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A noninferiority randomized controlled trial to compare transabdominal and transvaginal sonography for eligibility assessment prior to medical abortion☆,☆☆,★

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ABSTRACT

Objectives: To compare transabdominal sonography (TAS) to transvaginal sonography (TVS) in medical abortion eligibility assessment, specifically to measure how often clinicians chose to order additional testing for eligibility assessment following TAS and TVS, and to look for differences by patient and clinician characteristics. Also, to compare patient acceptability between the two modalities.

Study design: This pragmatic multisite randomized noninferiority trial compared TAS to TVS at 10 New York City and New Jersey health centers that provide medical abortion. Women seeking medical abortion were randomized 1:1 to receive TAS or TVS. Following the study ultrasound examination, clinicians determined whether participants were eligible for medical abortion based on these results or warranted further testing. All participants completed an acceptability questionnaire. We compared additional testing and acceptability between TAS and TVS.

Results: Of those randomized to TAS, 63/317 (19.9%) received additional testing compared to 15/312 (4.8%) randomized to TVS. After TAS, most additional testing consisted of a same-day TVS. Other tests included β-hCG testing, scheduled repeat sonography or return visit. After TAS, 13.4% seen by physicians and 27.6% seen by advanced practice nurses (APNs) received additional testing ($p<.01$). Additional testing was more common in early gestational ages for both groups. We enrolled too few women with a body mass index (BMI) >35 kg/m^2 to make comparisons. Participants found TAS more acceptable than TVS, and two thirds preferred TAS for future care.

Conclusions: TAS provided sufficient information for clinicians to assess medical abortion eligibility without additional tests for most patients. However, the frequency of additional testing was exceedingly close to our predefined noninferiority boundary. Why APNs ordered substantially more additional testing than physicians is unclear. TAS was more acceptable to patients than TVS.

Implications: TVS use requires high-level disinfection, which is resource-intensive and thus can be a barrier to care. Instead, TAS can be first-line for most women, reducing resources needed to provide medical abortion. Further research could help to establish gestational age and BMI thresholds beyond which TVS would be a more informative first test. We also need to evaluate whether additional training in using TAS would decrease additional testing.

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1. Introduction

In 2014, medical abortion accounted for 31% of all outpatient abortions in the United States [1]. Reliance on ultrasound is one potential barrier to increased abortion access. Guidelines from major organizations and the mifepristone prescribing information (Mifeprex; Danco Laboratories, LLC, New York, NY, USA) do not specify routine sonography as a requirement prior to medical abortion [2–9]. However, many clinic protocols still require routine sonography, and early dating sonography is commonly performed transvaginally, an examination that women may find uncomfortable; no randomized trials have assessed acceptability of transvaginal sonography (TVS) in abortion patients. Without an ultrasound examination, clinicians are concerned about underestimating gestational age or failing to diagnose an ectopic or molar pregnancy. Although ectopic pregnancy is rare among women seeking abortion [10–12], a missed diagnosis has important clinical consequences. Clinicians may prefer TVS because of its perceived greater sensitivity.

The Centers for Disease Control and Prevention have stringent requirements for high-level disinfection (HLD) of all endoprobes, including TVS probes. Unlike transabdominal sonography (TAS), TVS requires the use of HLD between examinations [13]. HLD requirements are cumbersome, including costly equipment up-front, ongoing supply purchases (often including a proprietary disinfection solution) and periodic replacement of probes that may be damaged with repeated transfers and degrade with disinfection. Further, the time required for disinfection between patients can interfere with clinic flow and operations. Facilities are subject to routine auditing and must meet requirements for instrument maintenance, such as those enforced by the Joint Commission [14,15].

Our study objective was to compare the use of TAS and TVS in medical abortion eligibility assessment and evaluate the acceptability of these modalities. We hypothesize that, for clinicians routinely performing TVS prior to medical abortion, switching to TAS will allow eligibility determination for most patients and that patients will find this acceptable or preferable. If true, using TAS may help simplify processes around medical abortion provision. No studies have directly compared the acceptability of TAS versus TVS among women seeking medical abortion. Several studies have found TVS acceptable to obstetrical patients, but these data are limited [16–18].

2. Materials and methods

This pragmatic noninferiority randomized controlled trial compares TAS to TVS in medical abortion eligibility assessment using a 1:1 allocation ratio. The Columbia University Irving Medical Center (CUIMC) Institutional Review Board (IRB) approved this study, and Chesapeake IRB approved those portions of the study conducted at Planned Parenthood of Northern, Central, and Southern New Jersey (PPNCSNJ) locations. ClinicalTrials.gov registration: NCT03047551.

Ten clinic sites at CUIMC and PPNCSNJ serving diverse urban and suburban communities in New York City and New Jersey participated. These clinics provide medical abortion up to 70 days from last menstrual period (LMP) and use TVS routinely. As this was a pragmatic trial, medical abortion scheduling and clinical protocols at participating sites were unchanged.

Women 18 years or older seeking medical abortion at an estimated gestational age up to 70 days from LMP were eligible if English- or Spanish-speaking. Participating clinicians included gynecologists, family physicians and Advanced Practice Nurses (APNs including Nurse Practitioners and Certified Nurse Midwives); all routinely used TVS prior to medical abortion. All clinicians providing medical abortion agreed to participate.

Relevant staff at the 10 participating clinics received a formal investigator-led orientation to this study. Clinicians completed a questionnaire regarding education, specialty and experience with TAS and TVS. Four clinicians with the least TAS experience (all APNs) received additional TAS guidance during one to two half-day clinical sessions before enrollment began. Forty-seven clinic staff participated during a run-in period to pilot all study procedures.

Study coordinators assessed eligibility, explained the study and invited women to participate, obtaining informed consent in English or Spanish. Participation concluded after the clinic visit ended, and participants could withdraw at any point. Participants received $20 in compensation.

Following enrollment, participants completed a baseline questionnaire. Next, staff obtained and recorded relevant history per clinic routine. Participants then underwent assigned ultrasound, with all study sites using the GE Healthcare LOGIQ P5® ultrasound and either a 1.4–4.8-MHz transabdominal probe or 4–11-MHz transvaginal probe. The clinicians performed ultrasonography at all but one site, where a licensed sonographer performed some of the testing ($n=13$ participants). After the ultrasound examination, clinicians used all available information to make an assessment and clinical plan, either providing medical abortion or obtaining further testing as they would in usual practice. Further testing could include an additional ultrasound evaluation (switching to TVS, or a repeat examination performed by another clinician), serum or urine β-hCG, a scheduled return visit or transfer to the emergency department. Due to the pragmatic nature of this study, further testing was entirely at the discretion of the provider and based on clinical judgment rather than a prespecified protocol. At the end of the visit, participants completed an acceptability questionnaire.

The primary outcomes were how often the provider ordered additional testing in each randomization group (TAS or TVS) and patient acceptability for each ultrasound modality based on results from a 100-mm visual analog scale (VAS). A priori secondary outcomes included analyses stratified by body mass index (BMI), gestational age, provider type, obstetric history, study site, provider experience and within-study trends; we also assessed patient preference regarding future ultrasound type. We report the measured gestational age as the {mean sac diameter (mm) + 30} or {crown-rump length (mm) + 42} [4]; if these measurements were not recorded, we used the clinician's gestational age assessment at the end of the study visit. Too few participants were diagnosed with miscarriage for meaningful subgroup analysis of this characteristic.

Sample size was calculated a priori to have 80% power and a one-sided alpha of 5% using a noninferiority design. We estimated that 5% of participants would receive additional testing following TVS and 10% of participants would receive additional testing following TAS. We selected a noninferiority boundary of 80% and inferiority margin of −10%, aiming to enroll a total of 680 participants (340 per arm). The estimate for the proportion receiving additional testing following TVS was based on chart review at CUIMC where (prior to this study) all patients seeking medical abortion routinely received TVS. We based our estimate for the proportion receiving additional testing following TAS on our clinical notion of what would be a likely difference, as this information has not previously been reported.

The randomization scheme used a 1:1 allocation ratio, stratified by site, with randomly permuted block size. Colleagues at the central research office uninvolved with study procedures placed randomization assignments into sealed, sequentially numbered, opaque envelopes. Allocation remained concealed from staff and participants until immediately prior to the ultrasound examination; blinding was not performed.

Investigators (A.F., C.E.W.) reviewed at least 20% of all charts at each site to assess adherence to standardized data collection and recording, gathered completed forms on an ongoing basis and entered data into a study-specific database in Research Electronic Data Capture [19].

Using SAS software version 9.4 (SAS Institute Inc., Cary, NC, USA) and STATA software (StataCorp LLC, College Station, TX, USA), we compared the need for additional testing (using a test of difference in proportions) and acceptability (assessing difference in mean VAS score). We then assessed these outcomes in subgroups of a priori interest using chi

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