Original Article

Sonographic Diagnosis of Paravaginal Defects: A Standardization of Technique

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Abstract: The qualitative and quantitative effects of bladder and vaginal balloon volumes on the sonographic diagnosis of paravaginal defects were evaluated. Transabdominal ultrasound measurements were performed on patients with stage 4 prolapse and coexisting paravaginal defects (study group) as well as on nulliparous patients without prolapse or paravaginal defects (control group). Paravaginal defects were measured, first without a water-filled condom in the vagina, and then sequentially with a 30, 60 and 90 ml water-filled balloon in the vagina at bladder volumes of 150 and 300 ml. Paravaginal defects were detected on transabdominal ultrasound in both groups. In both the study and the control groups the size of the paravaginal defect was directly related to the size of the balloon placed in the vagina (P<0.0001). There were no significant differences in the size of the paravaginal defects measured at a bladder volume of 150 ml compared to those measured at 300 ml. We conclude that transabdominal ultrasound is not useful in detecting paravaginal defects.

Keywords: Anterior vaginal wall prolapse; Paravaginal defects; Prolapse; Ultrasound

Introduction

White [1] in 1909 recognized that cystoceles could be caused by detachment of the anterior endopelvic fascia from its lateral attachment to the arcus tendineus fasciae pelvis, and that repairing these fascial defects could reduce cystoceles. His concept and approach were, however, largely ignored. Decades later this concept was re-examined by Richardson et al. [2], who noted that 67% of cystoceles, or anterior vaginal prolapse, were caused by defects in the paravaginal connective tissues. Furthermore, surgical correction of these defects resulted in reduction of the cystocele in 58 (97%) of the 60 patients studied. Others [3–11] have also reported repair of paravaginal fascial defects for correcting anterior vaginal prolapse and treating genuine stress urinary incontinence.

Paravaginal defects are usually diagnosed on physical examination. The anterior vaginal sulcus is noted to ‘sag’ as the central part of a cystocele or opposite sulcus is supported by a curved ring forceps. Cystoceles caused by paravaginal defects will be reduced if the lateral vaginal sulci are supported by curved ring forceps. Huddleston et al. [12] and Aronson et al. [13] have used magnetic resonance imaging (MRI) to detect paravaginal defects in patients with stress urinary incontinence, but this method is expensive and may not be readily available.

Alternatively, transabdominal ultrasound may be used to detect paravaginal defects [14,15]. Although this is less expensive than MRI and may be easily mastered, the data obtained from previous studies [14,15] were qualitative and the methods were not standardized. We therefore conducted this study to evaluate the qualitative and quantitative effects of bladder and vaginal balloon volumes on the sonographic diagnosis of paravaginal defects.

Materials and Methods

Patients evaluated at Harbor-UCLA Medical Center for various gynecologic problems were eligible to participate in the study. The control group consisted of
nulliparous patients without clinical evidence of pelvic organ prolapse and anterior vaginal wall prolapse. The study group consisted of patients with stage 4 prolapse and coexisting paravaginal defects. Patients excluded from the study included those who were pregnant, those with previous pelvic reconstructive surgery or pelvic irradiation, and those with anterior vaginal wall prolapse without coexisting paravaginal defects.

Detailed histories and physical examinations were performed on all patients prior to the ultrasound examination. Staging of prolapse was based on the POPQ system [16]. The Q-tip test was performed with the patient in the supine position and maximum Valsalva. Patients were examined for paravaginal defects in the supine position, using the posterior blade of a speculum, and with maximum Valsalva [17]. Each vaginal sulcus was examined by supporting the opposite sulcus with a pair of curved ring forceps. A paravaginal defect was diagnosed if the anterior vaginal sulcus ‘sagged’ as the opposite sulcus was supported. The curved ring forceps was then used to support both anterior vaginal sulci by placing the distal ends in contact with the ischial spines and the proximal end in contact with the posterior border of the pubic symphysis. When lateral support resulted in complete reduction of the cystocele, the patient was considered to have loss of paravaginal support. If the cystocele was only partially reduced then the patient was thought to have loss of both central and paravaginal

![Fig. 1](image1.png)

Fig. 1. A coronal view of the bladder, paravaginal spaces and vagina is obtained with the ultrasound transducer. A horizontal line (H) is drawn across the bladder base with the ultrasound caliper. The vertical distances of the right (RD) and left (LD) paravaginal defects are then measured.

![Fig. 2](image2.png)

Fig. 2. Coronal sonographic images demonstrating bilateral paravaginal defects performed at 300 ml bladder volume with (A) No vaginal balloon; (B) 30 ml vaginal balloon; (C) 60 ml vaginal balloon; (D) 90 ml vaginal balloon. The size of the paravaginal defect is directly related to the size of the water-filled condom placed in the vagina.