

OBJECTIVES

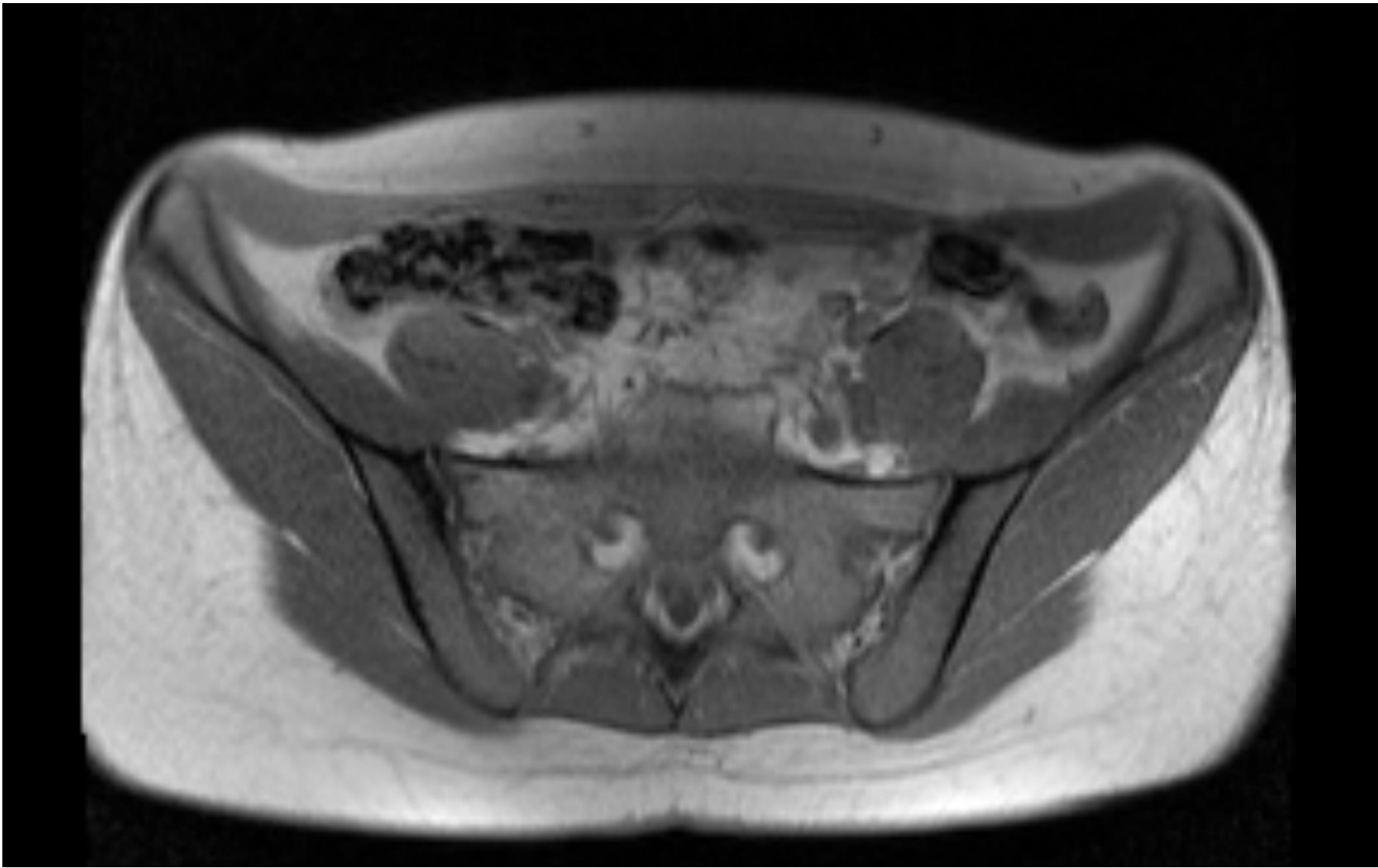
Cephalopelvic disproportion is a major cause of obstructed labor and unplanned cesarean delivery, yet pelvic dimensions are rarely assessed before labor. We present the first fully automated pipeline that segments the bony pelvis from MRI, localizes obstetric landmarks, and computes pelvimetry without operator input.

METHODS

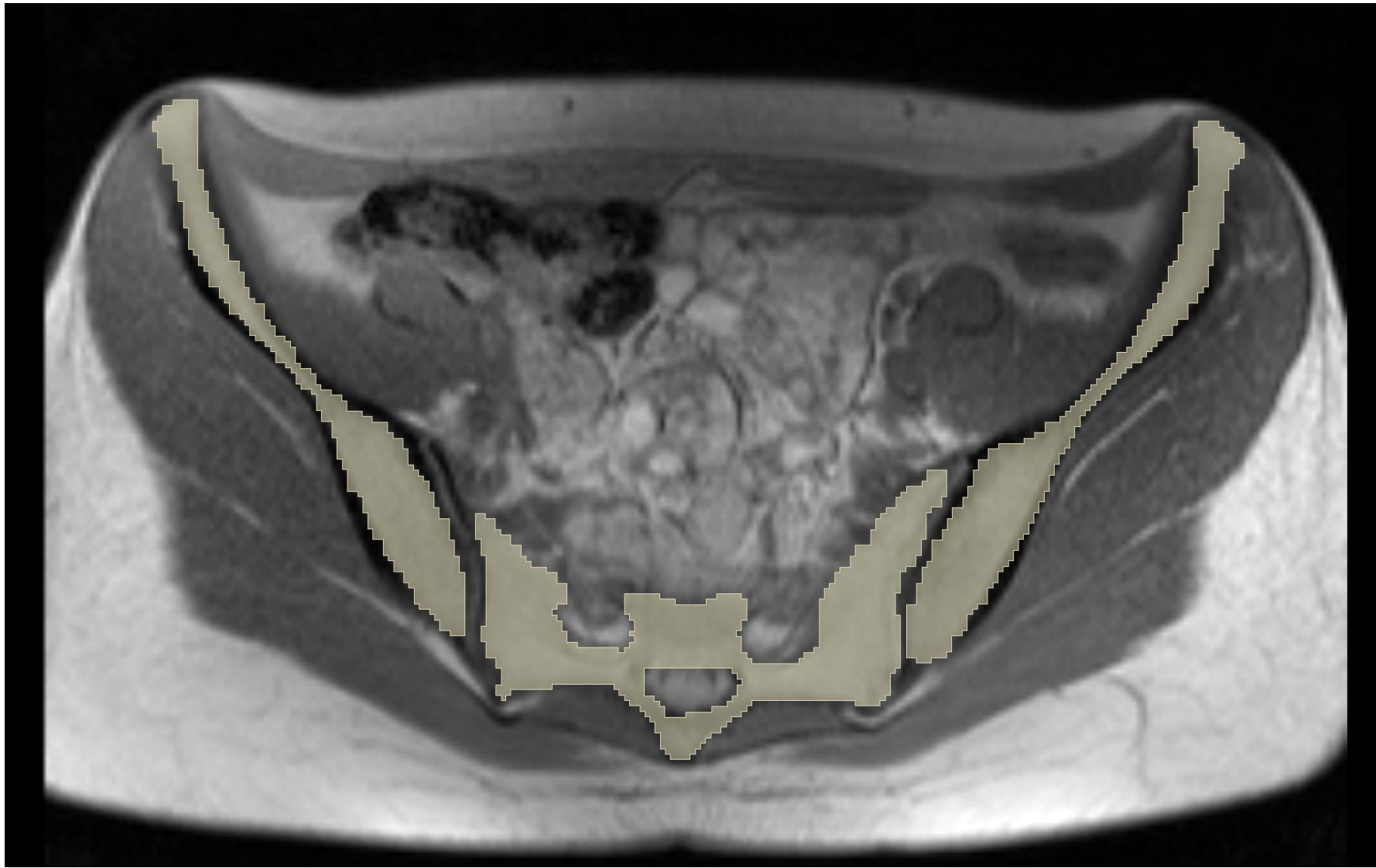
Retrospective pelvic MRI volumes, acquired for clinical indications unrelated to this study, were assembled from nulliparous women delivering at Hadassah Medical Center (2006–2025). The optimal axial sequence was auto-selected. MRSegmentator produced a 3D bone segmentation validated against radiologist-corrected ground truth (n=50). The midsagittal plane was estimated via PCA with symmetry refinement. Ten landmarks were extracted and validated against expert annotations (n=56). Ten measurements were computed including obstetric conjugate, AP inlet/outlet, transverse diameter, inlet area, interspinous distance, midpelvis circumference, subpubic angle, and sacral curvature depth.

A fully automated pipeline segments the bony pelvis from routine MRI and computes obstetric pelvimetry without operator input

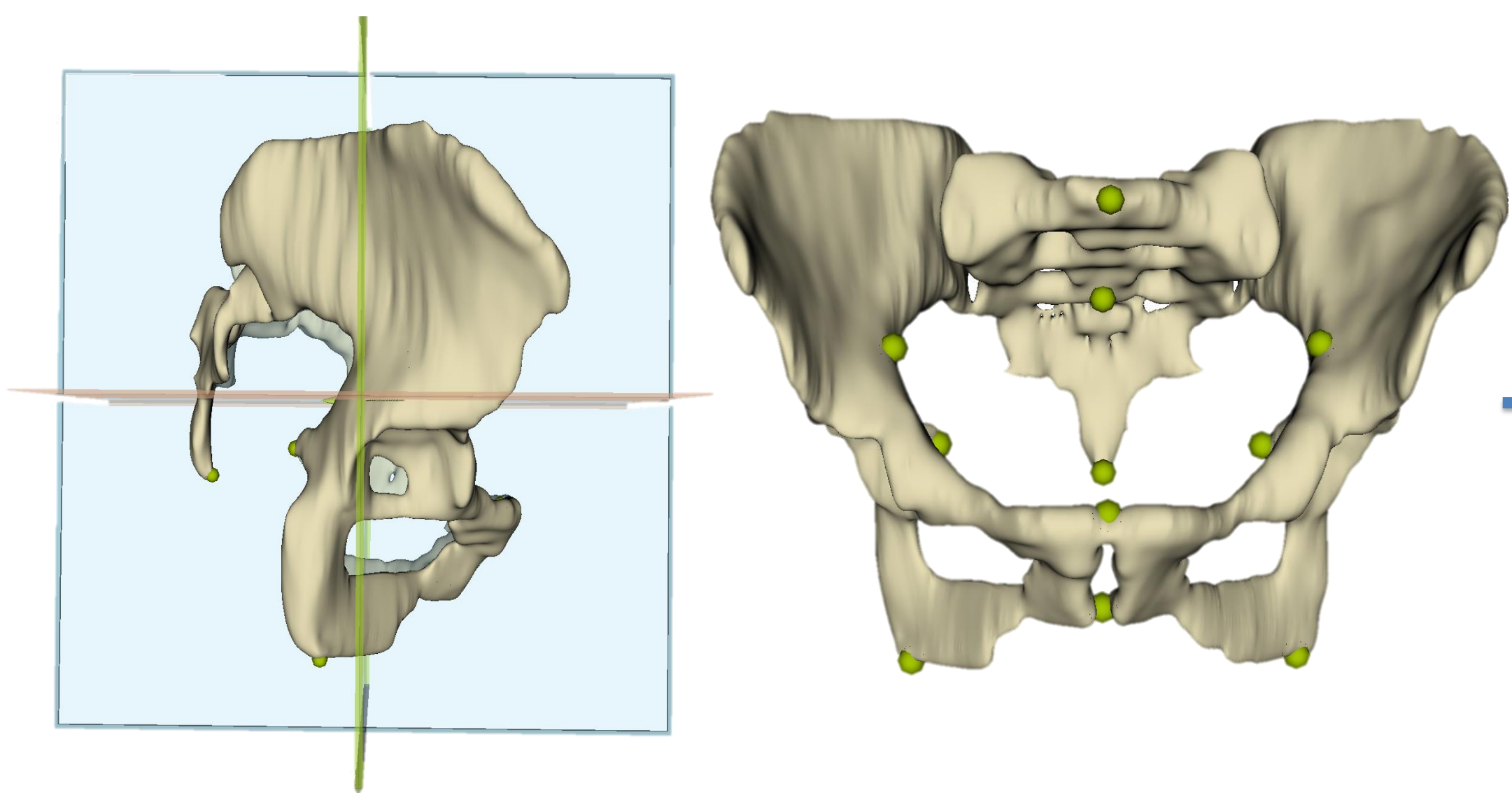
1 Pelvic MRI T1/T2



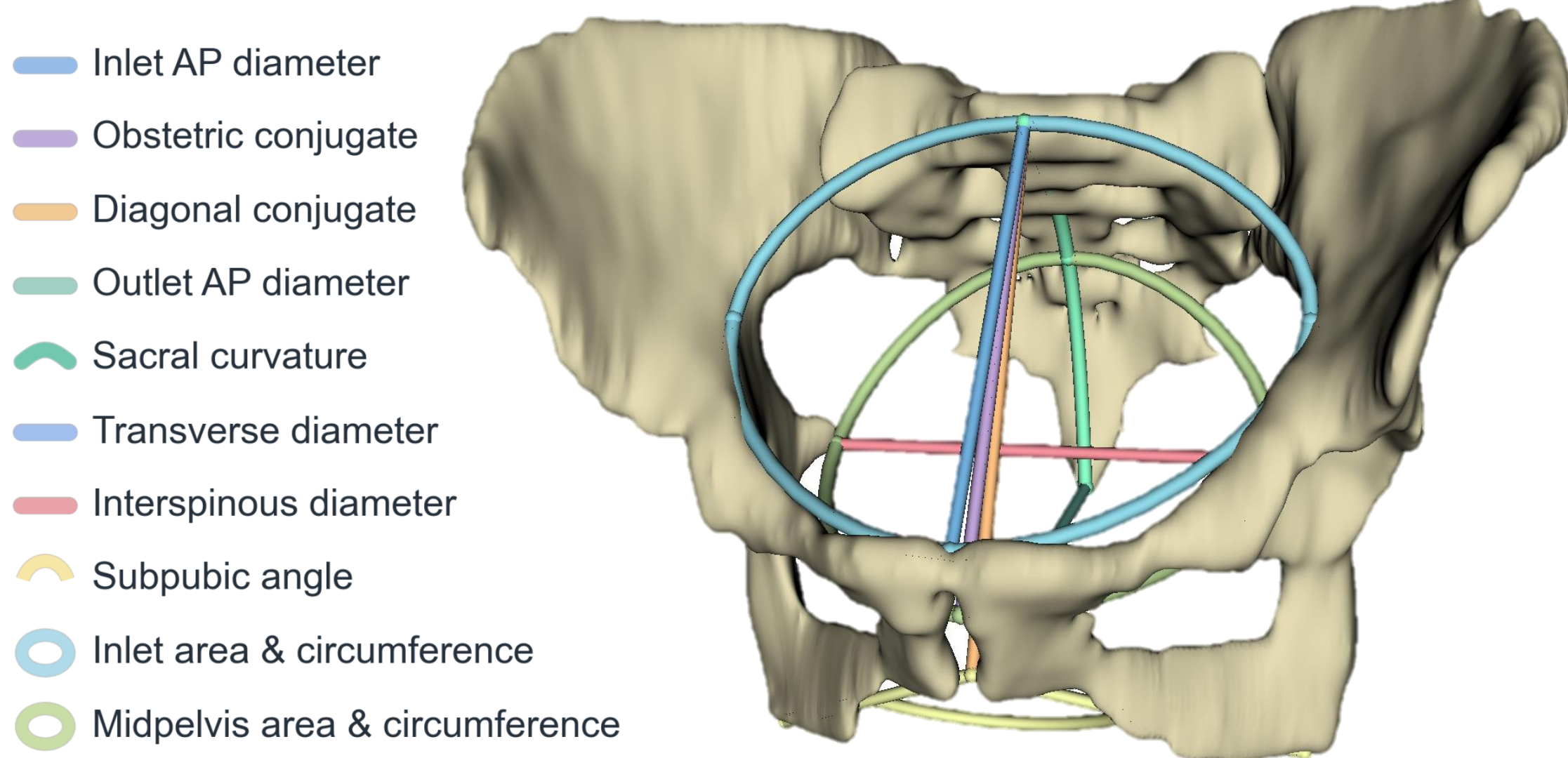
2 Bone segmentation



3 Landmark extraction



4 Obstetric measurements



Automated pipeline shown on one study from the cohort: the optimal axial series is segmented and reconstructed in 3D, ten obstetric landmarks are localized, and ten pelvimetric measurements are computed — end to end, without operator input.

RESULTS

207 cases were processed (204 with clinical data: 146 vaginal, 27 instrumental, 31 cesarean). Segmentation achieved Dice 0.93±0.04, surface distance 0.45±0.40 mm, HD95 1.64±1.54 mm. Mean landmark error (n=56) was 6.7±2.1 mm. T2 (n=103) and T1 (n=101) were concordant (all p>0.3): obstetric conjugate 136.5±11.5, inlet AP 126.5±11.1, transverse diameter 133.1±7.4, interspinous distance 122.1±9.2 mm, inlet area 84.2±10.0 cm², subpubic angle 109.5±12.0°, sacral curvature depth 22.7±7.5 mm. Women with unplanned cesarean had smaller obstetric conjugate and pelvic inlet than vaginal delivery (p<0.05).

CONCLUSIONS

This first fully automated, sequence-agnostic pipeline enables reproducible MRI pelvimetry at scale. A step towards establishing pelvic inlet size as a measurable anatomic correlate of delivery mode and a candidate marker for personalized risk stratification.

Automated MRI-based pelvimetry pipeline for 3D pelvic segmentation and obstetric measurement in nulliparous women

Ellie Leidner⁴, Leo Joskowicz⁴, Michal Lipschuetz¹, Simcha Yagel³, Jacob Sosna², Amit Haboosheh², Yishai Sompolinsky³

1. Henrietta Szold Hadassah–Hebrew University School of Nursing, Faculty of Medicine, The Hebrew University of Jerusalem, Jerusalem, Jerusalem District, Israel.
2. Radiology, Hadassah-Hebrew University Medical Center, Jerusalem, Israel.
3. Obstetrics and Gynecology, Hadassah-Hebrew University Medical Centers, Mt. Scopus, Jerusalem, Israel.
4. The Hebrew University of Jerusalem, Jerusalem, Jerusalem District, Israel.

