Transvaginal 3D ultrasonography and quantitative elastography of the uterine cervix as a predictor of cervical incompetency and preterm delivery

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Objective
To examine the relationship between transvaginal ultrasound cervical changes and pregnancy outcome and ultrasound elastography strain measurements of cervical stiffness in women at risk of cervical incompetency and preterm delivery.

Methods
In 312 pregnancies with clinical and ultrasonic signs of cervical incompetency and preterm delivery the length of the cervix, the thickness of the anterior wall of a lower uterine segment and the width of the endocervical canal have been evaluated ultrasonically (2D-3D) and strain stiffness was calculated in five regions of interest on anterior cervical lip and correlated to outcome of cervical cerclage and spontaneous preterm delivery. We evaluated these same parameters in 300 non-risk pregnancies.

Results
In patients from 10 weeks to 14 weeks the cervix is significantly longer and the anterior wall of the lower uterine segment is significantly thicker than in the the 25 to 36 week group. In pregnancies at risk for cervical incompetency, cervical lengths and wall thickness, were significantly different from those in comparable controls.

Strain measurements values >0.90 were associated with cervical incompetency and strain values >0.98 were associated with preterm delivery. 45% of the patients in the at-risk group, with cervical cerclage, delivered at 37,5 weeks and 10,5% of pregnancies ended in abortion when the amniotic membrane herniated into the cervical canal. The frequency of preterm delivery was 55%, 39% and 17% for cervical length of <10mm, 10-20mm, and 20-30 mm and stream values of 1,20; 0,90 and 0,80.

Conclusion
A shortened cervix with decreased thickness of the anterior wall of lower uterine segment and dilatated endocervical canal comparing with ultrasound elastography strain measurements of cervical stiffness shows a strong association with cervical incompetency and preterm birth.