

# Elastoscan™ of uterine cervix during pregnancy

Malgorzata Swiatkowska-Freund PhD, Krzysztof Preis PhD  
Department of Obstetrics, the Medical University of Gdansk, Gdansk, Poland

## INTRODUCTION

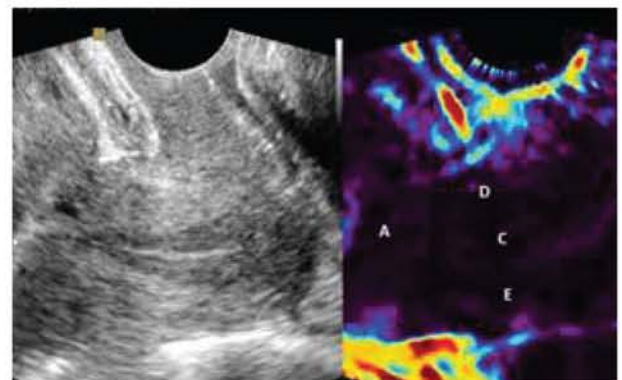
Elastography is widely used in radiology to diagnose tumors and to help to perform biopsy in liver, salivary gland, thyroid and prostate tumors. The authors present a preliminary report of cervical assessment by elastography to show the ability of this method to present consistency of uterine cervix during pregnancy. Changes in the cervix leading to delivery called ripening, make the cervix softer towards the end of pregnancy. Presented pictures show the changes and the authors concluded that there is a possibility to evaluate prognosis of preterm delivery and of labor induction success.

## METHODS

The figures presented are Elastoscan™, pictures of the uterine cervix during pregnancy. Criteria of the B-mode were the same as Fetal Medicine Foundation criteria to measure internal os and cervical canal length. Elastoscan™, color map 2 was used (purple to red). Additionally, if there was urine or amniotic fluid visible, they should be coded as red, fetal skull as purple.

The Elastoscan™, color map from purple to red is described by the authors as follows: hard (purple) was coded as 0 points, less hard (blue) as 1 point, green as 2, yellow as 3, and red as 4 points. A scale of 5 steps was created in this way, called Cervical Elastography Index (CEI), and the parts of the cervix (anterior and posterior wall, internal and external os and cervical canal) were described in points of CEI. In all the figures internal os was marked as A, external os as B, cervical canal as C, anterior wall as D, posterior wall as E.

Figure 1 presents uterine cervix during pregnancy without symptoms of ripening. Consistency of the cervix is the same at the region of internal and external os, cervical canal, anterior and posterior wall. All parts of the cervix presented at Figure 1 were evaluated as 0 points, which can be interpreted in two possible ways: the whole cervix is hard or the entire cervix is soft. After performing approximately 50 examinations it was concluded, that this kind of picture represents a stiff cervix without symptoms of ripening.



**FIGURE 1**  
Uterine cervix during pregnancy without symptoms of ripening

Figure 2 presents a cervix at 28 weeks of pregnancy, where external parts of cervical wall were softer than region of the cervical canal. Anterior and posterior walls were described as 5 CEI points, external os - 2 points, middle part of the cervical canal - as 3 points. In this cervix internal os - structure the most important in the mechanism of pregnancy retention, was the hardest part. The question arises, is this effect the result of softening of the cervical walls beginning before the internal os begins to ripen, or hardening of the internal os following the rising pressure of growing fetus.

As the delivery (term or preterm) approaches, internal os and the entire cervix becomes softer. Authors observed very strong correlation between internal os CEI and success of labor induction with the use of Oxytocin ( $r=0.71$ ,  $p=0.0004$ ). The softer the internal os, the better the chance for positive reaction for Oxytocin infusion were. Figure 3 and 4 present uterine cervix close to delivery. Internal os at Figure 3 was described as 0 points, but the lower parts of the cervical canal - middle part and external os - as 3 points. The closest to time of delivery picture is Figure 4 - internal os was described as 4 points of CEI, similar to middle part of cervical canal, and softer than external os (3 points).

It is difficult to assess internal os in the patient with cervical incompetence. Figure 5 presents such a patient, but interpretation of that picture needs further studies. Authors suggest, that changes of the uterine Elastoscans™ picture are so clear, that finding CEI of internal os higher than 1 and evaluation of the entire cervix similar to those presented at figures 3 and 4, may be an easy and valuable predictor of approaching delivery at term or in earlier stages of pregnancy. Elastoscans™ of uterine cervix may be a method of objective assessment of internal os ripening before term or preterm labor. Creating standards of cervical properties seen in elastography during pregnancy may help to diagnose the risk of preterm labor in its early stage and plan prostaglandins or Oxytocin use in labor induction.

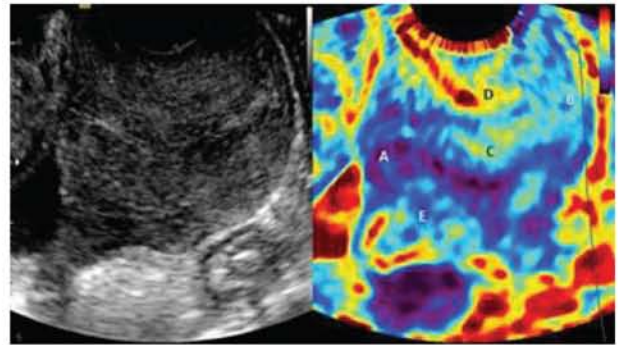


FIGURE 2 Uterine cervix during pregnancy with possible first signs of ripening

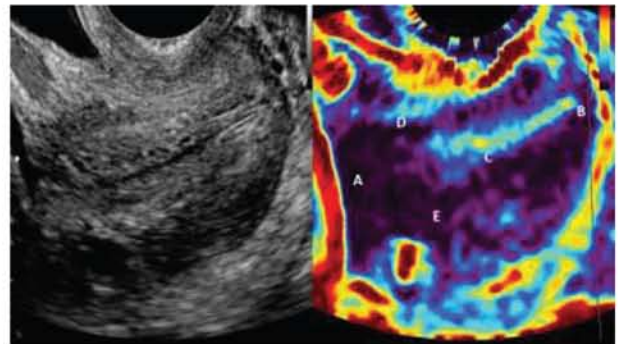


FIGURE 3 Uterine cervix close to delivery

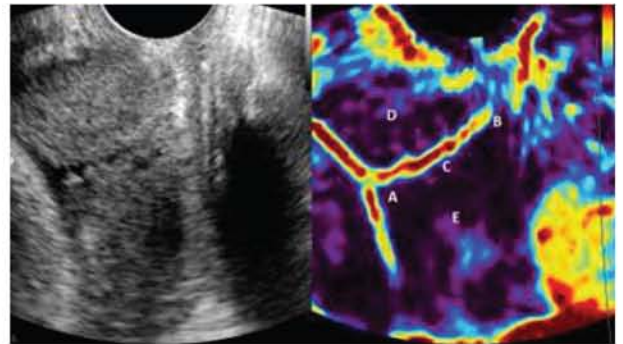


FIGURE 4 Uterine cervix closest to delivery

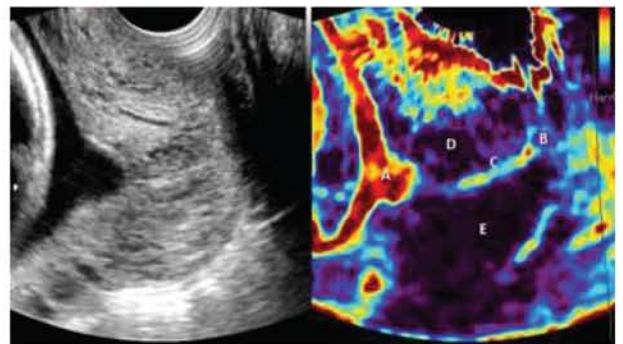


FIGURE 5 Uterine cervix during pregnancy with symptoms of cervical incompetence

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