



# 'Temporomandibular joint hematoma nerve block'—a new technique in management of mandibular condylar fractures

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## Abstract

**Purpose** Management of mandibular condylar fracture has invited a great deal of controversy in maxillofacial trauma care. In the orthopaedic literature, surgeons have exhaustively described the use of a 'hematoma block' technique during closed reduction (CR) of the ankle or other long bone fractures. Post-traumatic ankylosis of the temporomandibular joint (TMJ) is due to development and progression of the intra-articular hematoma. We improvised their technique for use during CR of mandibular condylar fractures. The desirable effects which can be achieved with our proposed 'novel TMJ hematoma nerve block' technique are evacuating the accumulated hematoma, blocking auriculotemporal and masseteric nerves which in turn causes relaxation of the lateral pterygoid muscle, all in all, favouring accurate anatomical reduction of the fracture.

**Method** Thirteen patients with isolated unilateral condylar fractures were subjected to our new technique. The parameters assessed were the amount of hematoma evacuated, pain in TMJ region during reduction and postoperative anatomic reduction on cone beam computed tomography (CBCT).

**Results** All the patients showed a significant reduction in pain and lowered post-reduction angulation between the proximal condylar and distal ramal segments.

**Conclusion** Our technique is minimally invasive, safe, simple to perform, yielding excellent anatomic reduction of the fracture fragments.

**Keywords** Hematoma block · TMJ hematoma nerve block · Closed reduction · Condyle fracture

## Introduction

Mandibular condylar fractures are the most common fracture, constituting 16.8% of the mandibular fractures [1]. Treatment of condylar fractures is subject to controversies in maxillofacial trauma care. By far, the treatment options available include conservative, functional and surgical methods. Goals of management of condylar fracture include achieving pain-free mouth opening with interincisal distance > 40 mm, jaw movements in all excursions, restoration of pre-injury occlusion, stable temporomandibular joints (TMJs) and aesthetic facial and jaw symmetry. Supporters who consider demerits of open reduction (OR) to be sizeable often resort to closed reduction (CR) as being the beneficent treatment [2].

Orthopaedicians routinely perform 'hematoma block' for ankle or other long bone fractures, with advantages like safety, simplicity and effectiveness [3]. This technique can be duly applied during the CR of mandibular condylar fractures. However, there have been no literature pieces of

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evidence in maxillofacial surgery, which support the use of this technique in the management of condylar fractures.

We hypothesize that the presence of hematoma is likely to cause hindrance in achieving anatomic reduction and pain. Here, we introduce a novel technique called ‘temporomandibular joint hematoma nerve block’ (TMJHNB) during CR, which promises good anatomic reduction and lessens the intra- and postoperative pain along with the complications in fresh intra-articular and condylar head with neck fractures.

## Materials and methods

### Study design

The research protocol was prepared according to guidelines of the World Medical Association Declaration of Helsinki and approved by the local institutional ethical committee (Ref No. EC Ref. meeting dated 18/05/2018). The study was conducted at the Department of Oral and Maxillofacial Surgery, Government Dental College and Hospital, Mumbai, from June 2018 to November 2020. Eleven patients were recruited for this study.

### Eligibility criteria

#### Inclusion criteria

1. Patients with MC fractures with or without concomitant mandibular fractures and who were willing to participate in the study were enrolled.
2. Patients who reported to OPD immediately or within a day of injury.

3. Patients with Wassmund’s type I or MacLennan’s type a/ type b condylar fracture(s) assessed on cone beam computed tomography (CBCT).

#### Exclusion criteria

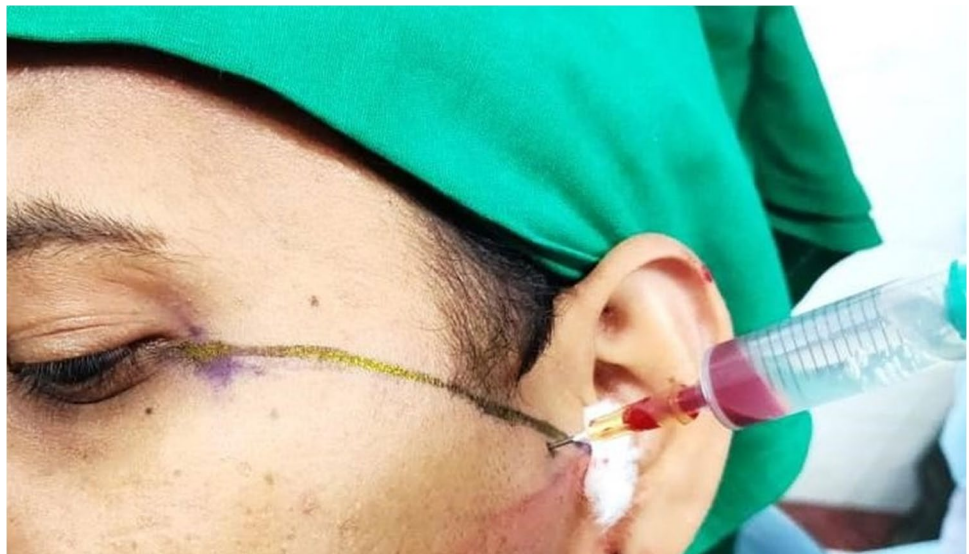
1. Patients willing for OR.
2. Patients with comminuted/displaced condylar fractures.
3. Patient with any other associated cranio-maxillary fractures except those mentioned in inclusion criteria.
4. Patients with a history of any TMJ disorder/of any invasive procedure on the TMJ/any systemic diseases which can affect skeleton of head and neck.
5. A patient with a history of asthma, epilepsy where intermaxillary fixation (IMF) is contraindicated.

The patients were informed about the study protocol and a written informed consent explaining the rationale, surgery and possible risks associated with the treatment was obtained. Patients from both groups were group were subjected to CBCT of face for initial evaluation and diagnosis. Patients with other associated mandible fractures were treated according to the Association of Osteosynthesis protocol.

### ‘Temporomandibular joint hematoma nerve block’ technique

Under all aseptic precautions and standard surgical protocol, a canthotragal line (drawn from the middle of the tragus to the outer canthus) was marked with a sterile skin marker and flexible scale (Soni Office Mate, India) over the skin of the fractured side (Fig. 1). The target area was the pre-auricular

**Fig. 1** Markings of the canthotragal line and needle entry point shown with syringe showing volume of hematoma evacuated and the local anaesthetic solution being deposited



region on the side of the fracture. The needle entrance point was located along the canthotragal line, 10 mm from the centre of the tragus and 2 mm below the line. At the marked entrance point, a 20-gauge needle (Dispo Van) (attached to a 5-cc syringe) was inserted and the hematoma from the superior joint cavity (SJC) was evacuated (Romsons® Juniors India Unit 2) (Fig. 1). The syringe with the evacuated hematoma was detached, keeping the needle in place and a second syringe containing 2% lignocaine with 1:2,00,000 adrenaline (CADILA® Pharmaceuticals Limited, India) was used to give the hematoma block (Fig. 2). On completion of the procedure, a pressure dressing was given. The MC was then manipulated, occlusion verified followed by IMF for 3–4 weeks. Postoperative instructions were given.

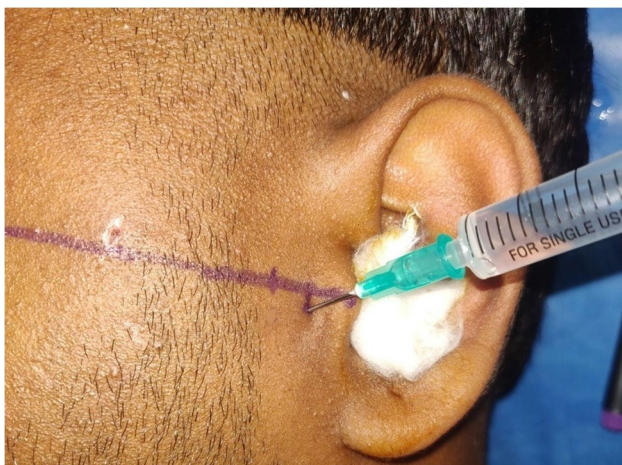
## Outcomes

The outcomes assessed were the amount of hematoma evacuated in millilitre (ml), pain in TMJ during reduction on visual analogue scale (VAS) and immediate postoperative change in angulation between proximal condylar and distal segments on CBCT in coronal plane.

## Results

After screening 139 patients, 11 were enrolled in the study. The mean age was 24.54. Distribution of participants' data is given in Table 1. The left side was seen to be most commonly involved ( $n=9$ ) in the fracture.

The mean volume of hematoma evacuated in 9 patients was 0.55 ml (0.3 to 1.5 ml) (Table 2). However, in 2 patients, the hematoma was found to be absent and could not be evacuated. The pain score (VAS) during reduction was found to be 1.18 with a range of 0–3 (Table 2). The mean change in



**Fig. 2** TMJ hematoma block being given with the same needle

**Table 1** Data of participants

Factors	
Mean age (years)	24.54
Sex (M/F)	7/4
Aetiology (RTA/fall/assault)	7/3/1
MacLennan type (deviation/no displacement)	3/8

angulation between proximal condylar and distal ramal segments was reduced from  $10.68^\circ$  preoperatively (range 0 to  $25.32^\circ$ ) (Fig. 3) to  $7.4^\circ$  (Fig. 4) in the immediate postoperative period (range 0 to  $23.2^\circ$ ) (Table 2).

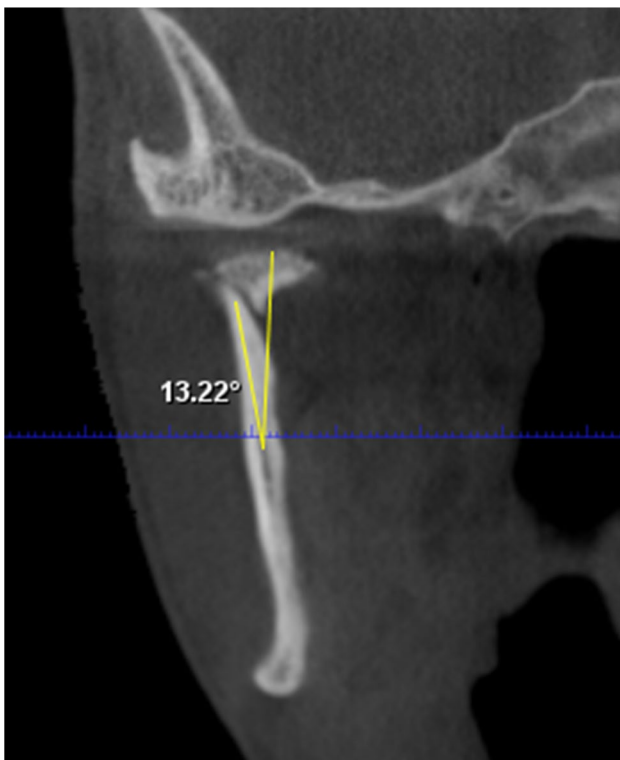
## Discussion

Condyles act as muscular processes and not load-bearing structures, so the necessity for precise repositioning of bone ends is not desirable at every time because they always heal by bony union regardless of any therapy. [4] Nussbaum et al. [5] in his systematic review concluded that patients who underwent CR had greater maximum mouth opening, no significant difference in postoperative mandibular deviation, protrusion, excursion movement and facial asymmetry compared to OR.

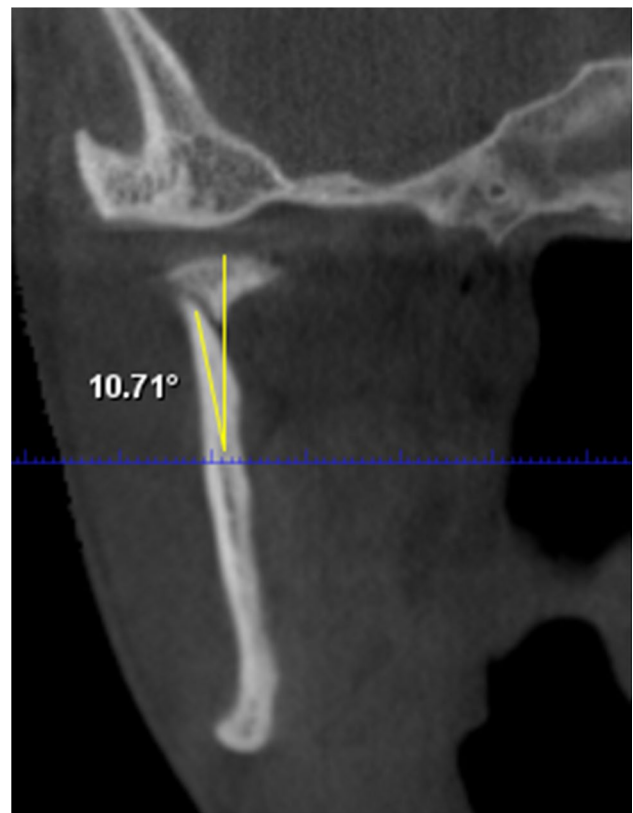
In the traditional approach of CR, only IMF is done without any active interventions in a fractured joint. Andrew et al. [6] used masseteric and deep temporal nerve block which reduces both pain and muscle spasm, thus facilitating reduction of the mandibular dislocation. Klineberg [7] described the regional nerve block technique for the TMJ capsule. In our technique, we hypothesized that it causes anaesthesia of auriculotemporal and masseteric nerves and relaxation of the lateral pterygoid muscle enabling easy manipulation of the condyle and accurate reduction of fractured segments. Trauma to TMJ causes intra-articular hematoma formation, due to disruption in the capsular ligament and adjoining periosteum which may terminate into fibrosis, excessive bone formation or ultimately ankylosis. There have been no studies in the literature regarding evacuation of the hematoma to date. Evacuation of hematoma certainly would reduce the chance of developing ankylosis. We were able to evacuate hematoma in 81.8% (09/11) subjects. A mean volume of 0.55 ml hematoma was evacuated from SJC. The patients in which hematoma evacuation was not evident were found to have reported late after the injury, suggesting a possibility of organization of hematoma. TMJHNB causes anaesthesia of auriculotemporal, masseteric nerves and nerve endings with relaxation of the lateral pterygoid muscle, thus achieving good pain control, enabling easy manipulation and accurate reduction of fractured segments. The

**Table 2** Variables assessed

Age/sex	Type of condylar fracture	Amount of hematoma evacuated (ml)	VAS score during reduction of fracture	Change in angulation (°)	
				Preoperative	Postoperatively
26/M	Unilateral left condylar neck fracture	0.9 ml	2	8.7	1.4
18/M	Unilateral right dicapitular fracture	0.6 ml	2	24	13.6
20/M	Unilateral left condylar neck fracture	Nil	3	6.36	4.75
19/M	Unilateral right condylar base fracture	0.6 ml	2	3.56	2.12
26/F	Unilateral left condylar base fracture	Nil	1	25.32	23.02
34/M	Unilateral left condylar neck fracture	Nil	0	23.2	23.2
27/F	Unilateral left condylar neck fracture	1.5 ml	0	1.66	1.6
29/M	Unilateral right condylar base fracture	0.3 ml	1	0.3	0.9
19/F	Unilateral left condylar neck fracture	0.5 ml	1	8.7	0.9
31/F	Unilateral left neck fracture	1.1 ml	0	15.77	10.83
21/M	Unilateral left condylar base fracture	0.6 ml	1	0	0



**Fig. 3** Preoperative angulation between fractured segments of the right side on CBCT in coronal view



**Fig. 4** Immediate change in angulation between fractured segments of the right side after IMF

mean VAS score during reduction was found to be 1.18, which shows that satisfactory pain control and compliance was achieved using our technique.

The mean change in angulation of the fractured segment was, however, not found to be statistically significant between the groups. We had one case of transient facial nerve palsy immediately after TMJHNB, which recovered within 3 days after prescribing oral prednisolone therapy.

**Conclusion**

We conclude that the TMJHNB is less painful, minimally invasive, safe, simple to perform, promising and yielding an excellent anatomic reduction of the fracture fragments.

## Limitations

Well-designed, randomized clinical trials with a large sample size are necessary to further substantiate our results which are ongoing in our department.

## Declarations

**Ethics approval** The approval from institutional ethics committee was duly obtained (EC Ref. meeting dated 18/05/2018).

**Patient consent** Obtained wherever necessary

**Conflict of interest** Copyright approval for the “TMJ Hematoma Nerve Block technique” has been obtained by Copyright Office, Government of India dated 4 May 2020 (diary number: 4741/2020-CO/L).

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