

Functional Treatment of Condylar Process Fractures in Children

Kenji Arita

Department of Pediatric Dentistry Social and Environmental Medicine, Integrated Sciences of Translational Research Institute of Health Biosciences, The University of Tokushima Graduate School

Introduction

Management of mandibular fractures in children differs somewhat from that in adults because of anatomy, variation, rapidity of healing, degree of patient cooperation, and the potential for interference with mandibular growth. Inadequate treatment or overtreatment may lead to growth retardation or growth excess in mandible, while excessive immobilization may result in mandibular hypomobility. Jaw function is encouraged to promote growth by virtue of the high regenerative and remodeling potential which is inherent in childhood. Functional treatment using a removable orthodontic appliance (activator) is usually given for conservative treatment of childhood condylar fractures at pediatric dental clinic in our hospital. The activator is useful in establishing and maintaining straight line opening of mandible. The purpose of using activator is to promote normal mandibular growth in disrupt structures of the soft and hard tissue of mandible.

The purpose of this study was to evaluate the clinical outcome after our functional treatment by an activator.

Subjects and methods

I investigated clinical characteristics and outcome of functional treatment for my 11 patients with condylar process fractures, who were treated using an activator at Pediatric Dentistry of Dental Division in Tokushima University Medical and Dental Hospital. The subjects were 7 boys and 4 girls, with an age range of 2.75 to 14.58 years (mean, 7.1 ± 3.3 years). Ten patients (90.9%) were 10 years older or less. The fractures were classified fracture types according to Nukata et al¹⁾ and investigated fracture sites. All patients underwent a clinic-radiologic investigation focusing on fracture remodeling, outcome, dental occlusion, symmetry on mandible, and mandibular mobility. I also observed the remodeling process using three-dimensional CT reconstructions at pretreatment, 1 month, 3 months and 7 months after functional treatment in a 5-year-old boy with left condylar process fracture and left mandibular body fracture by traffic accidents at riding bicycle.

Results

Evaluation of condylar process fractures

There were 14 condylar process fractures in 11 patients. Eight patients (72.7%) had unilateral fractures including 6 patients (54.5%) in left side and 2 patients (18.2%) in right side, and 3 patients (27.3%) had bilateral fractures. The most frequent cause of fractures was bicycle accidents in 7 patients (63.6%) including 3 traffic accidents at bicycle ridings. The remainder of the fractures occurred in falls in 4 patients.

1) Type of Fractures

Three fractures (27.3%) were Type I, 4 fractures (36.4%) were Type II (Type IIa: 1, Type IIb: 3), 1 fractures 9.0% was Type III (Type IIIa: 1, Type IIIb: 0), 3 fractures (27.3%) were Type IV, and 3 fractures (27.3%) were Type V.

2) Site of Fractures

Two fractures (14.3%) occurred in head regions of condylar, 9

fractures (64.3%) occurred in neck regions including 4 fractures in lower neck and 5 fractures in upper neck, and 3 fractures (21.4%) occurred in base regions.

Evaluation in pretreatment

1) Status of Dentition (Hellman's dental age)

Five patients (45.5%) had primary dentition including 1 was IC and 4 were IIA, 5 patients (45.5%) had mixed dentition including 2 were IIC, 1 was IIIA, and 2 were IIIB, and 1 patient (9.1%) had permanent dentition (IIIC).

2) Associated Facial and Mandibular Fractures

Four patients had associated mandibular body fractures (36.4%), 2 patients had symphysis fractures at mandibular midline, 1 patient had fracture in cranial base.

3) Occlusion in Pretreatment

No patient had a good occlusion. Eight patients (72.7%) had malocclusions, and most frequent malocclusion was a posterior cross bite in 4 patients. Eight patients also had many deciduous molars with disintegration crowns for severe caries.

4) Time from Initiating Trauma to Placing Activator

The average time from initiating trauma to placing activator was 7.9 days (range, 3 to 18 days). Two patients (18.2%) visited our clinic at more than 2 weeks after injury.

Treatment

The mean placing period of activator was 40.5 days (range, 22 to 68 days). Chin cap was usually useful to be bit the activator for younger children. Eight patients (72.7%) also wore a chin cap with an activator within 2 weeks. No patient was asked to do functional exercise (Maximal mouth opening, right and left lateral excursion, and protrusive excursion) during treatment and post-treatment.

Results of Posttreatment

The mean follow-up period was 4.2 years (range, 0.5 to 14.2 years). The clinical outcome was successful with pain-free joint in all patients. Ten patients (90.1%) were returned to the preinjury occlusion after treatment. After activator was removed, one patient was treated cross bite of the preinjury occlusion to normal occlusion by an occlusal guidance using lateral expansion appliance. The facial profile was good without any deviation of the jaw on opening the mouth. The maximum mouth opening was 41.22 ± 3.95 mm (range, 38.5 to 50.0 mm) at 1 or 2 months after treatment in 10 patients. All patients had symmetrical maximum mouth opening. Posttreatment facial and mandibular symmetry was present in all cases.

Findings of CT reconstructions (Figs. 1 and 2)

CT findings suggested conspicuous bone resorption of the fracture fragments and rapid formation of a new condyle with additional bone in 3 months after treatment. Morphology of the newly formed condylar head was round but width and length of the condyle were normal. Seven months after treatment, the

generated condylar were observed to be completely remodeling to normal morphology in mandibular fossa.

Conclusion

These results indicated that our functional treatment using activator

is a very effective conservative management for condylar process fractures in children of 10 years old or less..

References

- 1) Nukata, et al: Comparison of clinical results of conservative and surgical treatment for condylar fractures of mandible. JJTOM 46(9): 545-548, 1998.

