MAXILLARY MORPHOLOGY OF PEDIATRIC OSA PATIENTS USING CBCT

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BACKGROUND

- Pediatric obstructive sleep apnea (OSA) is characteristically different from adult OSA, not only in prevalence and etiology, but also in anatomical phenotype, in clinical presentation, and in sequelae.

NIGHTTIME SYMPTOMS:
Enuresis
Sleep terrors
Sleep walking
NREM parasomnias

DAYTIME SYMPTOMS:
Morning headaches
Excessive daytime sleepiness (EDS)
Failure to thrive

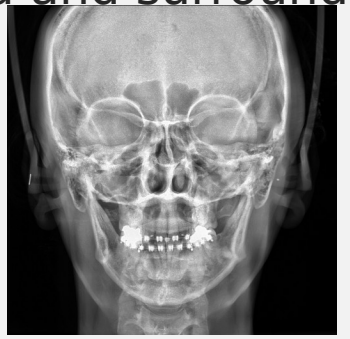
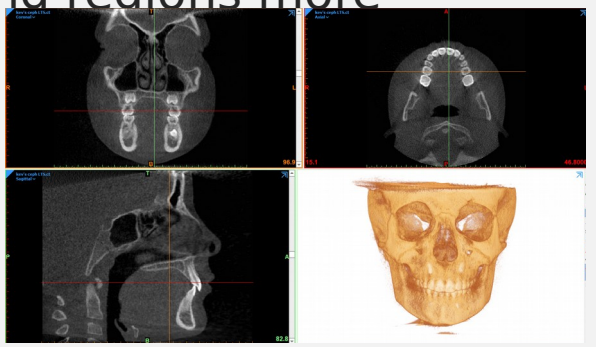
BEHAVIORAL CONCERNS:
Diffi culty concentrating
Poor school performance
Hyperactivity
Depression
Psychiatric problems

DECREASED LEVELS OF GROWTH HORMONE

BACKGROUND

- The characteristic craniofacial morphology that predisposes children to experience sleep disordered breathing has been well studied using lateral cephalometrics, for sagittal and vertical analysis.
- Analysis of phenotypes in the transverse dimension have been neglected due to:
  - inability to view on a 2D lateral ceph
  - limitations of panoramic films
  - inherent inaccuracies of a PA-ceph
- CBCT scans enable clinicians to view the maxilla and surrounding regions more pr



SIGNIFICANCE

- Contribution to science & current knowledge of the condition
- Assistance to clinical professionals in screening, properly referring, thus diagnosing & treating

OBJECTIVE

- This study aims to use CBCT scans to analyze in 3D the maxillary dentoskeletal morphology in healthy children, as compared to children with diagnosed obstructive sleep apnea (OSA).

HYPOTHESIS

- Null Hypothesis (H_0): There is no difference between the maxillary skeletal morphology of children with OSA as compared to children without OSA.

- Alternative Hypothesis (H_1): There is significant difference between the maxillary skeletal morphology of children with OSA as compared to children without OSA.

MATERIALS & METHODS

- Total n = 83 subjects with CBCT’s and PSGs
- Males and females between the ages of 2 – 15 with no prior orthodontic treatment
- Categorized into 2 groups:
  - (+)OSA diagnosis
  - (-)OSA diagnosis
- Evaluation and analysis of CBCT images will be performed using Mimics v.21.0 (Materialise, Leuven, Belgium).

Total			
n = 98			
+ OSA		- OSA	
n = 35		n = 48	
M	F	M	F
23	12	34	14

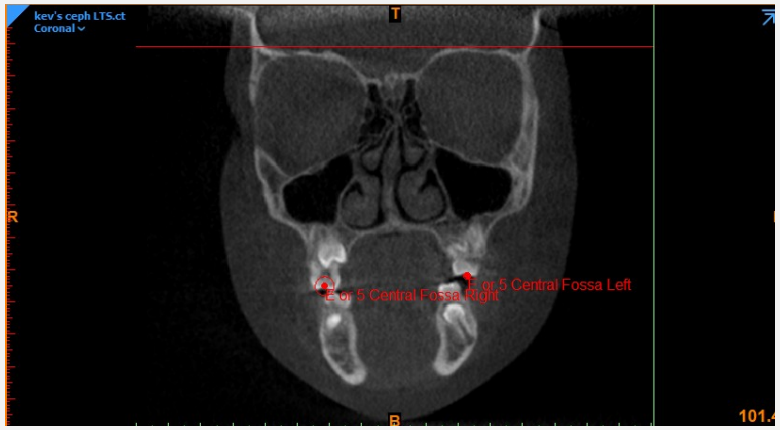
DATA COLLECTION

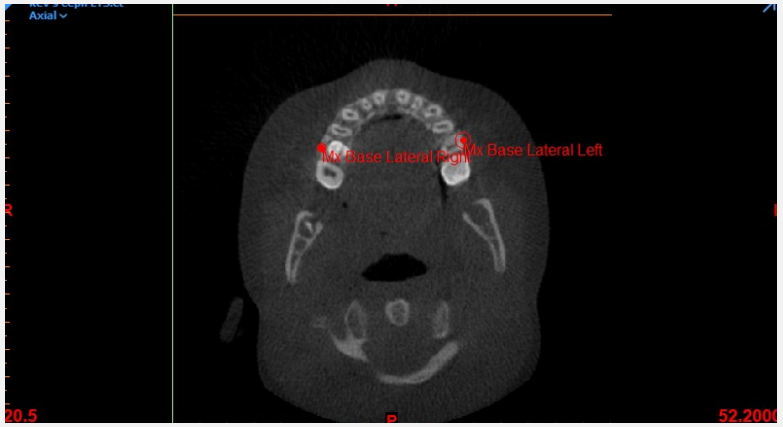
Land-mark	Description
1,2	Second deciduous molar, or second permanent premolar measured at the alveolar crest at the most palatal aspect (L/R)
3,4	Second deciduous molar, or second permanent premolar measured at the alveolar crest at the most buccal aspect (L/R)
5,6	Second deciduous molar, or second permanent premolar measured at the central fossa (L/R)
7,8	Second deciduous molar, or second permanent premolar measured at the furcation (L/R)
9,10	Permanent or deciduous canine measured at the alveolar crest at the most palatal aspect (L/R)
11,12	Permanent or deciduous canine measured at the cusp tip (L/R)
13,14	Permanent or deciduous canine measured at the apex (L/R)
15,16	Greater palatine foramen (L/R)
17,18	Zygomatico-maxillary suture anterior (L/R)
19,20	Zygomatico-maxillary suture posterior superior (L/R)
21,22	Zygomatico-maxillary posterior inferior (L/R)
23	Nasofrontal suture anterior
24,25	Nasofrontal suture (L/R)
26,27	Pterygoid Process anterior (L/R)
28,29	Pterygoid Process posterior medial (L/R)
30,31	Pterygoid Process posterior lateral (L/R)
32	Vomer superior
33	Vomer inferior (L/R)

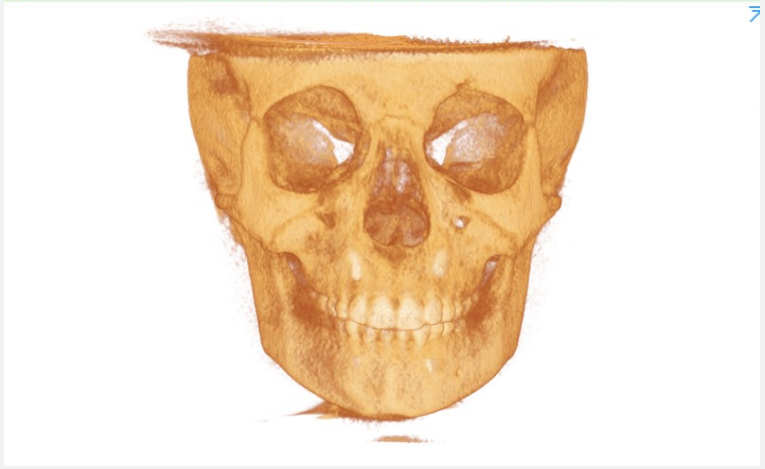
DATA COLLECTION – PART 1

Line	Point 1	Point 2
1-2	Second deciduous molar, or second permanent premolar measured at the alveolar crest at the most palatal aspect (R)	Second deciduous molar, or second permanent premolar measured at the alveolar crest at the most palatal aspect (L)
3-4	Second deciduous molar, or second permanent premolar measured at the alveolar crest the most buccal aspect (R)	Second deciduous molar, or second permanent premolar measured at the alveolar crest the most buccal aspect (L)
5-6	Second deciduous molar, or second permanent premolar measured at the central fossa (R)	Second deciduous molar, or second permanent premolar measured at the central fossa (L)
7-8	Second deciduous molar, or second permanent premolar measured at the furcation (R)	Second deciduous molar, or second permanent premolar measured at the furcation (L)
9-10	Permanent or deciduous canine measured at the alveolar crest at the most palatal aspect (R)	Permanent or deciduous canine measured at the alveolar crest at the most palatal aspect (L)
11-12	Permanent or deciduous canine measured at the cusp tip (R)	Permanent or deciduous canine measured at the cusp tip (L)
13-14	Permanent or deciduous canine measured at the apex (R)	Permanent or deciduous canine measured at the apex (L)
15-16	Greater palatine foramen (R)	Greater palatine foramen (L)
26-27	Pterygoid process anterior (R)	Pterygoid process anterior (L)

DATA COLLECTION – PART 1



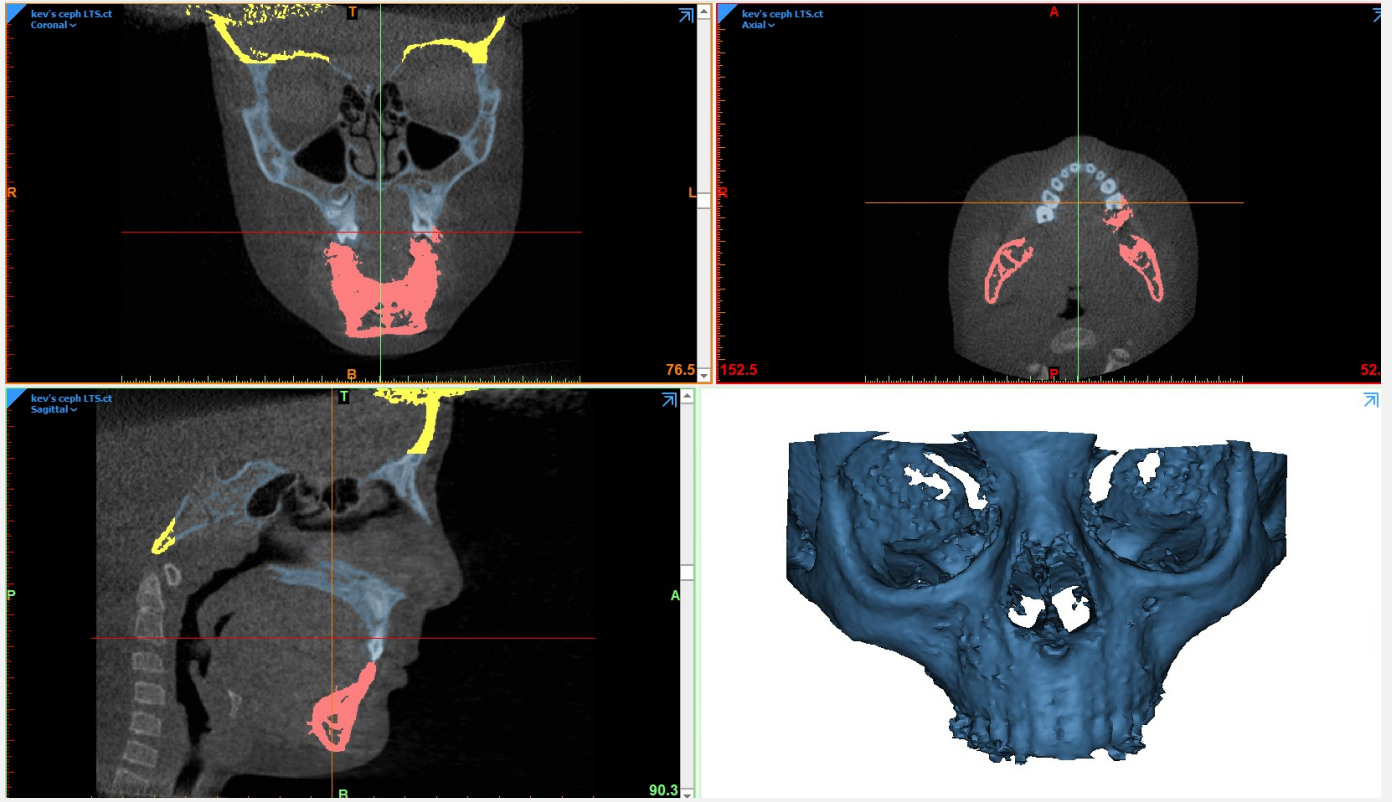




DATA COLLECTION – PART 2

Plane	Point 1	Point 2	Point 3
Zygomatico-maxillary Suture (Left)	Zygomatico-maxillary anterior (Left)	Zygomatico-maxillary posterior superior (Left)	Zygomatico-maxillary posterior inferior (Left)
Zygomatico-maxillary Suture (Right)	Zygomatico-maxillary anterior (Right)	Zygomatico-maxillary posterior superior (Right)	Zygomatico-maxillary posterior inferior (Right)
Nasofrontal Suture	Nasofrontal Anterior	Nasofrontal Left	Nasofrontal Right
Pterygoid Process (Left)	Pterygoid Process Anterior (Left)	Pterygoid Process Posterior Medial (Left)	Pterygoid Process Posterior Lateral (Left)
Pterygoid Process (Right)	Pterygoid Process Anterior (Right)	Pterygoid Process Posterior Medial (Right)	Pterygoid Process Posterior Lateral (Right)
Vomer (Midway)	Vomer Superior	Vomer Inferior (Left)	Vomer Inferior (Right)

DATA COLLECTION – PART 2



RESULTS – PART 1

- Students t-test

Variables	No OSA				OSA				MD	SD	P-Value
	Mean	SD	Median	IQR	Mean	SD	Median	IQR			
Age	6.86	2.35	6.77	3.63	6.94	2.38	7.11	3.62	-0.09	2.36	0.87
C or 3 Apex	29.30	2.72	29.22	3.64	28.20	4.70	29.12	5.66	1.10	3.67	0.18
C or 3 Cusp tip	30.10	2.96	29.29	4.20	29.25	4.94	29.71	6.25	0.85	3.80	0.34
C or 3 Palatal	23.43	2.55	23.16	3.58	22.89	3.25	22.88	4.82	0.54	2.86	0.40
E Alveolar	29.36	2.96	29.13	4.45	28.17	3.06	28.16	4.30	1.19	3.00	0.08
E Central Fossa	40.11	3.33	39.78	4.57	39.23	3.65	39.28	5.13	0.88	3.47	0.26
E Furcation	39.73	2.94	39.52	4.26	38.39	3.26	38.12	5.06	1.34	3.08	0.06
Greater Palatine	25.85	2.22	25.69	3.06	25.16	3.33	24.89	5.59	0.70	2.73	0.26
Maxillary Base	48.88	3.07	49.32	4.70	48.16	3.98	47.86	5.99	0.72	3.48	0.36

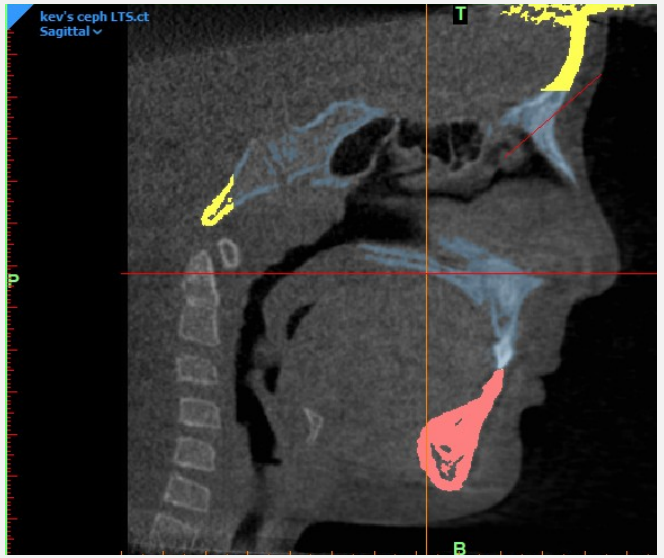
RESULTS – PART 1

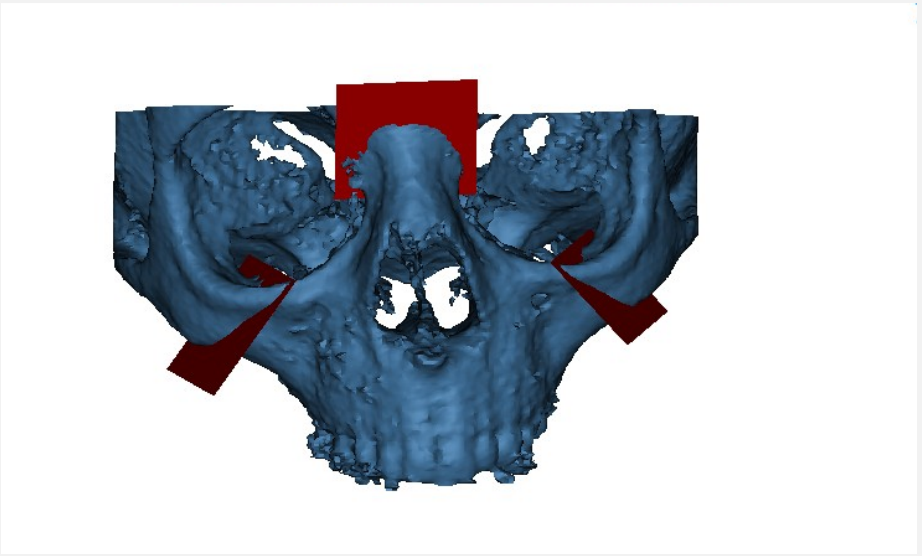
- Logistic Regression Analysis

Variables	Odds Ratio	95% CI		P-Value
C or 3 Apex	0.916	0.804	1.04	0.19
C or 3 Cusp tip	0.933	0.820	1.06	0.29
C or 3 Palatal	0.927	0.782	1.10	0.39
E Alveolar	0.838	0.699	1.00	0.06
E Central Fossa	0.905	0.775	1.06	0.20
E Furcation	0.805	0.664	0.98	0.03
Greater Palatine	0.870	0.708	1.07	0.18
Maxillary Base	0.918	0.781	1.08	0.30

RESULTS – PART 2

- Pending





CONCLUSION

- Of the eight linear values measured, no measurement was found to have a statistically significant difference between positive and negative groups ($p > 0.05$).
- Results are inconclusive as all parameters of the study have not been tested. According to the linear measurements analyzed so far, we have yet to determine a significant difference between the maxillary dentoskeletal morphology of children with OSA as compared to children without OSA.
- Future studies look to increase landmarks and parameters to discover any associations

THANK YOU!

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