CASE REPORT

Superolateral Dislocation of Intact Mandibular Condyle: A Case Report and Review of Literature

Degala Saikrishna¹ · S. Shyam Sundar¹ · K. S. Mamata¹

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Abstract Anteromedial fracture dislocation of the mandibular condyle is common but a superolateral dislocation of an intact condyle is quite rare. This type of dislocation is often misdiagnosed or completely overlooked and hence inadequately addressed. We report a case of a 41-year-old male patient who experienced superolateral dislocation of the intact condyle with symphysis fracture and panfacial fracture following a road-traffic accident, and review of literature of superolateral dislocations from 1967 to 2014.

Keywords Superolateral dislocation · Mandibular condyle · Mid-symphyseal fracture

Introduction

Dislocation of the temporomandibular joint occurs when the temporomandibular joint is subject to large-amplitude movements, or suffers an injury. Dislocation of the mandibular condyle has been described as the clinical condition “when the condyle head is displaced out of the glenoid fossa but still remains within the capsule of the joint” [1]. According to displacement direction complete dislocation of the mandibular condyle from the glenoid fossa can be classified into four groups: anterior, posterior, lateral, and superior dislocations. Fracture dislocation of the mandibular condyle is a common injury and an antero-

medial dislocation is the most common one owing to the pull of the lateral pterygoid muscle. All the groups except anterior dislocation are rare [1–7]. These uncommon dislocations usually result from acute trauma and are associated with mandible fracture.

Superior and Lateral displacement of the intact mandibular condyle is a rare entity. Allen and Young [2] in 1969 first reported 5 cases, and they subdivided such dislocations into 2 types: type I (lateral subluxation) in which the condyle has been laterally dislocated out of the fossa, and type II (complete dislocation), in which the condyle has passed laterally and then superiorly to enter the temporal fossa. Satoh et al. [3] reported 1 case and further classified type II dislocation into type IIA, in which the condyle is not hooked above the zygomatic arch; type IIB, in which the condyle is hooked above the zygomatic arch; and type IIC in which the condyle is lodged inside the zygomatic arch, which is fractured, which are further related to the technical difficulty of reduction. The clinical assessment for this condition is early reduction. Rather, open reduction is more definitive. However, unavoidable delay in reduction induces ankylosis of the joint, which sometimes necessitates condylectomy with or without arthroplasty.

Superior and lateral dislocations are frequently related to a high energy mechanism of trauma [3]. Superior and lateral dislocations is frequently associated with fractures of mandible but is rarely associated with other facial fractures [1–3]. The purpose of this article is to describe a case of Superolateral dislocation of TMJ associated with a panfacial fracture as well as to present a review of cases found in English-language literature from 1969 to 2014. So far, a total of 35 cases of lateral dislocation of an intact condyle have been reported in the world English literature by Pubmed search. The paucity of data probably has refrained

✉ Degala Saikrishna
degalasaikrishna@gmail.com

¹ Department of Oral and Maxillofacial Surgery, JSS Dental College and Hospital, JSS University, Sri Shivarathreeswara Nagara, Mysore 570015, Karnataka, India

clinicians from establishing a protocol for managing such cases. This case report attempts to add our case to the preexisting numerical data along with the review of literature to understand the dynamics of etiology, pattern, and current methods of treatment of such dislocations.

Case Report

A 41-year-old man moderately built and moderately nourished, with non contributory medical, social and cultural records, was referred to emergency unit of JSS Hospital, Mysore, India, after having suffered a motor vehicle accident, a head on collision with another bike, in December 2013. The patient presented with right femur fracture and maxillofacial trauma with a transitory loss of consciousness. Patient gave history of bleeding from his left ear, oral and nasal region. After having been examined for severity of injury by both a trauma surgeon and a neurosurgeon, the patient was treated conservatively for pneumocephalus by a neurosurgeon and then referred to an oral and maxillofacial surgeon. Clinical examination demonstrated a gross facial asymmetry with diffuse edema in the midfacial area and left lateral deflection of the mandible, a lacerated wound over right eyebrow and forehead, bilateral peri orbital oedema was present. Tenderness and step palpated over bilateral frontozygomatic suture region and nasal bone region. Left eye enophthalmus noted. Tenderness and step over bilateral Infraorbital region. Paresthesia over bilateral Malar region, Maxillary mobility noted over base of nose diffuse, bony-hard swelling in the left preauricular region. Intra-oral examination revealed left parasagittal palatal split. Tenderness over bilateral buttress, symphysis areas, restricted mouth opening of ~1.5 cm with a symphyseal splay between the mandibular central incisor. Colemans sign was positive with tenderness and step deformity elicited in the mid-symphysis region with an occlusion deranged, obvious cross bite on the left side (Fig. 1).

Three-dimensional computed tomography (3D CT) scans were taken, which presented a superolateral dislocation of the left mandibular condyle as well as panfacial fracture: fractures in, symphyseal region of mandible, B/L. Lefort III, Lt. parasagittal palatal split, naso-orbito ethmoid complex # (Fig. 1b, c).

Under general anesthesia via submental intubation ORIF was performed according to Top-Down protocol for pan facial fractures after 7 days of injury (Fig. 2a, b).

The LT condyle was reduced, after upper facial half was fixed, by applying downward pressure in left molar region, and lateral downward push over condyle region, through the existing coronal incision. Patient was set in intermaxillary fixation (IMF) for 5 weeks with rigorous

physiotherapy. A satisfactory result of 33 mm mouth opening and normal mandibular movements was achieved (Fig. 3c, d). Post-op 3D-CT was performed and the reduction in the superolateral dislocation of the left condyle within the glenoid fossa was confirmed (Fig. 3b, c).

Discussion

The rarity of these dislocations can be attributed to the varying anatomy of the condyle, the direction of pull of muscles attached to the condyle and low incidence of skull base fractures from an indirect blow.

The biomechanics of relatively slender condylar neck is such that whenever a high-impact force is exerted over condylar region, the condylar neck fractures before the condyles dislocate and the thin fragile floor of middle cranial fossa fractures. Movement of the human condyle is restricted by the articular capsule, the temporomandibular ligament, the articular disc, the lateral pterygoid muscle and other structures; thus, superolateral dislocation is difficult. However, in the present case, there is lateral dislocation of the intact condyle due to high-impact trauma. The mode of injury was a motor bike accident. The step deformity between symphysis suggests that high-impact force from the front and right region has lead to lateral dislocation of the left intact condyle with associated symphysis fracture. Along with this he had multiple facial fractures, i.e. B/L lefort III #, Lt. parasagittal palatal split, and noe #.

Allen and Young [2] classified lateral dislocations into type I (lateral subluxation) and type II (complete dislocation), in which the condyle is forced laterally and then superiorly. Satoh et al. further classified type II dislocations into type IIA, in which the condyle is not hooked above the zygomatic arch; type IIB, in which the condyle is hooked above the zygomatic arch; and type IIC, in which the condyle is lodged inside the zygomatic arch, which is fractured. According to these classifications, our case belongs to type IIB dislocation.

Tauro et al. [8] have proposed modifications in the existing classification:

- Type I—Lateral subluxation
- Type II—Complete dislocation with associated fracture of anterior mandible
 - Type IIA—Condyle not hooked above the zygomatic arch
 - Type IIB—Condyle hooked above the zygomatic arch
 - Type IIC—Condyle lodged within the zygomatic arch which is fractured
- Type III—Complete dislocation without associated fracture of anterior mandible

Fig. 1 Pre-Op photograph and 3D CT scans

Fig. 2 Intra-Op photograph

Type IIIA—Condyle not hooked above the zygomatic arch

Type IIIB—Condyle hooked above the zygomatic arch

Type IIIC—Condyle lodged within the zygomatic arch which is fractured.

A Pubmed search of the English language literature was carried out for cases of superolateral dislocation, and only 35 cases were found. Table 1 summarizes the cases of superolateral dislocation of mandibular condyle reported in the English language literature and our case reported in this study.

Li et al. [9] explained the dynamics of dislocation by simulating the dislocation on a dried skull. They concluded that, the factors considered essential to such an injury occurring are the size and the direction of applied force, the position of the jaw during impact (the mouth may be in a wide open position), and the anatomic features of the joint (joint capsule and pterygoid muscles may be flabby). In most of the reported cases, the etiology was road traffic accidents (motor-bike accident) [9–12]. Bu et al. [11] reported a case of

superolateral dislocation of the intact condyle into the temporal fossa (type IIC), but the zygomatic arch was not fractured. By simulating this unusual dislocation on a dried skull, it is evident that the whole mandible may rotate on a vertical axis. This results in the coronoid process traps anteriorly and superiorly to zygomatic arch, and the condyle head dislocates completely out of the glenoid fossa and then hooks above the zygomatic arch.

Allen and Young [2] suggested that an associated fracture of the anterior mandible, near the symphysis, is a prerequisite for a type II dislocation. Rattan [10] stressed that, for these cases with lateral dislocation of the mandibular condyle, there was always a history of trauma to the side of the chin and there is an associated fracture in the symphyseal or body region, usually on the contralateral side. Obviously, the associated mandibular fracture facilitates the rotation and movement of the ramus, which will contribute to the superolateral dislocation of the mandibular condyle. Present case also experienced symphysis fracture of mandible.

Because the extrapetrosal peripheral segment of the facial nerve is so near the mandibular ramus, the nerve may be affected by injuries involving fractures of the ramus (especially of the condylar process) or by injuries causing severe dislocation without actual fracture of the ramus. Although facial palsy is not seen in every case with superolateral dislocation of mandibular condyle, it is worthwhile to pay more attention to the facial nerve condition of the patient before the reduction treatment. In our case we did not encounter facial nerve injury.

The goal of treatment of any dislocation is the return of the condyle to its original physiologic position [11]. If the

Fig. 3 Post-Op 3D Ct scan and Opg

condyle is hooked on the zygomatic arch, manual reduction might be difficult, thereby requiring open reduction or strong traction [6]. Open reduction is to be reserved for those cases not amenable to closed reduction. Ferguson [1] and Kapila [13] have described use of traction through wires placed in holes drilled in the exposed angle region. Shen et al. [14] used mandibular sagittal split ramus osteotomy and condylar reduction. Direct exposure of dislocated condyle through a preauricular approach is useful for difficult cases and more so in long standing ones (fibro-osseous ankylosis) where condylectomy with or without arthroplasty would be necessary [2–4]. Rigorous mouth-opening exercises are to be advocated as early as possible to prevent fibrosis from developing postoperatively [10].

Our case was treated 7 days after the injury, and manual manipulation through existing coronal incision under general anesthesia was successful. It was suggested that lateral dislocation had a high incidence of unsatisfactory results and imperfect reduction [3, 5, 6, 9, 12]. Delayed reduction of a laterally dislocated condyle is more difficult and less accurate due to establishment of fibrous adhesions and organization [1]. For our case, the satisfactory results may

be attributed to the accurate diagnosis, and early management.

In the literature from 1969 to 2014, the male to female ratio of the 35 reported cases of SDMC was 6.2:1. Among these, there were three cases of type I dislocation (8.3 %) and 32 of type II dislocation (88 %); 25 patients had unilateral dislocation (69 %) and eleven had bilateral dislocation (30.5 %). In 32 cases, dislocation was accompanied by fracture at other mandibular sites (88 %); in four cases, there was no fracture of any other mandibular site (11.1 %). Sixteen cases (44 %) were treated within 7 days and 15 cases (42 %) were treated more than 7 days after the injury. In five cases (13 %), the time of surgery was not reported. The longest delay in reduction was 35 days.

The treatment methods were divided into closed reduction and open reduction. Although the data were incomplete, the incidence of ankylosis was 2/36, 0.5 %, dysocclusion was 2/36, 0.5 % and facial nerve injury was 2/36, 0.5 %.

Among the treatment options for intact condyle dislocations, manual reduction is the simplest, least traumatic, and safest [15, 16]. Nonsurgical methods such as traction wire placed at the angle of the mandible [6, 9] or mouth

Table 1 Reported cases of superolateral dislocation of intact mandibular condyle (from 1969 to 2014)

Years	Authors	Type	Unilateral or bilateral	Time to reduction (days)	Treatment method and reduction result	Result after treatment
1969	Allen and Young [2]	I	U	8	Partial (C)	Fibro-osseous ankylosis
		II	U	15	Partial (C)	Malocclusion
		I	B	1	Complete (C)	Malocclusion
		I	U	1	Complete (C)	Full range of jaw movement
		II	U	1	Complete (O)	Not available
1978	Brusati and Painsi [4]	II	U	1	Complete (C)	With facial palsy not detailed
		II	U	12	Complete (O)	With facial palsy and full jaw function
1982	Worthington [5]	Unusual	U	14	Partial (O)	Fibro-osseous ankylosis
1988	Devita et al.	II	B	NA	Complete (O)	Not available
1989	Ferguson et al. [1]	II	U	1	Complete (O)	Condylectomy, arthroplasty using costal cartilage, 30 mm mouth opening
1989	To EW	II	U	14	Complete (O)	Bifid condyle, reduced mouth opening
1994	Satoh et al. [3]	II	B	13	Partial (O)	Condylectomy, 30 mm mouth opening
1996	Kapila and Lata [13]	II	U	7	Complete (O)	30 mm mouth opening
1998	Hoard et al.	II	B	NA	Complete (C)	Not available
2000	Yoshii et al.	II	B	16	Complete (C)	20 mm mouth opening
2002	Rattan [10]	II	U	14	Complete (O)	30 mm mouth opening
		II	B	NA	Not reduced	Interpositional gap arthroplasty
2007	Hsieh et al. [12]	II	B	1	Complete (C)	41 mm mouth opening
2007	Bu et al. [11]	II	U	5	Complete (C)	37 mm mouth opening
2009	Li et al. [9]	II	U	1	Complete (C)	36 mm mouth opening
2010	Papadopoulos et al.	II	B	NA	Complete (O)	32 mm mouth opening
2010	Lloyd and Sivarajasingam	II	U	7	Complete (O)	30 mm mouth opening
2010	Tauro and Lakshmi	II	U	3	Complete (c)	32 mm mouth opening
2011	Amaral and Bueno	II	U	NA	Complete (O)	30 mm mouth opening
2013	Kim et al.	II	U	4	Complete (c)	Normal range of mouth opening
2014	Shen et al.	II	U	4	Complete (o)	34 mm mouth opening
		II	B	12	Partial (O)	33 mm mouth opening
		II	U	15	Partial (O)	30 mm mouth opening
		II	U	17	Partial (O)	37 mm mouth opening
		II	U	5	Complete (o)	41 mm mouth opening
		II	B	12	Partial (O)	38 mm mouth opening
		II	U	6	Complete (o)	34 mm mouth opening
		II	U	27	Partial (O)	36 mm mouth opening
		II	U	19	Partial (O)	38 mm mouth opening
		II	B	35	Partial (O)	27 mm mouth opening
2014	Present case	II	U	7	Complete (o)	33 mm mouth opening

props functioning as fulcrum placed in the molar region [12] have been previously used. According to the literature review, however, open reduction was selected for treating 63.8 % of the cases, whereas closed reduction was carried

out in the remaining 36.1 %. The higher rates of open reduction may be correlated to the waiting time for treatment [17]. Delay in treatment may cause fibrosis of the glenoid fossa, resulting in incomplete reduction. The

formation of fibrous tissue can make manual reduction impossible [12]. After a review of previous literature, we found that the reduction and internal fixation of the fractured and superolaterally displaced condyle can produce satisfactory results after more than 2 or 3 weeks.

In summary, superior or lateral dislocation of the intact condyle is often neglected yet requires thorough physical and radiographic examinations. Early diagnosis and management are strongly emphasized because prolonged dislocation can make reduction more difficult, leading to unsatisfactory results. Manual reduction is the first treatment option for superior-lateral condylar dislocations; in delayed cases, however, open reduction is highly recommended.

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Compliance with Ethical Standards

Conflict of interest None declared.

Ethical Approval This research was approved by the Institutional Ethical Committee of JSS Dental College, JSS University, Mysore, India (Ref; No: JSS/ACP/Ethical/2012-2013 dated 31-01-2013).

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