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## Cervical Incompetence; Clinical Management of Hirsutism and Virilization

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# Chapter 1—Cervical Incompetence

Francis S. Nuthalapaty, MD, and Matthew F. Davies, MD, FACOG

## I. INTRODUCTION

Cervical incompetence has commonly been described as painless cervical dilatation leading to recurrent second-trimester pregnancy loss. This description results from the old all-or-nothing concept that the cervix is either completely competent or incompetent. This concept was further substantiated by an early study that used digital assessment of cervical dilation and length but that failed to identify a degree of incompetence leading to preterm labor.<sup>1</sup> Therefore, cervical incompetence was considered distinct from the general process of preterm labor. Since that time, the ability to more accurately assess cervical changes by using ultrasonography has led to the theory that cervical incompetence is part of a continuum of preterm labor.<sup>2</sup> In this review, we will discuss the evolution of our understanding of cervical incompetence as well as the current tools available for diagnosis and management of this process. The goals of this review are to describe the pathogenesis, clinical features, diagnosis, and management of cervical incompetence.

## II. ETIOLOGY

### NORMAL CERVICAL STRUCTURE

Knowledge of normal cervical structure is essential to understanding the factors that may contribute to cervical incompetence. The female genital tract begins development at the sixth embryologic week. Invagination of the coelomic epithelium occurs to form the müllerian (paramesonephric) ducts.<sup>3</sup> The uterine cervix is formed by fusion of the most caudal portions of the müllerian ducts.<sup>4</sup> Nonpregnant cervical tissue is dense and fibrous; it is composed primarily of cross-linked types 1 and 3 collagen, elastic tissue, blood vessels, and, to a lesser degree, smooth muscle.<sup>5</sup> The proportion of cervical smooth muscle increases from 6% at the external os to 29% at the internal os.<sup>6</sup> The transition from the fibrous to muscular tissue at the cervicoisthmic junction extends over a 5- to 10-mm zone.<sup>7</sup> This muscular and elastic zone is responsible for retaining the fetus in utero during pregnancy.<sup>8</sup>

Normal cervical length during the course of gestation and the process of effacement has been determined by transvaginal ultrasound. In the late second and early third trimesters, cervical length follows a normal distribution with the 50th percentile at about 35 mm and the 10th percentile at 25 mm (Figure 1).<sup>9</sup> The process of cervical effacement begins at the internal os and proceeds caudally according to the shape of the letters T, Y, V, and U as shown in Figure 2.<sup>10</sup> The corresponding biochemical changes in cervical structure are marked by dissolution of the fibrous collagen matrix.<sup>5</sup>

### RISK FACTORS

#### Congenital Factors

Factors associated with an increased risk for cervical incompetence can be divided into 3 general categories: congenital, acquired, or other (Table 1). Congenital factors—such as a short cervix because of normal biologic variation, müllerian abnormalities, and diethylstilbestrol (DES) exposure—are among the best defined factors. As illustrated in Figure 1, the risk of spontaneous preterm birth progressively increases as cervical length decreases, beginning with lengths less than the 75th percentile. The association of various müllerian abnormalities with adverse pregnancy outcomes is well defined. In this population, the reported rate of early miscarriage is 25% to 38% and the rate of preterm delivery is 25% to 47%. Cervical incompetence likely contributes to a portion of these adverse pregnancy outcomes.<sup>11</sup> Similarly, women exposed to DES in utero have an increased risk of preterm delivery. This increased risk is likely the result of DES-associated genital tract abnormalities, including alterations in cervical length and composition.<sup>12</sup>

#### Acquired Factors

Acquired factors leading to cervical incompetence result from the alteration of cervical structure, through either trauma or iatrogenic events. Both vaginal and cesarean birth can result in extensive cervical trauma. Overzealous mechanical dilatation of the cervix once was thought to be the main cause of cervical incompetence.<sup>13</sup> The overall incidence of cervical injury during