

Condylar Volumetric Asymmetry is Associated with Facial Asymmetry and Surgical Intervention in Patients with Cleft Lip and/or Palate

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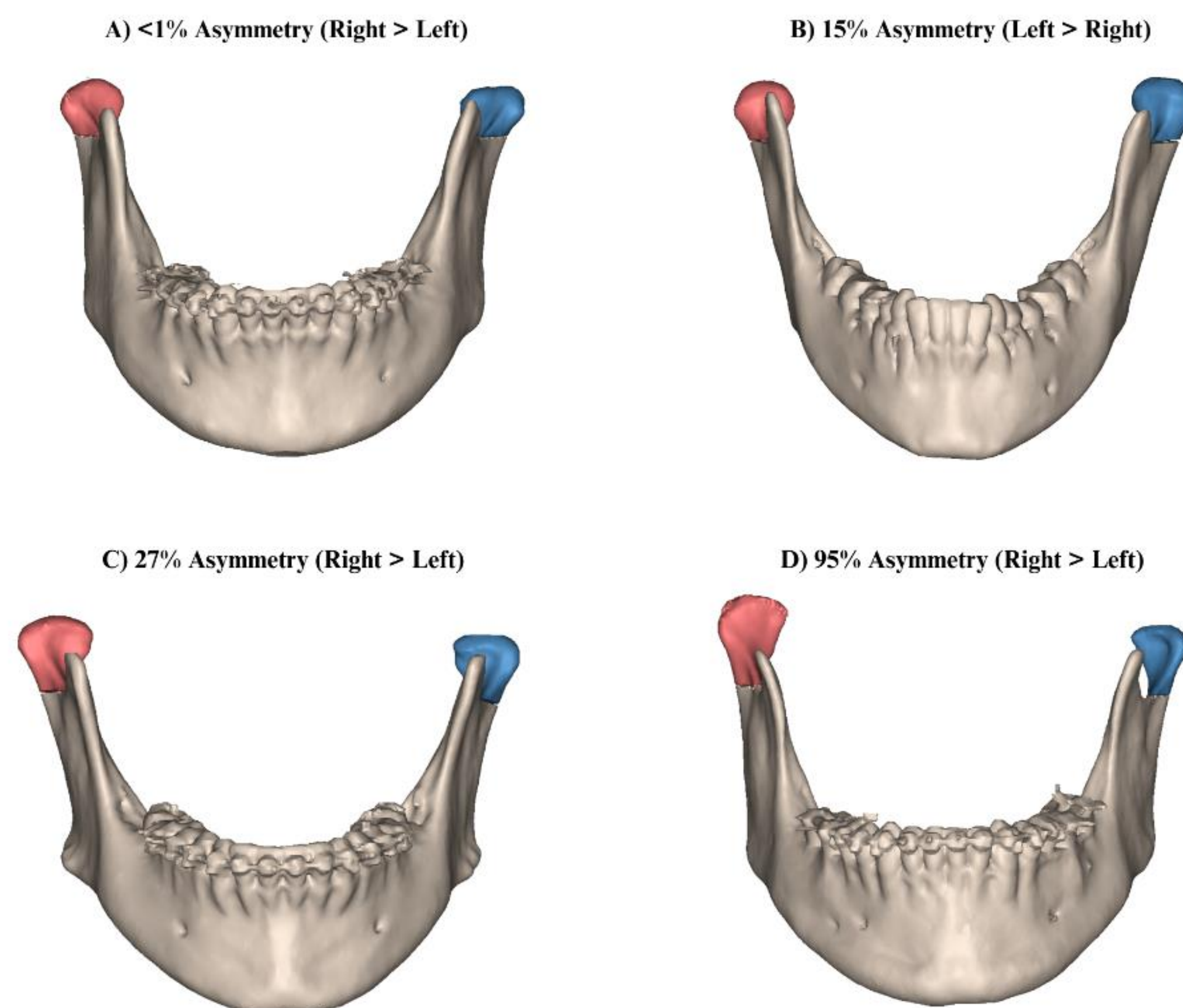
Introduction

In this study, we investigate the associations between the mandibular condyle, facial asymmetry, and malocclusion in patients with cleft lip and/or palate (CLP).

Methods

Condylar volume was calculated by measuring the bony volume of the posterior mandible superior to the sigmoid notch in skeletally mature patients with CLP and controls. Relationships between condylar asymmetry, facial deviation, and malocclusion were compared using t-tests, correlation analysis, and receiver operating characteristic curves.

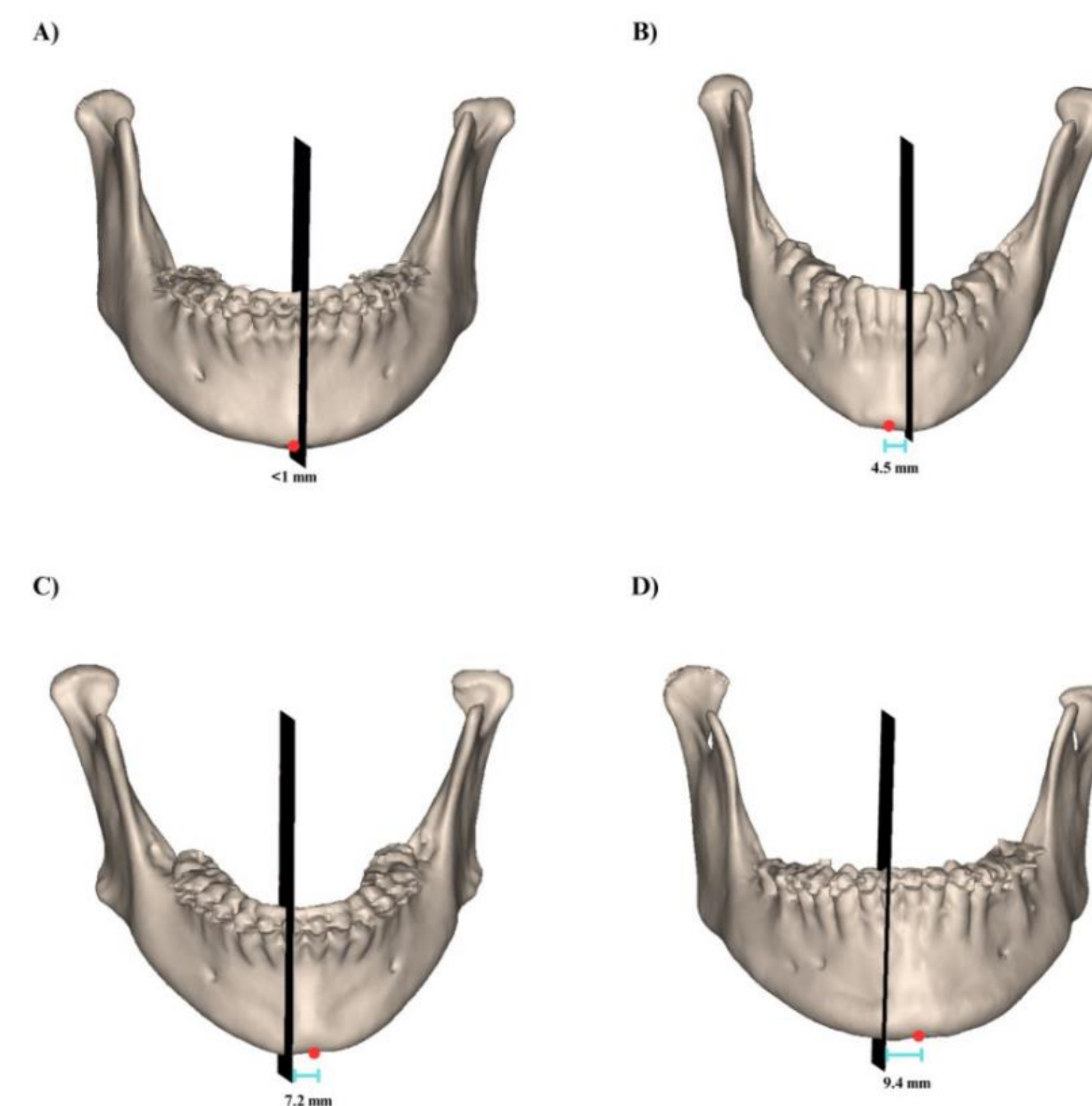
Figure 1. Characterization of bilateral mandibular condyles in four patients with cleft lip and/or palate



Results

This study included 118 patients: 60 with CLP preparing for orthognathic surgery, 17 with CLP who did not undergo orthognathic surgery, and 41 controls. Condylar volumes in patients with CLP preparing for orthognathic surgery were more asymmetric than those with CLP not requiring surgery ($16.4 \pm 17.4\%$ vs. $7.1 \pm 6.0\%$, $p=0.03$). Patients with CLP who did not undergo orthognathic surgery and controls had similar degrees of condylar asymmetry ($7.1 \pm 6.0\%$ vs. $5.9 \pm 3.8\%$, $p=0.35$). Condylar asymmetry correlated with both chin deviation ($p<0.01$) and degree of maxillary-mandibular malocclusion ($p<0.01$). Patients with CLP and clinically significant chin deviation (>4 mm) had more asymmetric condyles than those without significant chin deviation, and the chin usually deviated toward the smaller condyle ($p=0.03$). Condylar asymmetry greater than 11% predicted undergoing orthognathic surgery in CLP with 70% sensitivity and 67% specificity.

Figure 2. Characterization of facial deviation in four patients with cleft lip and/or palate



Results

Table 1. Patient measurements (n=118)

	CLP non-orthognathic (n=17)	With CLP orthognathic (n=60)	Controls (n=41)	p
Condylar Volumetric Asymmetry (%)	7.1±6.0	16.4±17.4	6.0±3.8	<0.01
Chin Deviation (mm)	3.3±2.7	3.7±3.3	3.3±1.5	0.84
Malocclusion (mm)*	-4.5±3.9	4.0±5.0	-5.8±3.2	<0.01

*Positive values indicate underbite, negative values indicate overbite

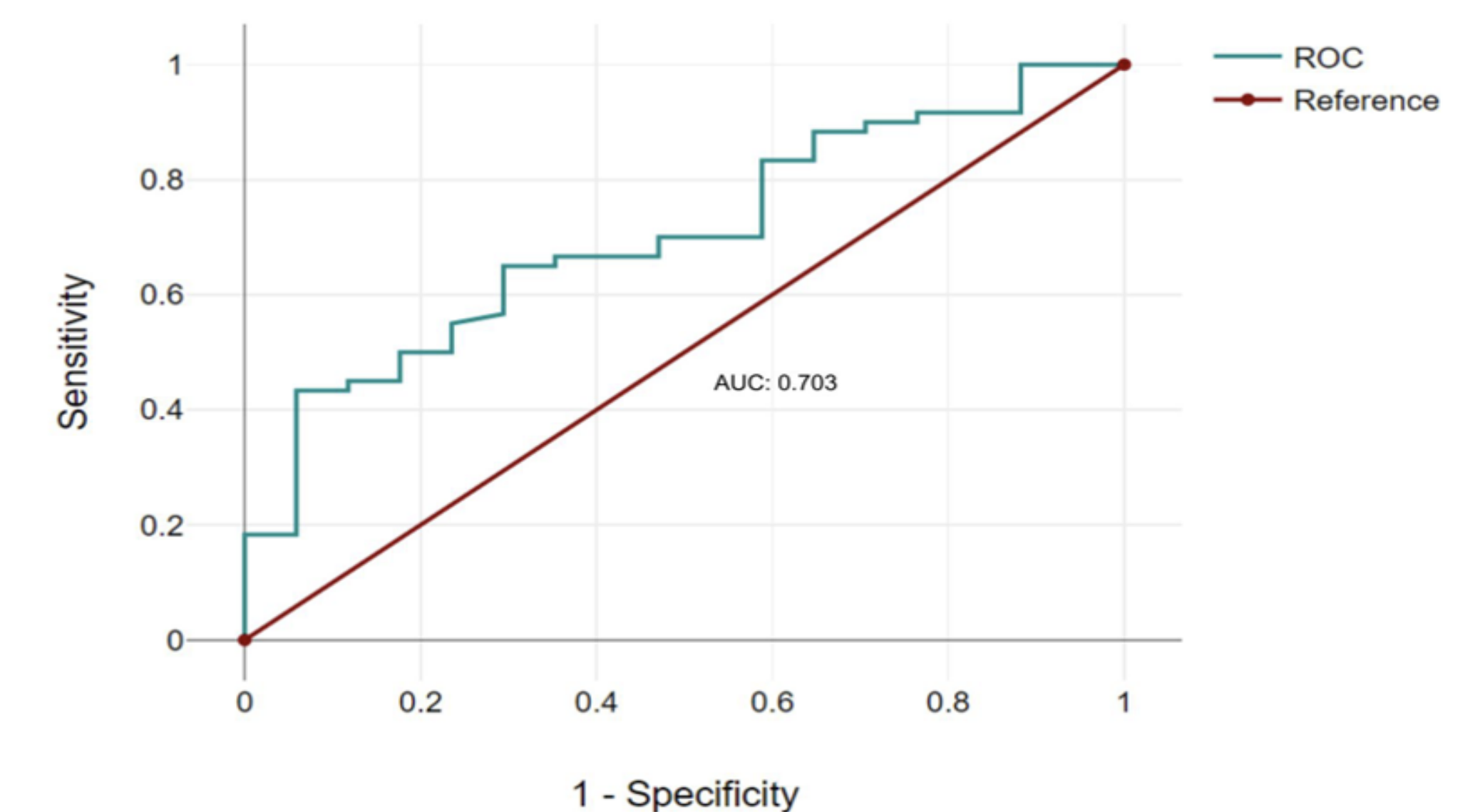


Figure. Receiver operating characteristic curve showing condylar asymmetry predicting surgery (combined cleft; n=77)

Conclusion

Condylar asymmetry is associated with malocclusion and facial asymmetry in patients with cleft lip and/or palate, and the facial midline often deviates towards the smaller condyle. Condylar volumetric asymmetry in patients with CLP may be a predictor for needing orthognathic surgery, useful information for surgeons and families alike.