

# Dental Disturbances following Mandibular Distraction Osteogenesis in Children with Pierre Robin Sequence

Chau MLS, Kerins CA, Park YJ, Maguire J, Hoffman JE

Texas A&M University College of Dentistry and Children's Medical Center, Dallas, TX



## BACKGROUND

Patients with Pierre Robin sequence may display a smaller lower jaw (micrognathia) and backward displacement of the tongue (glossoptosis), resulting in functional concerns such as upper airway obstruction.

Mandibular distraction osteogenesis (MDO) is a well-established and utilized technique in treating children with Pierre Robin sequence. It serves as an effective method in helping to alleviate airway obstruction.

Issues with tooth development have been identified as a surgical complication. These issues can range from changes in position, size, shape, number, and calcification of mandibular teeth, particularly molars. Data on the incidence and severity of injury to permanent mandibular molars has been variable in previous literature, with estimates ranging from 3.5% to 85% of patients.

By gathering more information regarding dental injury following distraction, it will allow dental providers who treat this population to better facilitate treatment and guidance to these patients.

## OBJECTIVE

To determine the presence of dental disturbances following mandibular distraction osteogenesis in children with Pierre Robin sequence.



## MATERIALS AND METHODS

A retrospective chart review was conducted of Children's Medical Center Dallas Dental, Orthodontic, and Craniofacial patients. Data was collected through review of Epic documentation, and Dexis and Dolphin imaging software.

**Inclusion criteria:** Patients with diagnosis of Pierre Robin sequence, who were seen at CMC between 2014 and 2024.

Out of 168 patients who had PRS, 100 patients were excluded due to limited radiographs, dental, or orthodontic records, and/or because they did not receive a comprehensive dental examination due to being lost to follow up or deceased.

68 patients were included in the study.

- Group 1: No history of mandibular distraction osteogenesis (N=12)
- Group 2: History of mandibular distraction osteogenesis (N=56)

Patients' posterior mandibular dentitions were evaluated for qualitative and quantitative enamel defects, and disturbances in number, size, shape and eruption.

## RESULTS

The mean age patients initially received MDO was 4.49 months, with age at initial surgery ranging from 5 days to 33 months. 14 patients received multiple MDO surgeries.

17% of patients who did not receive MDO had dental disturbances, in comparison to 86% of patients who received MDO. There was a statistically significant difference in presence of dental disturbances ( $p<.001$ ). The most frequently noted disturbances were quantitative enamel defects, affecting approximately 64% of the MDO patients.

The most commonly affected teeth were the first permanent molars, followed by second permanent molars and second permanent premolars.

Independent T-test were used to examine the mean age at initial MDO and presence of disturbances. Mean age at initial distraction was lower for patients with qualitative and quantitative enamel defects ( $p>.05$ ). Mean age at initial distraction was higher for patients with disturbances in number, shape, and eruption ( $p>.05$ ).

## DISCUSSION

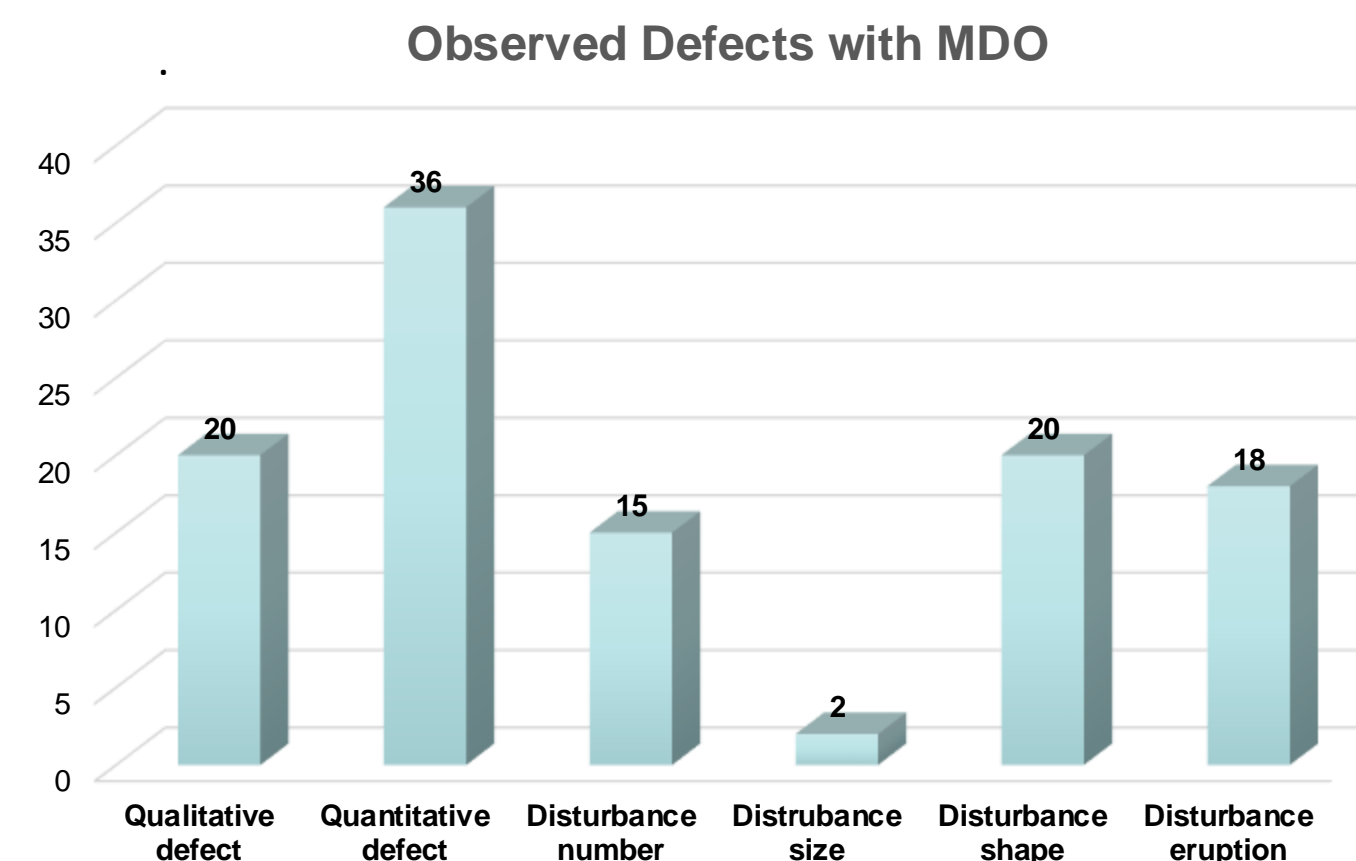
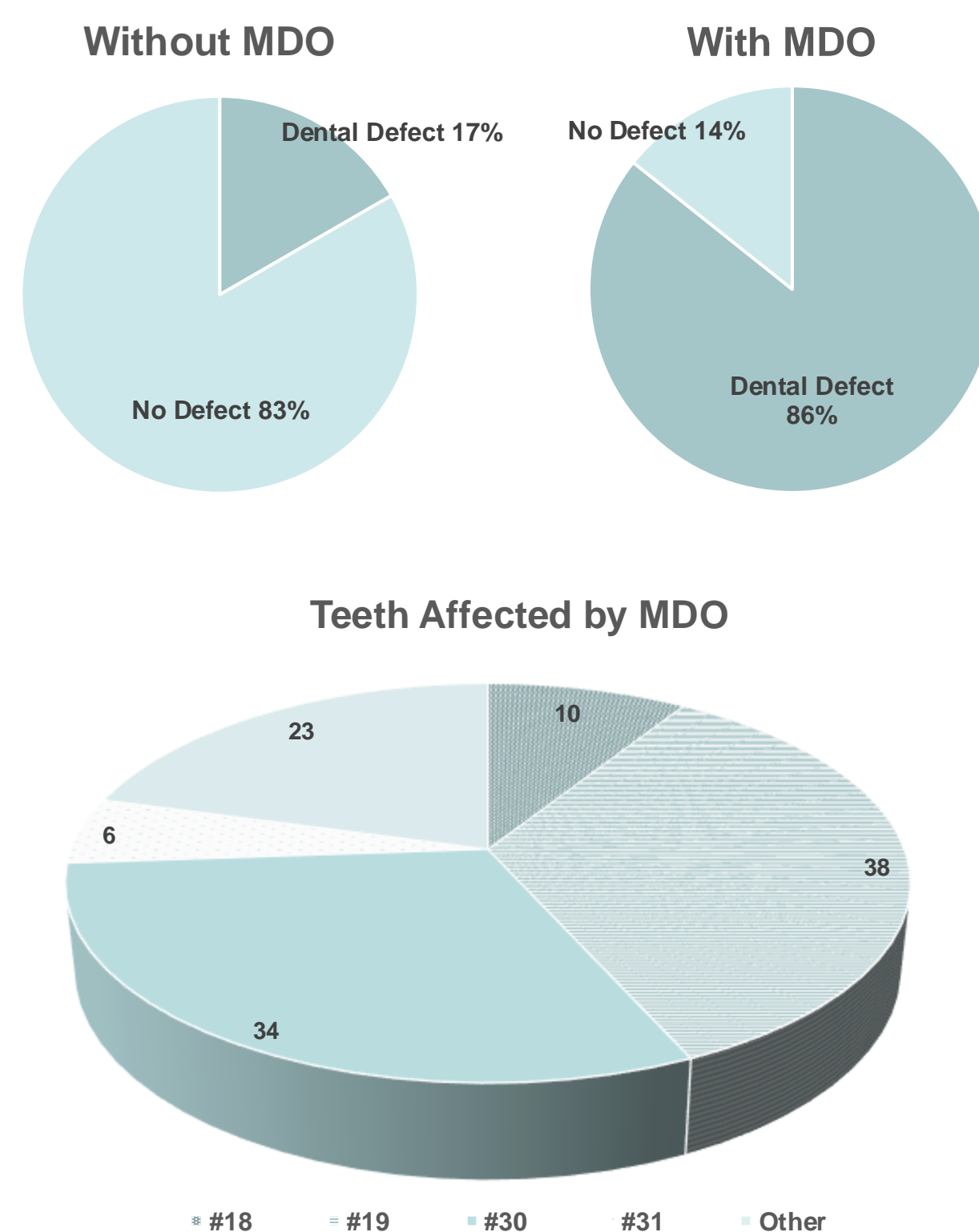
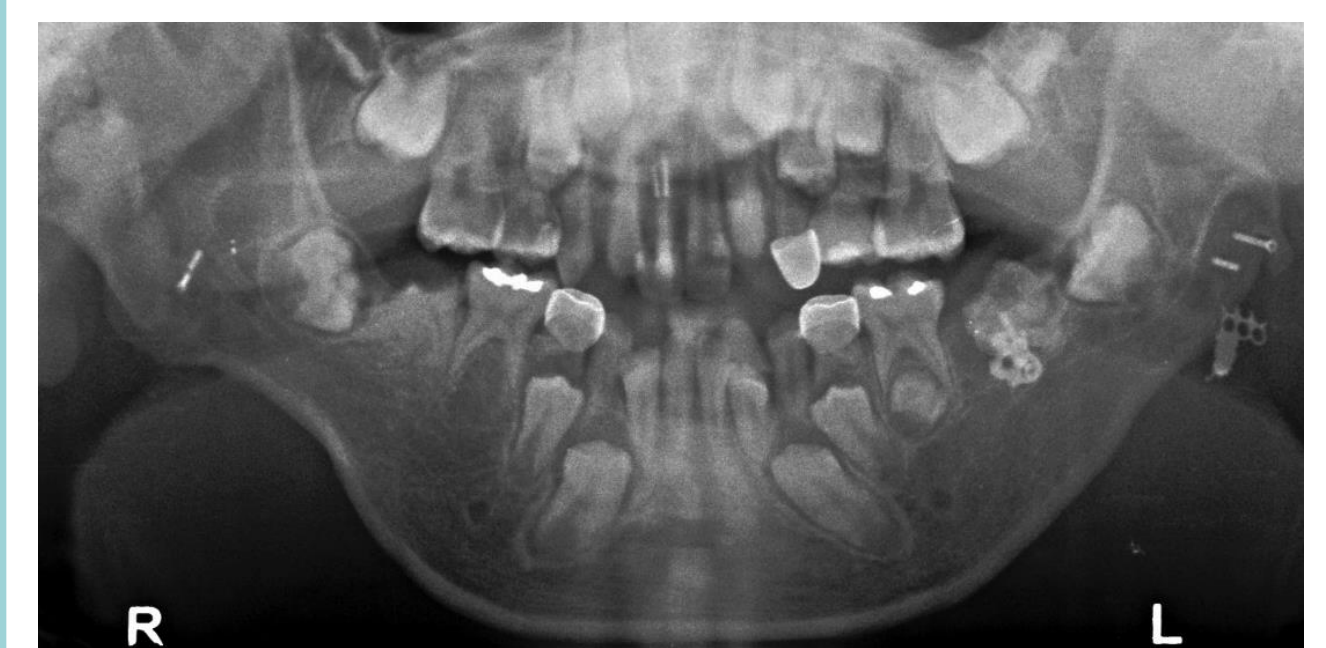
The study was limited due to several factors. While the percentage of MDO patients who had dental disturbances was greater than or equal to previous studies, variability in this value may be due to the smaller sample sizes of these studies. Many of the patient records had limited or inconsistent documentation regarding dental findings. Patients also had other medical conditions that may have contributed to the presence of disturbances. MDO technique and number of surgeries were not considered in this study.

Future research may include a larger sample size possibly involving multiple institutions. It may also consider other medical conditions and MDO techniques as they relate to dental disturbances. Further investigation regarding the timing of MDO in relation to type and severity of dental disturbances may be considered.

There are different methods to help avoid damaging vital structures during MDO. Practitioners may utilize virtual surgical planning and customized distractors to potentially prevent damage. Another option for PRS patients is the Tubingen palatal plate, an orthodontic device to push the base of the tongue forward to open the airway non-surgically. This could reduce the incidence of defects and the associated burden of care.

## CONCLUSION

1. There was a higher presence of dental disturbances in Pierre Robin sequence patients who received MDO.
2. First permanent molars were most commonly affected by distraction, followed by second permanent molars and second permanent premolars.
3. Distraction was commonly associated with quantitative and qualitative enamel defects and disturbances in shape.



Mean age (months) at initial distraction and presence of disturbance

	Yes	No	
Qualitative defect	2.8	5.43	$p=0.224$
Quantitative defect	3.98	5.41	$p=0.561$
Disturbance number	6.87	3.55	$p=0.311$
Disturbance shape	6.13	3.65	$p=0.315$
Disturbance eruption	6.4	3.68	$p=0.356$