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Superolateral dislocation of the intact mandibular condyle associated with panfacial fracture: a case report and literature review

CASE REPORT

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Abstract – Superolateral dislocation of the intact mandibular condyle (SDIMC) is rare. This case report focuses on a 15-year-old teenager who was involved in a motor vehicle accident as well a literature review regarding the SDIMC. Clinical examination demonstrated a diffuse edema in the midfacial area and a left lateral deflection of the mandible, including an open bite and a crepitation in the symphyseal region. Three-dimensional computed tomography scans were taken, which presented a superolateral dislocation of the left mandibular condyle as well as panfacial fracture. The patient was set in intermaxillary fixation for 2 weeks and underwent subsequent active jaw physiotherapy, the evaluation of which presented satisfactory results. This case study also presents a literature review, which demonstrated 21 well-documented cases of SDIMC. The patients' mean age was of 29 years. The male gender proved to be more prevalent, with road traffic collisions representing the most common form of accident. Type II, with unilateral dislocation, proved to be the most common. The mean reduction time was 7 days. The open methods were the most commonly used reduction methods. Mandible fracture was associated with dislocation in 82% of the cases, with other facial fractures appearing in only 23% of the cases. Patient follow up presented satisfactory results in 59% of the cases.

Superolateral dislocation of the intact mandibular condyle (SDIMC) is rare. The two main works that classify the lateral dislocation of the mandibular condyle were published by Allen and Young (1) and Satoh et al. (2). Allen and Young (1) presented two classification types: type I (lateral subluxation), in which the condyle is laterally displaced out of the fossa, and type II (complete dislocation), in which the condyle has been laterally dislocated as well as superiorly entering in the temporal fossa. Also, Satoh et al. (2) proposed another classification for type II dislocation by subdividing it into three categories: 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. SDIMC is frequently related to a high energy mechanism of trauma (3), which can produce panfacial fractures (4). SDIMC 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 SDIMC associated with a panfacial fracture as well as to present a review of cases found in English-language literature from 1969 to 2010.

Case report

A 15-year-old girl, with non-contributory medical, social, and cultural records, was referred to the emergency unit of Hospital João XXIII/FHEMIG in Belo Horizonte, Brazil after having suffered a motor vehicle accident. The patient presented only maxillofacial trauma with a transitory loss of consciousness. After having been examined for severity of injury by both a trauma surgeon and a neurosurgeon, the patient was referred to an oral and maxillofacial surgeon. Clinical examination demonstrated a diffuse edema in the midfacial area and left lateral deflection of the mandible, including an open bite and crepitation in the symphyseal region. Three-dimensional computed tomography (CT)

scans were taken, which presented a superolateral dislocation of the left mandibular condyle as well as panfacial fracture: fractures in the right condyle, symphyeal region, maxilla, right zygomatic complex, left zygomatic arch, nasoorbitalethmoid complex, and frontal sinus (Fig. 1). The patient was transferred immediately to the operating room, under general anesthesia via oral tracheal intubation. A tracheostomy was also performed to protect the airway because of the visible edema present on the patient's face. After completing the tracheostomy, with the patient completely paralyzed, a successful, bimanual reduction in the superolateral dislocation was performed by applying direct downward pressure. The patient was set in intermaxillary fixation (IMF) to stabilize the symphyeal and maxillary fractures using Erich arch bars and 26 gauge wires for 2 weeks. After 7 days, a new CT was performed and the reduction in the superolateral dislocation of the left condyle within the glenoid fossa was confirmed (Fig. 2). The patient was placed on the scheduled surgery service, which was chosen by close reduction method of the nose fracture as well as to follow up the other fractures. After surgery, the patient underwent postoperative active jaw physiotherapy. After 5 months of follow up, the mouth opening was measured at 3.0 cm, and satisfactory occlusion could be observed (Fig. 3).

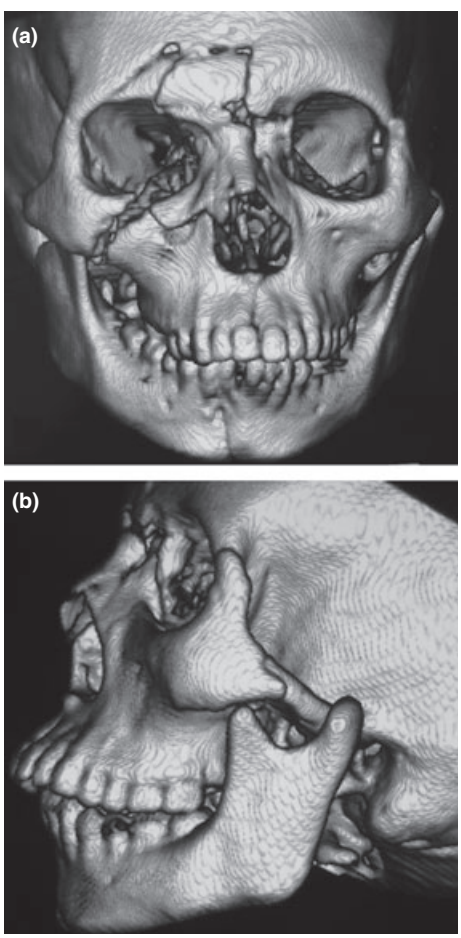

Fig. 1. Three-dimensional computed tomography (CT) features of superolateral dislocation of intact mandibular condyle. (a) CT shows a panfacial fracture. (b) CT demonstrated a superolateral dislocation of the intact left condyle.

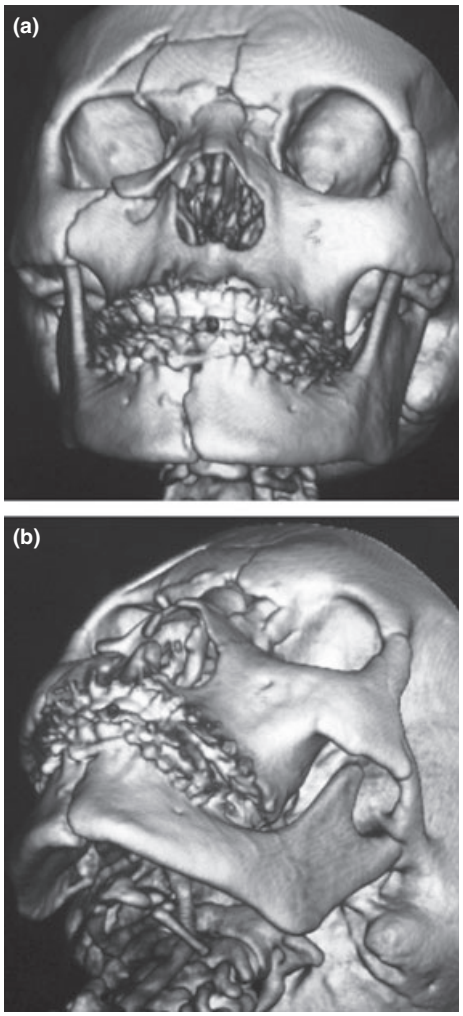

Fig. 2. Postoperative three-dimensional computed tomography (CT) presents superolateral dislocation of intact mandibular condyle. (a) CT demonstrated a closed reduction in the panfacial fracture. (b) An accurate reduction in the left condyle in a CT can be observed.

Discussion

Previous case reports of SDIMC, published between 1969 and 2010, were researched by means of a detailed investigation into the English-language literature across, PUBMED, by searching the following keywords: superolateral dislocation, condyle, facial fracture, and panfacial fracture. All cases using clinical-radiographic diagnoses were included in this review (1–3, 5–16). Together with the present case report, a total of 22 cases, which were deemed acceptable for evaluation and analysis, were selected. The data from all cases are presented in Table 1.

The current case presents the clinical-tomography features of the diagnosis and management of SDIMC. Twenty-one cases of SDIMC could be found in the

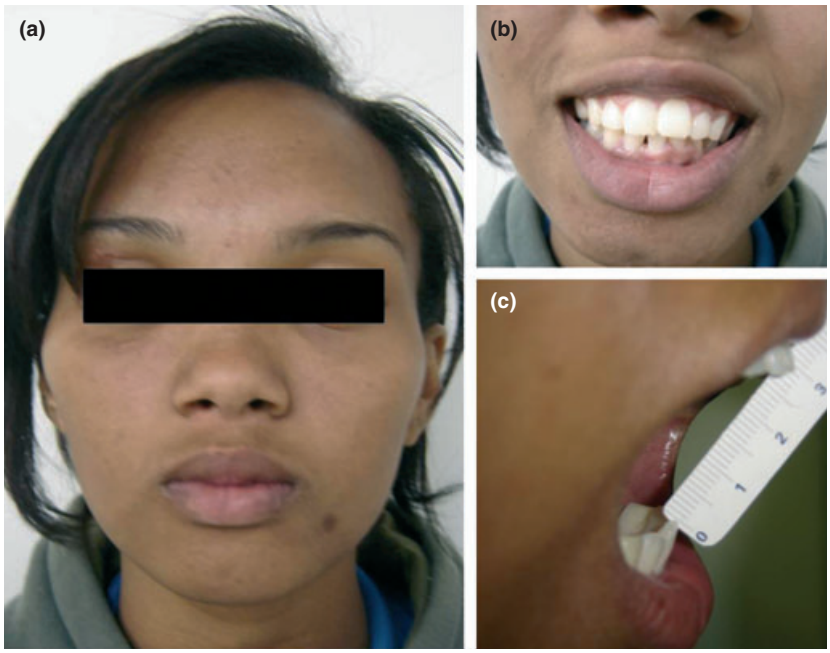

Fig. 3. Clinical features after 5 months of superolateral dislocation of the intact mandibular condyle. (a) Facial contour of the patient after the closed reduction in the left condyle and facial fractures. (b) Satisfactory occlusion and 30-mm mouth opening (c).

literature, mostly as single reports. Only three authors published more than one case (1, 5, 13). The mean age of patients with SDIMC was 29 years, ranging from 1 to 55 years of age. The ratio of male to female patients was 3.6:1. The majority of SDIMC could be found in patients that had suffered road traffic accidents (71%), followed by motorcycle accidents (19%). Other possible accidents, such as hits and falls, accounted for the remaining cases (10%). The data demonstrated that maxillofacial trauma associated with SDIMC is more prevalent in young male adults, who had suffered a road traffic accident. These results are in accordance with data from epidemiological studies in which maxillofacial fractures were evaluated (17, 18). Moreover, excluding mandible fractures, other facial fractures associated with SDIMC tend to be rare, representing only 23% of the reviewed cases. In the present case report, the patient presented a panfacial fracture.

According to the Satoh et al. (2) classification, the current case fits the criteria of a type IIB. This type of dislocation occurs with a high energy of trauma and in association with anterior mandible fractures. Therefore, the rotation and movement of the mandibular ramus produce the superolateral dislocation of the condyle (1, 13). The majority of reviewed cases (82%) also presented fractures of the mandible, whereas only four cases (18%) were type II dislocation without fractures of the mandible (7, 14, 16). Other possible mechanism for SDIMC may be flaccid joint capsule and pterygoid muscles associated with round condyle and zygomatic arch is rather elastic mainly in young patients. The present case was associated with symphyseal and right condyle fractures. Moreover, data gathered from the English-literature review demonstrated that unilateral SDIMC was more prevalent (73%) than was bilateral SDIMC (27%).

SDIMC diagnoses can be in agreement with clinical evaluations: (i) persistent restriction of mandibular movement, (ii) persistence of open bite and malocclusion after reduction in jaw fracture, (iii) an apparent loss of ramus height coupled with a rise in the ramus fragment, and (iv) facial asymmetry (6). Additionally, 3D CT scans clearly demonstrate (i) the dislocated condyle, (ii) the dislocation type, and (iii) whether or not there is a fracture in the condyle or in the other segments of the mandible (14). In the present case, 3D CT scans were important in diagnosing and demonstrating the type of dislocation and fractures.

Closed reduction is the first choice of treatment for SDIMC. It is the simplest, least traumatic, and safest of all alternatives (14, 19). However, according to the reviewed data, open reduction methods were carried out in 54.5% of the patients, whereas 41.0% of the patients were treated by closed reduction methods. The patients whose average waiting time for treatment was 9.3 days (range 1–16 days) were submitted to open reduction methods. By contrast, patients whose average waiting time was 4.1 days (range 1–15 days) were submitted to closed reduction methods. Thus, a correlation can be drawn between the modalities of treatment and the waiting time for management. This fact is important in defending the early diagnosis and management of SDIMC in an attempt to prevent open reductions and unsatisfactory results.

Satisfactory results after the treatment of SDIMC include (i) a mouth opening ≥30 mm and (ii) a satisfactory occlusion. These results were obtained in 59% of the reviewed cases. Four patients were delayed in more than 7 days (range from 8 to 16 days, mean of 13.2 days). In these cases, the reduction in SDIMC showed unsatisfactory results. Otherwise, patients with satisfactory results presented a mean reduction of 5.6 days (range from 1 to 14 days).

Bu et al. (14) affirmed that a reduced condyle tends to return to the preoperative position. To prevent this from occurring, an IMF, over a 2-week period, aids in

Table 1. Clinical profile of superolateral dislocation of intact mandibular condyle

Authors	Age (years)	Sex	Type of accident	Type of dislocation	Unilateral or bilateral	Reduction time (days)	Reduction method	Mandible condition	Other associate facial fractures	Results after treatment
Allen and Young (1)	16	M	Road traffic	I	Unilateral	8	Closed	Symphyseal fracture	Maxilla, left zygomatic	Fibro-osseous ankylosis
	50	M	Road traffic	II	Unilateral	15	Closed	Right parasymphyseal fracture	Not associated	Gross malocclusion
	36	M	Road traffic	I	Bilateral	1	Closed	Left symphyseal fracture	Maxilla, Zygomatics	25% reduction
	22	M	Road traffic	I	Unilateral	1	Closed	Symphyseal fracture	Maxilla, zygomatics	Full range of jaw movement
	30	M	Road traffic	II	Unilateral	1	Open	Left symphyseal fracture	Not associated	Unknown
Brusati and Paini (5)	19	M	Road traffic	II	Unilateral	1	Closed	Symphyseal fracture	Not associated	With facial palsy, not described
	13	F	Road traffic	II	Unilateral	12	Open	Fracture of the mandibular body and left condyle	Not associated	With facial palsy, full jaw motion
Worthington (6)	11	F	Road traffic	Unusual	Unilateral	14	Open	Right parasymphyseal fracture and right condyle	Not associated	Not described
De Vita et al. (7)	28	F	Road traffic	II	Bilateral	Not available	Open	Without associated mandibular fracture	Not associated	Not described
Ferguson et al. (8)	31	M	Fell off a bull	II	Unilateral	1	Open	Symphyseal fracture	Not associated	Condylectomy, arthroplasty by costal cartilage, 30-mm mouth opening
To (9)	34	M	High falls	II	Unilateral	14	Open	Comminuted symphyseal fracture	Not associated	Bifid condyle, reduced mouth opening
Satoh et al. (2)	48	M	Motorcycle	II	Bilateral	13	Open	Comminuted symphyseal fracture and left mandibular body	Not associated	Condylectomy, arthroplasty by costal cartilage, 30-mm mouth opening
Kapila and Lata (10)	42	M	Road traffic	II	Unilateral	7	Open	Symphyseal fracture and right condyle	Not associated	30-mm mouth opening
Hoard et al. (11)	36	M	Road traffic	II	Bilateral	Not available	Closed	Without associated mandibular fracture	Not associated	Not described
Yoshii et al. (12)	1	F	Hit by truck	II	Bilateral	16	Open	Right symphyeal fracture	Left zygomatic arch	20-mm mouth opening
Rattan (13)	55	M	Motorcycle	II	Unilateral	14	Open	Left symphyseal fracture	Not associated	30-mm mouth opening
	52	F	Road traffic	II	Bilateral	Not available	Not Reduced	Symphyseal fracture	Not associated	Interpositional gap arthroplasty, 35-mm mouth opening
Bu et al. (14)	42	M	Motorcycle	II	Unilateral	5	Closed	Without associated mandibular fracture	Not associated	37-mm mouth opening and normal mandibular movement
Li et al. (15)	28	M	Motorcycle	II	Unilateral	1	Closed	Without associated mandibular fracture	Not associated	36-mm mouth opening and normal mandibular movement
Lloyd and Sivarajasingam (3)	20	M	Hit by a car	II	Unilateral	Not available	Open	Right angle of the mandible fracture	Not associated	30-mm mouth opening

Table 1. (Continued)

Authors	Age (years)	Sex	Type of accident	Type of dislocation	Unilateral or bilateral	Reduction time (days)	Reduction method	Mandible condition	Other associate facial fractures	Results after treatment
Papadopoulos and Edwards (16)	16	M	Road traffic	II	Unilateral	1	Open	Without associated mandibular fracture	Not associated	32-mm mouth opening and normal mandibular movement
Current study	15	F	Road traffic	II	Unilateral	1	Closed	Symphyseal fracture and right condyle	Panfacial fracture	30-mm mouth opening and normal mandibular movement
Total	Mean 29 years Range 1–55 years	73% M 27% F Ratio 3.6:1	71% road traffic 19% motorcycle 10% others	14% Type I 82% Type II 4% Unusual dislocation	73% Unilateral 27% Bilateral	Mean 7 days Range 1–16 days 4 cases not available	54.5% open 41% closed 4.5% not reduced	82% associated with mandibular fracture 18% without association with mandibular fracture	23% associated 77% not associated	59% satisfactory results[1] 18% unsatisfactory results 23% not described

F, Female; M, Male.
[1]Satisfactory results: ≥30-mm mouth opening and satisfactory occlusion.

the healing of damaged ligaments. The application of an IMF over at least a 1- or 2-week period was applied in nearly all of the reviewed cases. Additionally, when maxillofacial fractures are associated, they must be addressed through the use of open or closed techniques, with or without rigid fixation (16). In the present case, a closed reduction with IMF, as well as a closed reduction in the maxillofacial fractures, was successfully applied.

In addition to the treatment of SDIMC, an intense physiotherapy is required to minimize the risk of ankylosis. Long-term follow up is also necessary because fibrous adhesion and ankylosis may occur long after the initial follow-up treatment (13, 15, 16, 20).

In summary, the current paper presents a case report of SDIMC as well as a literature review. The reviewed case reports present patients with a mean age of 29 years. The male gender proved to be more prevalent with road traffic collisions representing the most common form of accident. Type II, with unilateral dislocation, proved to be the most common. The mean reduction time was 7 days, and the open methods were the most commonly used reduction methods. Mandible fracture was associated with dislocation in 82% of the cases, with other facial fractures appearing in only 23% of the cases. Patient follow up presented satisfactory results in 59% of the cases. An accurate diagnosis and early management are necessary for the proper treatment of SDIMC, thus generating a favorable environment for a closed reduction to bring about satisfactory results. Delay in treatment, however, may well produce an unsatisfactory outcome.

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Conflict of interest

None.

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