Neonatal Distraction
Osteogenesis:
Converting Virtual Surgical Planning Into Operative Reality

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• Disclosures:
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Background

• Mandibular Distraction Osteogenesis (DO) has become an accepted method to manage severe cases of micrognathia-induced airway obstruction in neonates.
• Standard imaging offers a limited role during pre-operative planning and throughout the operation.
Background

- To our knowledge, we offer the first description of virtual surgical planning (VSP) being used to guide DO in the mandible of a neonate.
- VSP can serve an important role in DO planning and can offer objective guidance in device selection, vector planning and operative guide positioning.
Pre-Operative VSP

• A virtual surgical plan was created using 3D reconstructions of the patients’ CT scan.

• VSP was then used to create custom osteotomy guides that snapped onto the patients’ mandible in the operating room.
Pre-Operative VSP

(A)

(B)

(C)

(D)

15 mm Advancement Position

Objectives  Methods  Results  Conclusions
Intra-Operative VSP

- As predicted, given the uniqueness of each mandible, the custom guide would only snap on if placed in the VSP designed position.
Intra-Operative VSP

• The VSP guide was then exchanged out for the distraction devices using K wires placed over pre-planned holes.
Results

• VSP was used for DO in 3 neonates (n = 6 mandibles)

• A total advancement of 20mm was performed bilaterally in each child

• At follow up, the children have excellent cosmetic results and have avoided tracheotomy.
Improvement in airway after VSP-DO

- Pre-operative MRI
- 3 month post-operative CT

Objectives

Methods

Results

Conclusions
Progression of one patient with VSP-DO

POD 0

1 month post op

4 months post op

17 months post op

Objectives

Methods

Results

Conclusions
Conclusions: VSP-DO in the neonate

• Virtual Surgical Planning used in neonatal Distraction Osteogenesis transforms standard 2D imaging into an operative roadmap.

• The resultant model provides custom and precise guidance in device selection, vector planning and guide positioning that is easy to implement.