ELSEVIER

Contraception 83 (2011) 194–201

Contraception

Review article

# Expanding medical abortion: can medical abortion be effectively provided without the routine use of ultrasound?☆

Bliss Kaneshiro[a,*], Alison Edelman[b], Robyn K. Sneeringer[c], Rodolfo Gomez Ponce de Leon[d]

[a]Department of Obstetrics and Gynecology, University of Hawaii, Honolulu, HI 96826, USA
[b]Department of Obstetrics and Gynecology, Oregon Health and Science University, Portland, OR 97239, USA
[c]Medical Abortion Initiative, Ipas, Chapel Hill, NC 27514, USA
[d]Department of Maternal and Child Health at the School of Public Health, University of North Carolina-Chapel Hill and Training and Service Delivery Improvement Unit Ipas, Chapel Hill, NC 27514, USA

Received 18 February 2010; revised 22 July 2010; accepted 23 July 2010

**Abstract**

Medical abortion studies have traditionally relied on ultrasound to confirm gestational age, intrauterine location and abortion completion. However, the routine dependence on ultrasound can limit access to safe services for women living in low resource settings that are often most in need of safe abortion care. This review discusses the literature surrounding the safe provision of medical abortion without the routine use of ultrasonography and concludes that clinicians can use the reported last menstrual period (LMP) and physical examination to reasonably estimate gestational age. Completed pregnancy expulsion can be confirmed primarily through history and physical examination with some studies indicating that urine pregnancy tests may also play a limited role. Central to the discussion of whether medical abortion can be provided in most low resource settings without the routine use of ultrasonography is the fact that the mifepristone–misoprostol regimen is a highly effective procedure for pregnancy termination through 63 days' gestation.


*Keywords:* Medical abortion; Ultrasound; Gestational age dating; Pregnancy termination; Abortion

## 1. Introduction

Despite an overall decrease in the number of abortions worldwide, the incidence of abortion in developing countries remains high (35 million) with over half of these being performed using unsafe methods. The estimated morbidity and mortality associated with these unsafe abortions include 8 million abortion-related complications and 70,000 maternal deaths every year [1]. It is evident that there is still a dire need to expand safe abortion services and medical abortion offers the potential to vastly expand access to safe abortion in communities with and without access to surgical abortion providers [2–4].

Medical abortion studies addressing efficacy have relied on ultrasound to confirm gestational age, intrauterine location and abortion completion [5,6]. This dependence on ultrasound can strongly limit the expansion of services to women living in low resource settings who suffer the largest burden of unsafe abortion and have the highest rates of maternal mortality [7–9].

This article reviews the published evidence regarding the effectiveness and safety of medical abortion with mifepristone–misoprostol without the routine use of ultrasonography. Specifically, the published literature concerning methods of estimating gestational age utilizing reported last menstrual period (LMP) and physical examination with ultrasound and laboratory testing reserved for unusual circumstances will be discussed [5,10–39]. We will also discuss clinical tools that allow for confirmation of pregnancy expulsion without ultrasound. Unless noted, all studies referenced in this article refer to medical abortion utilizing a mifepristone–misoprostol regimen.

## 2. Estimating gestational age

Reasonable gestational age estimation is important to the provision of medical abortion because the mifepristone–

☆ There were no sources of funding for this project.
* Corresponding author. Tel.: +1 808 203 6500; fax: +1 808 955 2174.
*E-mail address:* bkaneshiro@ucera.org (B. Kaneshiro).

0010-7824/$ – see front matter © 2011 Elsevier Inc. All rights reserved.
doi:10.1016/j.contraception.2010.07.023

misoprostol regimen is most effective with the lowest complication rates when it is used within the first 63 days of gestation [40,41]. However, the regimen does not stop working after this gestational age. Rather, the effectiveness decreases gradually after 63 days. A recent study of 254 women who presented for pregnancy termination between 63 and 90 days' gestation reported a successful termination rate of 91.7% when repeated dosing of misoprostol was used [42]. Thus, only a significant *underestimation* of gestational age increases the risk of heavy bleeding and unsuccessful expulsion with medical abortion [43,44]. *Overestimation* of gestation age, on the other hand, would not diminish efficacy or increase the risk of complications. This means that an approximate and not a precise estimate of gestational age is what is necessary for effective and safe use of medical abortion with mifepristone–misoprostol.

### 2.1. Last menstrual period

Direct evidence supporting gestational age estimation without the routine use of ultrasonography is outlined in Table 1. A standard way to estimate gestational age is by calculating the time that has passed since the LMP [35]. Several large medical abortion studies have demonstrated that LMP highly correlates with physical examination and ultrasound estimates of gestational age and can be used to reasonably estimate gestational age for medical abortion care. An analysis of data collected from a 17-site medical abortion trial of mifepristone and misoprostol conducted in the United States compared LMP estimates of gestational age to those based on ultrasound [26]. Almost all of the women (99%) were able to supply an LMP and only 1.8% underestimated gestational age by more than 2 weeks.

In an observational medical abortion study based in China, Cuba and India, gestational age estimates by LMP were compared with estimates based on physical examination. More than half (53%) of approximately 800 women had an LMP-based gestational age that exactly matched physician estimates based on physical examination and the majority (92.4%) fell within 1 week [30]. In this study, the LMP established gestational age more closely correlated with medical abortion success than estimates by physical exam suggesting that a woman's menstrual history may be more accurate in estimating gestational age than physical examination.

In an observational study conducted in urban clinics in the United States (Atlanta) and India (Pune) of more than 400 women presenting for abortion care at less than 13 weeks' gestation, estimates of gestational age based on LMP or date of unprotected intercourse were compared to clinician estimates using bimanual examination [27]. Ultrasound could be done at the provider's discretion and was rarely used in Pune (1.5%) where clinicians almost entirely relied on bimanual examination to confirm gestational age and was almost always used in Atlanta (99.5%). Estimates of gestational age based on LMP or date of unprotected intercourse fell within 2 weeks of clinician estimates 85.4% of the time in Atlanta and 93.6% of the time in Pune.

There were 90.0% of women in Atlanta and 90.2% of women in Pune who were able to estimate gestational age within a margin of error that was clinically inconsequential for safe mifepristone–misoprostol use irrespective of educational attainment, gravidity or previous abortion experience. Only about 10% of women fell into what the authors described as the "caution zone" which occurred when the patient's estimate of gestational age based on history was less than 56 days but clinician estimates of gestational age were beyond 56 days. Based on the high efficacy of mifepristone–misoprostol through 63 days and the gradually decreasing efficacy thereafter, presumably many of the women who fell into the "caution zone" would still have had successful pregnancy expulsion.

An observational study of 673 women examined the accuracy of gestational age estimation by LMP and a woman's estimate of pregnancy duration (using the question, "how pregnant are you?") in women seeking abortion care at less than 22 weeks' gestation based on physical examination in South Africa. Estimates of gestational age using these methods were compared to ultrasonographic findings. LMP-based estimates were more accurate in estimating gestational age (mean of 1 day less than ultrasound estimates) than a women's estimate of pregnancy duration (mean of 19 days less than ultrasound estimates). There were 12% of patients who fell into a 63-day caution zone where LMP-based gestational age was less than 63 days' gestation despite ultrasound estimating gestational age to be greater than 63 days [29].

### 2.2. Physical examination

In addition to LMP, bimanual examination has been used to provide reliable estimates of gestational age. A few studies have directly compared gestational age estimates by bimanual examination to ultrasound estimates (Table 1). In a US-based study, investigators examined the accuracy of bimanual examination performed by experienced obstetrics and gynecology faculty vs. residents with less than 1 year of training in patients undergoing first trimester surgical abortion up to 11 weeks gestation [37]. Study participants were blinded to both LMP and ultrasound results. Estimates of gestational age by bimanual examination agreed with ultrasound measurements within 2 weeks most of the time for both residents (77.6%) and faculty (92.2%), indicating that experienced providers were very accurate in estimating gestational age based on physical examination and relatively inexperienced providers — trainees with less than a year of experience — were also able to accurately estimate gestational age in most instances. A study of 673 women in South Africa undergoing medical abortion up to 56 days' gestation reported that bimanual examination agreed with ultrasound estimates within 2 weeks in 74% of cases and within 3 weeks in 85% of cases [29]. A study of more than