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Installing an original sleeve for rod unaccessible pain from a distraction device in a hemifacial microsomia patient

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ABSTRACT

INTRODUCTION: Lengthening of the mandible by distraction osteogenesis using an internal device is the preferred method for the treatment of hemifacial microsomia. Despite its advantages, this technique can lead to various complications after the surgery.
PRESENTATION OF CASE: We report the case of an 8-yr-old Japanese girl whose case presented practical difficulties in device activation because of rod unaccessible pain after the initial mandibular distraction with an internal device, and this complication was addressed with the installation of an original sleeve.
DISCUSSION: In the present patient, the region of the bend rod was located at the inferior border of the right mandible, causing rod unaccessible pain by contacting the surrounding tissue including a sensory nerve. Careful vertical ramus distractor position planning and tools to resolve complications are the key factors for accomplishing the scheduled elongation.
CONCLUSION: Alternative techniques using a sleeve for safer and gentle distraction for rod unaccessible pain on activation should be considered.

1. Introduction

Hemifacial microsomia is a common congenital soft-tissue and skeletal craniofacial deformity caused by hypoplasia of the first and second branchial arches. Mandibular hypoplasia is the most obvious skeletal finding associated with this deformity. The preferred treatment of hemifacial microsomia is lengthening the mandible by distraction osteogenesis using an internal device. The number and types of distraction devices have increased rapidly in recent years. Small and submerged devices have been introduced to maximized patient comfort and provide esthetic and physical acceptability. Despite these advances, the treatment carries a constitutional risk of complications [1,2]. Here we describe a case in which rod unaccessible pain developed after the initial mandibular distraction activation, and the pain was resolved by installing an original sleeve.

2. Case presentation

An 8-yr-old Japanese girl presented with grade IIb right-side hemifacial microsomia. She had already undergone right ear reconstruction for microsomia at 1 yr of age. The reconstruction was performed under general anesthesia with nasoendotracheal intubation. The incision was made through the buccal mucosa along the external oblique line extending to the first molar. After a subperiosteal dissection was performed, the entire lateral and proximal aspect of the mandibular ramus and the gonial angle region were exposed. Subperiosteal tunneling was then performed, and the ramus was encircled to protect the surrounding tissue and the lingual nerve and vessels.

Next, an internal distraction device (Zurich pediatric ramus distractor, KLS Martin, Tuttlingen, Germany) was fixed with 1 screw in approximately the desired position. A second screw was then inserted, and both screws were tightened. The holes remaining from the screws were marked, and the distraction device was removed to complete the osteotomy. The osteotomy was performed as a horizontal cut of the ramus at a level below the mandibular foramen, by using a reciprocating saw. The cortical bone of the ramus was cut in the posterior, lateral, and anterior parts leaving the central cancellous bone and medial cortex to be fractured. After the distraction device was placed with screws, the activation was confirmed.

Because the protrusion of the activating rod did not arrive at the lower vestibule, we ligatured a nylon thread at the point of the con-

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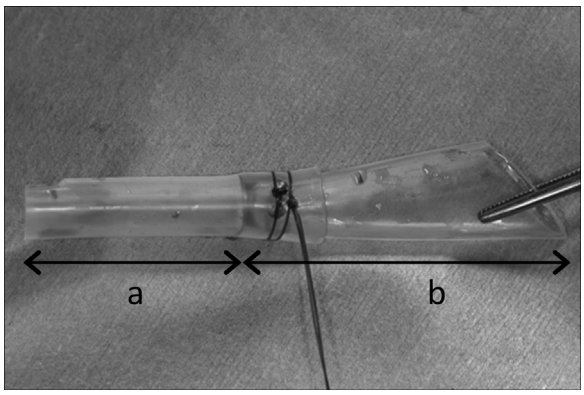

Fig. 1. An original sleeve. A silicone tube (a) connected with a plastic absorption pipe (b).

Fig. 2. Intra-oral views after the installation of the wire and the original sleeve.

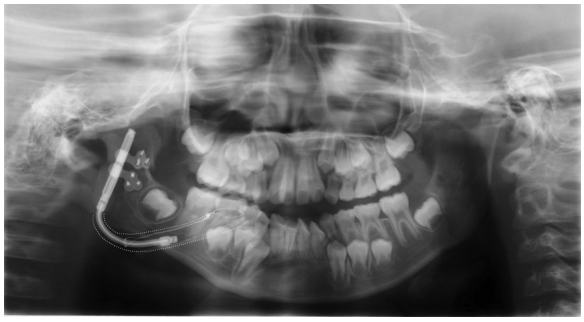

Fig. 3. Panorama X-ray after the installation of the wire and the original sleeve. Dotted lines, the position of the original sleeve.

nection and covered it with a Penrose drain for an emergency. On the sixth postoperative day, the distraction was started by turning the rod at the rate of 1 mm/day. However, the activation rod was intraorally, and it was thus difficult to access and caused pain to the surrounding soft tissues despite the traction of the activation rod by the ligatured nylon thread.

On the eighth postoperative day, with the patient under general anesthesia, the nylon thread was replaced with a wire for reliable traction, and the rod was completely installed by using a silicone tube connected with a plastic absorption pipe (Figs. 1–3). Subsequently, 13.5-mm distraction was possible on schedule without pain or discomfort (Fig. 4). After completion of the distraction, the length of the right mandibular ramus increased and the patient's face appeared more symmetrical. Trismus did not appear and the device was removed; the osteogenesis was confirmed to have progressed well after 1 yr of distraction.

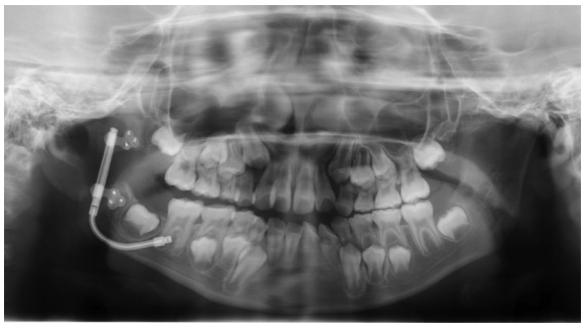

Fig. 4. Panorama X-ray after elongation was achieved.

3. Discussion

Distraction osteogenesis of the mandible is widely used for improving the morphology of the facial skeleton in patients with hemifacial microsomia [3]. Among the large number of reported cases, several types of complications in relation to distraction osteogenesis have been described [4]. During the age of mixed dentition in the present patient, the unerupted second molar bud was located high in the retromolar area and can be damaged by the osteotomy. To prevent damage to the tooth bud and to the inferior alveolar nerve, we performed the horizontal oblique mandibular ramus osteotomy for elongation of the mandibular ramus by distraction osteogenesis. To elongate the vector vertically downward with a slight anterior protrusion of the right hypoplastic mandible, the distraction device was placed accordingly. The osteotomy was completely mobilized to ensure that there would be no obstruction to the distraction process by turning the rod during the operation. However, it was difficult to access and caused pain to the surrounding soft tissues.

It is important to gain more knowledge about complications, practical difficulties in device activation, neuropraxia, infection in relation to the distraction device and trismus during distraction. Norholt et al. reported that 30.5% of the patients after mandibular distraction osteogenesis with internal devices have incidents of pain on activation [2]. The process of distraction osteogenesis was developed to lengthen the mandible, which loads mechanical compressive stress from the surrounding tissues. Traction forces applied to bone also create tension in the soft tissues, initiating a sequence of adaptive changes [5]. Minor to severe complications can be avoided if attention is paid to these factors, and complications that do occur can be resolved with adequate intervention [2].

In the present patient, the vector of elongation was vertically downward, with a slight anterior protrusion of the right hypoplastic mandible. The position of the fixation screw was established in consideration of the vector of the vertical elongation of the right ramus. As a result, the region of the bend rod was located at the inferior border of the right mandible, causing rod unaccessible pain by contacting the surrounding tissue including a sensory nerve. Careful vertical ramus distractor position planning and tools to resolve complications are the key factors for accomplishing the scheduled elongation. Alternative techniques using a sleeve for safer and gentle distraction for rod unaccessible pain on activation should also be considered.

Conflict of interest

None.

Funding

None.

Ethical approval

Informed consent was taken.

Authors contribution

Tsuyoshi Shimo and Akiyoshi Nishiyama contributed to data and writing. Norie Yoshioka and Akira Sasaki contributed to data collections.

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