 (11.0)	2 (18.2)	0 (0.0)	1 (11.0)	3 (27.1)	7 (63.6)
Recurrent	0 (0.0)	0 (0.0)	1 (11.0)	0 (0.0)	1 (11.0)	2 (18.2)
Chronic	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (18.2)	2 (18.2)
Total	1 (11.0)	2 (18.2)	1 (11.0)	1 (11.0)	6 (54.6)	11 (100.0)

another two presented in chronic state (>14 days). There were 10 cases of anterior bilateral dislocation, and 1 case of unilateral (R) anterior dislocation. No superior, lateral, medial or posterior dislocation was seen.

Most of the acute cases (4) were successfully managed using the Hippocrates maneuver (with or without sedation), 1 had the maneuver under GA, and 2 had spontaneous reduction. (Table 3).

Follow up periods ranged from 1 day to 9 months with the majority of patients defaulting within the first 2 weeks after reduction of the dislocation (Table 4).

Summary of cases:

Case 1: OO is a 45 year old male shoe maker. He was single. He presented with a one week history of inability to close the mouth following a fall from a

Table 3: Management of TMJ dislocation

Management	Aetiology			Total
	Trauma	Wide Mouth Opening	Unknown	
Hippocrates's maneuver	2 (18.2)	2 (18.2)	1 (11.0)	5
Hippocrates + IMF + Sedation	0 (0.0)	2 (18.2)	0 (0.0)	2 (18.2)
Hippocrates + GA	1 (11.0)	0 (0.0)	0 (0.0)	1 (11.0)
Spontaneous reduction	1 (11.0)	1 (11.0)	0 (0.0)	2 (18.2)
Unsuccessful	0 (0.0)	1 (11.0)	0 (0.0)	1 (11.0)
Total	4 (36.4)	6 (54.6)	1 (11.0)	11 (100.0)

Table 4: Follow up period

Follow-up Group	Aetiology			Total
	Trauma	Wide Mouth Opening	Unknown	
≤ 14 Days	2 (18.2)	5	0	7
> 14 days	2 (18.2)	1	1	4
Total	4	6	1	11

moving bus. There was associated loss of consciousness which lasted about 10 minutes. He was previously treated for Tuberculosis 15 years prior to presentation and claimed to have completed the prescribed regimen. No other comorbid condition was noted. On general examination, we saw middle-aged man who walked with a limp. There were facial bruises over the left supraorbital ridge and right zygomatic area, tip of the nose and right side of the upper lip, sutured laceration on right foot, but no obvious facial asymmetry nor bony discontinuity was detected. Intraorally, there was gagging of occlusion posteriorly, and retained roots of 12 and 22. No other significant intraoral finding was detected. Radiological examination revealed anterior dislocation of the temporomandibular joint bilaterally. The patient had Hippocrates maneuver for repositioning the condyle which was successful after four (4) attempts. Analgesia was also administered and the patient discharged home. However, two days later he returned with a recurrent TMJ dislocation following yawning. The dislocation was reduced using Hippocrates maneuver modified with administration of diazepam. Barrel bandage was applied to limit joint mobility. The patient was seen two days later with no evidence of dislocation.

Case 2: OS, a 65-year-old female trader presented with a one year history of clicking sounds in the right temporomandibular joint area on mastication. There was no history of trauma, pain, swelling or any other symptoms. Background medical history revealed that she was a known hypertensive on medications. On examination, it was discovered that the patient had bilateral TMJ clicking sounds on mandibular excursion. There were no areas of swelling/depression or tenderness. Plain X-ray (TMJ views) showed anterior dislocation of the right mandibular condyle on opening. A diagnosis of chronic recurrent right TMJ dislocation was made. She was treated with intraarticular injection of triamsinolone 40mg weekly for six weeks alongside physiotherapy. There was improvement of symptoms and she did not present for follow up or with reoccurrence.

Case 3: AM was a 25-year-old female trader who discovered that she could no longer close her mouth after yawning a day before presentation. She also had pain in the preauricular region. This was her first experience of such, and she had no comorbid conditions. On examination, it was noticed that she had limitation in mouth opening and closure, her lip seal was incompetent and there was bilateral tenderness in the preauricular regions. TMJ movement transmission was not detected bilaterally. Radiologic investigations revealed an anterior displacement of the condylar head beyond the articular eminence. No other

abnormality was seen. Patient had Hippocrates manouvre done to reposition the head of the condyle back in the glenoid fossa and this was successful. Barrel bandage was applied to immobilize the joint. The outcome as at two (2) days post reduction was a successful restoration of TMJ movement

Case 4: 28 year old female student was in her usual state of health until a week earlier when she was unable to close her mouth after brushing her teeth. There was associated pain in the preauricular area bilaterally. She was a known RVD patient awaiting treatment commencement of HAART but had no other comorbid conditions. On general examination, the patient was frail, and weak, with a prognathic mandible. Preauricular depression and tenderness were present bilaterally. Intraorally, there was an anterior open bite, posterior gagging of occlusion, oral thrush. Patient was diagnosed as having bilateral TMJ dislocation and was successfully treated with Hippocratic manouvre under diazepam and PCM after the second attempt, with restoration of full TMJ functions.

Case 5: OO was a 40-year-old female fashion designer who presented with a 1 day history of inability to close her mouth following a fall during an epileptic fit during which she hit her face on the floor. This was the seventh episode, the first episode having occurred 13 years prior to presentation. She is known epileptic of twenty eight years on Epanutin and Phenobarbitone. On examination, patient had obvious facial asymmetry, with flattening of the left side of the face, elongation of the face and a depressed hollow in the preauricular areas bilaterally. There was also enamel fracture of 11. Diagnosis made was that of bilateral anterior TMJ dislocation. The dislocation was successfully treated using the Hippocrates manouvre. No complication was recorded.

Case 6: OM was a 26-year-old male student who presented with chronic recurrent TMJ dislocation following wide mouth opening (yawning) of about one day duration having had about 10 previous episodes (talking, laughing, yawning) all of which were successfully treated with the Hippocrates manouvre. He presented with a desire for a definitive treatment. Plain X-rays (TMJ views) revealed short mandibular condyles. He had reduction using the Hippocrates manouvre and subsequent immobilization with maxillo-mandibular fixation for two weeks but had a recurrence immediately after. Definitive care was bilateral eminectomy which involved grounding down of the articular eminences using round/acylic burs under general anesthesia. There was complete resolution of symptoms, restoration of temporomandibular joint

functions and resolution of associated facial nerve weakness at five month post-operative review.

Case 7: NP was a 60-year-old housewife who presented with a three hour history of inability to close the mouth after yawning. There was associated pain and discomfort in the preauricular area bilaterally. She had a similar incident four (4) months earlier. No previous history of trauma. She is a known hypertensive on moduretic. A diagnosis of bilateral anterior TMJ dislocation was made. She had a successful treatment using the extra-oral technique after failed Hippocrates manouvre attempts. She was subsequently immobilized with the barrel bandage

Case 8: JMO was a 48-year-old married female teacher who was a victim of assault. She was attacked by armed robbers on her way to work 5 days earlier. She was stifled by her assailants to prevent her from shouting for help. She subsequently discovered she could not close her mouth after the incident. Attempt at a private clinic and a teaching hospital in Lagos was unsuccessful. On examination, patient had bilateral preauricular depression and marked tenderness.

Since the patient had previously had several failed attempts at close reduction using Hippocrates maneuver while alert, Hippocrates maneuver was attempted under general anaesthesia, this was also unsuccessful, and was abandoned after a second attempt. The patient was placed in a class III maxillomandibular wires for gradual traction with daily adjustment which also did not produce the desired effect and was abandoned after 5 days. Patient was eventually planned for open reduction under general anaesthesia. She had open reduction under general anaesthesia which was successful. The outcome was a limited mouth opening which was managed with jaw exercises using acrylic screws.

She had multiple reviews up till 6 weeks after surgery with a gradual restoration of jaw movements.

DISCUSSION

Dislocation of the temporomandibular joints is an infrequent presentation in the emergency department. Lowery *et al*⁷ reported seeing 37 TMJ dislocations over a 7-year period in an emergency setting with approximately 100,000 annual visits in the United State. Similarly, Sang *et al*⁸ reported 29 patient in a ten year study from Nairobi while Agbara *et al*⁹ reported 26 patient over a similar period of seven years in Zaria Nigeria. This low incidence of TMJ dislocation may account for the limited number of patients seen in this study.

There is a female preponderance observed in this study, which is in agreement with some previous documentations,⁴ though Agbara *et al* reported a male preponderance.⁹ The study also showed that a history of recurrence is commoner among females, which is similar to the finding of Cascone *et al*,¹⁰ the reason for the female preponderance is yet to be fully understood. The mean age of occurrence of TMJ dislocation from this study (44.4 years) is about a decade higher than previous studies suggesting wear and tear due to ageing and laxity of joints being the predominant predisposing factors. This is displayed by the finding that the commonest aetiology in this study period is wide mouth opening.

TMJ dislocation due to trauma (road traffic crashes, assaults, falls) was found to comprise 36.4% of which road traffic crashes accounted for 18.2%, a percentage much smaller than expected due to the fact that road traffic crashes account for majority of the maxillofacial injuries in Nigeria.^{11,12} The case with unknown aetiology was seen in a patient with seizure disorder who was on medication with possible neuromuscular interactions. The dislocation could have resulted from excessive contraction of depressor muscles of the mandible perhaps during sleep.

Evaluation and treatment method for TMJ dislocation have continued to evolve due to varied aetiology and presentations, as different types of dislocations can result from traumatic and non-traumatic causes. Treatment ranges from conservative methods to complex surgical interventions. Treatment carried out on our patients was predominantly the Hippocrates manoeuvre (bimanual reduction of dislocated joints) with or without sedation. This manoeuvre was successful in 45% of the cases owing to the acute nature of presentation. This conservative option is usually the first treatment option (and the treatment of choice) in TMJ dislocations without associated fractures in acute case presentation^{2,13,14} or with added sedation, muscle relaxants and/or general anaesthesia.^{15,16} The technique is easy to apply and could be carried out in the accident and emergency department as well as on the dental chair in the clinic. The technique requires that the operator puts his thumbs over the molar teeth of the patient and push the dislocated jaw downward and backward. This manoeuvre takes a lot of effort and is usually modified with the administration of sedatives. Failure of reduction is not uncommon. Furthermore, the physician has to take the risk of being bitten and possible disease transmission.

Several modification of the conservative methods have been described in literature, these include the Wrist-

pivot technique by Lowery *et al*⁵, the Extraoral technique by Chen *et al*⁷, the “Syringe technique”¹⁸, the Combined ipsilateral staggering technique by Thomas *et al*⁹, and the Gag reflex procedure in which the soft palate is rubbed across with a dental probe to initiate relaxation of the lateral pterygoid muscle and spontaneous reduction and closure of the mouth²⁰. The extraoral technique is one based on the observed fact that in anterior TMJ dislocation, the coronoid process and anterior border of the ramus can be easily palpated extra-orally. By applying steady pressure over this prominence, the anteriorly dislocated condyle can be easily replaced in the glenoid fossa.¹⁷ This technique was successful in one of our patient after several failed attempts with traditional Hippocrates manoeuvre. However, Hippocratic manoeuvre still has the highest success rate both in literature and in the understudied centre.³

With the failure of the Hippocrates manoeuvre and other conservative measures in conscious patients, the reduction is attempted under GA. This can be conveniently converted to surgical treatment.^{3,16}

In patients with history of chronic or recurrent dislocation, there is the need to provide extra support for the joint post reduction. This was achieved by the use of maxillo-mandibular fixation (MMF). In literature, elastic rubber traction with arch bars and ligature wires/MMF with elastic bands have been said to be useful conservative methods for treatment³. Historically in the treatment of chronic or recurrent dislocation, it is said that impression compound spacer or acrylic blocks can be placed in between upper and lower posterior teeth to depress the mandible and open up the bite. This displaces the condyle downwards and the elastic bands that are applied in a front-to-backwards direction, after removing the spacer in about 1 week, helps to push the mandible/condyle backwards into the fossa. Teeth extrusion might occur as a complication of this technique but this could be easily corrected with a bite plane.^{16,21}

Chronic dislocations usually require other approaches for which non-surgical and surgical treatment modalities have been developed.^{6,15,16,22,23} The goals of surgical treatment are either to reduce the range of mandibular translation by the alteration of the associated ligaments and/or associated muscles; or to remove the obstacle at the articular eminence, thus preventing mandibular dislocation with subsequent locking of the condyle anterior to the eminence.^{2,6}

Surgical treatment is employed in both acute dislocation (if there is a superior dislocation into the middle cranial fossa)²⁴ and chronic (or recurrent) TMJ dislocations.

The intervention may involve both endoscopic procedures or open surgery⁹. Surgical techniques that have been used are intended to either restrict the condylar movement, create a mechanical obstacle along the path of condylar translation or remove the mechanical obstacle in the condylar path. These interventions include condylectomy (unilateral or bilateral), eminectomy, eminoplasty, meniscectomy, meniscoplasty, inverted L-shaped ostectomy, oblique ramus osteotomy and vertical subsigmoid osteotomy, Le-clerc’s, Dautrey’s and Boudreau/Obwegeser’s procedures^{25,26}. Eminectomy is presently the most popular surgical intervention for chronic dislocation. Eminectomy was first reported by Myrhaug in 1951 as a treatment option for recurrent dislocation. He rationalized that removal of the articular eminence in the path of the condyle would eliminate the possibility of dislocation. This procedure was further modified by Blankestijn *et al* by exposing the eminence without violating the intracapsular space thereby reducing the incidence of TMJ dysfunction.² Condylectomy is another frequently deployed option but anterior open bite deformity have been reported as a common complication of bilateral condylectomy.^{3,4}

Follow up of patients with TMJ Dislocation was quite poor, with majority (>63.6%) being followed up for less than two weeks. This reflects the sickness behaviour of the population. Most people do not appreciate the need for visiting the hospital once the obvious problem of jaw dysfunction has been taken care of. Those with follow up greater than 2 weeks were those with recurrences or chronic dislocations.

CONCLUSION

Anterior dislocation was the most common TMJ dislocation. Women were the predominant gender seen, while the commonest aetiology was wide mouth opening. The conservative method of management – the Hippocrates manoeuvre - proved to be very effective in most cases irrespective of duration of dislocation. Most of the patients had a poor attitude to follow up.

ACKNOWLEDGMENT

We will like to appreciate all the Consultants in the department whose patients were included in this study.

REFERENCES

1. **Ingawalé S**, Goswami T. Temporomandibular joint: disorders, treatments, and biomechanics. *Ann Biomed Eng* 2009; 37:976–996.
2. **Shorey CW**, Campbell JH. Dislocation of the temporomandibular joint. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2000; 89:662–668.

3. **Akinbami BO.** Evaluation of the mechanism and principles of management of temporomandibular joint dislocation. Systematic review of literature and a proposed new classification of temporomandibular joint dislocation. *Head Face Med* 2011; 7:10.
4. **Ugboko VI,** Oginni FO, Ajike SO, *et al.* A survey of temporomandibular joint dislocation: aetiology, demographics, risk factors and management in 96 Nigerian cases. *Int J Oral Maxillofac Surg* 2005; 34:499–502.
5. **Liddell A,** Perez DE. Temporomandibular joint dislocation. *Oral Maxillofac Surg Clin N Am* 2015; 27:125–136.
6. **Ardehali MM,** Kouhi A, Meighani A, *et al.* Temporomandibular joint dislocation reduction technique: a new external method vs. the traditional. *Ann Plast Surg* 2009; 63:176–178.
7. **Lowery LE,** Beeson MS, Lum KK. The wrist pivot method, a novel technique for temporomandibular joint reduction. *J Emerg Med* 2004; 27: 167–170.
8. **Sang L,** Mulupi E, Akama M, *et al.* Temporomandibular joint dislocation in Nairobi. *East Afr Med J* 2010; 87:32–37.
9. **Agbara R,** Fomete B, Obiadazie AC, *et al.* Temporomandibular joint dislocation: experiences from Zaria, Nigeria. *J Korean Assoc Oral Maxillofac Surg* 2014; 40:111–116.
10. **Cascone P,** Ungari C, Paparo F, *et al.* A new surgical approach for the treatment of chronic recurrent temporomandibular joint dislocation. *J Craniofac Surg* 2008; 19:510–512.
11. **Fasola AO,** Nyako EA, Obiechina AE, Arotiba JT. Trends in the characteristics of maxillofacial fractures in Nigeria. *J Oral Maxillofac Surg* 2003; 61:1140–1143.
12. **Adeyemo WL,** Ladeinde AL, Ogunlewe MO, James O. Trends and characteristics of oral and maxillofacial injuries in Nigeria: a review of the literature. *Head Face Med* 2005;1:7.
13. **Caminiti MF,** Weinberg S. Chronic mandibular dislocation: the role of non-surgical and surgical treatment. *J Can Dent Assoc* 64:484–491.
14. **Chin RS,** Gropp H, Beirne OR. Long-standing mandibular dislocation: report of a case. *J Oral Maxillofac Surg* 1988; 46:693–696.
15. **Dimitroulis G.** The role of surgery in the management of disorders of the temporomandibular joint: a critical review of the literature. Part 1. *Int J Oral Maxillofac Surg* 2005; 34:107–113.
16. **Aquilina P,** Vickers R, McKellar G. Reduction of a chronic bilateral temporomandibular joint dislocation with intermaxillary fixation and botulinum toxin A. *Br J Oral Maxillofac Surg* 2004; 42:272–273.
17. **Chen Y-C,** Chen C-T, Lin C-H, Chen Y-R. A safe and effective way for reduction of temporomandibular joint dislocation. *Ann Plast Surg* 2007; 58:105–108.
18. **Gorchynski J,** Karabidian E, Sanchez M. The “syringe” technique: a hands-free approach for the reduction of acute nontraumatic temporomandibular dislocations in the emergency department. *J Emerg Med* 2014; 47:676–681.
19. **Thomas A,** Wong T, Lau C. A case series of closed reduction for acute temporomandibular joint dislocation by a new approach. *Eur J Emerg Med* 2006; 13:72–75.
20. **Awang MN.** A new approach to the reduction of acute dislocation of the temporomandibular joint: A report of three cases. *Br J Oral Maxillofac Surg* 1987; 25:244–249.
21. **Shakya S,** Ongole R, Sumanth KN, Denny CE. Chronic bilateral dislocation of temporomandibular joint. *Kathmandu Univ Med J (KUMJ)* 8:251–256.
22. **Kumar AS,** Thangaswamy SV. Chronic traumatic unilateral dislocation of temporomandibular joint—a case report. *JIADS* 2010; 1:46–148.
23. **Kim C-H,** Kim D-H. Chronic dislocation of temporomandibular joint persisting for 6 months: a case report. *J Korean Assoc Oral Maxillofac Surg* 2012; 38:305.
24. **He Y,** Zhang Y, Li Z-L, *et al.* Treatment of traumatic dislocation of the mandibular condyle into the cranial fossa/ : development of a probable treatment algorithm. *Int J Oral Maxillofac Surg* 2015; 44:864–870.
25. **Undt G,** Kermer C, Rasse M, *et al.* Treatment of recurrent mandibular dislocation, Part II: Eminectomy. *Int J Oral Maxillofac Surg* 1997; 26:98–102.
26. **Undt G,** Kermer C, Piehslinger E, *et al.* Treatment of recurrent mandibular dislocation, Part I: Leclerc blocking procedure. *Int J Oral Maxillofac Surg* 1997; 26:92–97