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Medication abortion employing routine sequential measurements of serum hCG and sonography only when indicated☆

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Abstract

Objectives: This study was designed to demonstrate the safety and efficacy of providing medication abortion in a primary care site without routine use of pre- and postprocedure transvaginal sonography.

Methods: We performed a retrospective record review of 172 consecutive patients choosing medication abortion at our clinic. Our protocol used sonography only as needed for specific indications. All patients were intended to be followed up with serum human chorionic gonadotropin (hCG) testing pre- and posttreatment.

Results: Of the 151 patients not lost to follow-up, 96 (63%) had pretreatment sonography according to protocol or physician preference and 55 did not. Ninety-nine percent (95/96) of those receiving initial sonography had a successful, and uneventful, medication abortion treatment, while 98.2% (54/55) of those not receiving an initial sonography did so. This difference was not statistically significant (.597 by one-sided Fisher's Exact Test). All 119 of the women who did not receive postabortion sonography aborted completely. Only 4 of the 91 women who had both pre- and postprocedure hCG measurements, all of whom aborted successfully, had follow-up-to-initial hCG ratios of greater than 0.2 (20%).

Conclusion: Using a clinical protocol that involves obtaining pre- and posttreatment serum hCG measurements, with sonograms only when indicated, has similar outcomes to a protocol that uses mandatory pre- and posttreatment sonograms.

Keywords: Medical abortion; Sonography; Ultrasound; Serum hCG; Gestational age; Follow-up

1. Introduction

The safety and effectiveness of medication abortion with mifepristone/misoprostol make it an excellent treatment for primary care physicians to offer their patients. Since it does not require highly technical equipment or training, medication abortion has the potential to increase the number and variety of abortion providers and to broaden access to care. In general, in all countries where medication abortion is available, its use has been increasing steadily each year [1,2]. Despite this growth, availability of and access to medication abortion services in the United States remains limited. In the United States, routine use of sonography pre- and posttreatment poses a serious obstacle to the integration of medication abortion into primary care. The approved U.S. regimen for medication abortion does not stipulate that sonography should be used, and internationally, sonography is used less often than in this country [3,4].

In the United States, there appears to be a trend toward increased reliance on sonograms for the monitoring of the medication abortion process. Confirmation of intrauterine pregnancy and accurate dating of gestation prior to medication abortion are important: medication abortion with mifepristone is not effective in treating ectopic pregnancies, and medication abortion past 9 weeks' gestational age has an increased failure rate [4]. In general, U.S. providers rely on sonography for preprocedure evaluation of pregnancy. Many providers also consider a postprocedure sonogram essential to document that pregnancy is not ongoing, that the abortion is "complete," and that there is no underlying undiagnosed complication such as ectopic or molar pregnancy. Routine pre- and postprocedure sonograms may, however, unnecessarily limit women's access to medication abortion.

Other options for careful monitoring of the medication abortion process are available. For example, clinicians

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might rely on date of onset of last menstrual period (LMP) and pelvic examination to estimate gestational age prior to treatment, and on sequential serum human chorionic gonadotropin (hCG) measurements to confirm success after treatment. These approaches, which are much more common in Europe than in the United States, deserve further exploration to evaluate their safety and efficacy.

In this paper, we review our experience with a clinical protocol that does not depend on pre- and posttreatment sonograms. Our protocol relies instead on history, examination, and hCG levels in most uncomplicated cases to establish appropriate candidates for medication abortion and to confirm complete termination of pregnancy at follow-up. We review a case series of patients treated at our clinic after this clinical protocol was established.

2. Methods

We conducted a quality-assurance retrospective chart review of services at the Montefiore Family Medicine Health Center, Bronx, New York City, which is an academic community health center serving a multiethnic, underserved population. Charts were identified from the medication abortion log maintained by the abortion providers at the health center and subsequently reviewed and correlated by at least two investigators. All cases were confidential and eligible for review if they had obtained a medication abortion at our clinic in a 25-month period between 2002 and 2004.

One hundred seventy-two patients, who both desired and were of an appropriate gestational age (≤9 weeks) for medication abortion, presented at our clinic between January 2002 and February 2004. In this paper, we define "gestational age" as the time elapsed from the first day of the LMP. Three trained family physicians at the Family Health Center provided outpatient medication abortion during this period. They employed a protocol specifying serum hCG measurements be obtained for all women pre- and posttreatment and eliminated sonography except in the presence of certain predefined indications (Table 1). Although some providers unfamiliar with the protocol ordered sonograms that were not indicated, we have included all patients in our review in order to evaluate our study population on the basis of intention to treat.

Table 1
Absolute indications for sonography

Preabortion
1. Gestational age >8 weeks
2. Uterine size discrepancy with gestational age
3. Uncertain date of LMP (or no menses after delivery, abortion, or stopping depo-medroxyprogesterone acetate, etc.)
4. Adnexal mass or pain
5. Provider uncertainty with uterine size by pelvic examination
6. History of previous ectopic pregnancy
Postabortion
1. History not consistent with successful medical abortion (no cramping, no bleeding)
2. Woman still feels pregnant
3. Serum hCG not declining
4. Provider uncertainty with history

At the initial visit, all women underwent a pelvic examination for uterine sizing, a screen for gonorrhea and chlamydia, a Pap smear if they had not had one in the past year, a hematocrit, Rh typing, and a baseline serum hCG measurement, using Roche's Elecsys 2010 system (the range of values for this method are as follows: nonpregnant, 0–10 mIU/mL; inconclusive, 10.1–24.9 mIU/mL; pregnant, >25 mIU/mL). Patients signed the Mifeprex™ patient agreement and received 200 mg of oral mifepristone at the clinic; they were given 800 μg of misoprostol to insert vaginally at home approximately 24 h later. Patients were counseled about symptoms to be expected during the treatment and were given a written handout explaining the routine course of the procedure as well as symptoms of concern. All were given a 24-h number to contact the physician on call in case of need, and clinic staff recorded confidential contact numbers to reach the patient in the event of unexpected results.

At the 1-week follow-up visit, patients were asked about the length and amount of bleeding following misoprostol insertion and about symptoms of ongoing pregnancy. A pelvic examination was not performed unless the patient was having a large amount of bleeding, pain, or other unexpected symptoms. A second serum hCG measurement was taken at this time.

A postabortion sonogram was obtained only if the woman's history was not consistent with a successful medication abortion (no bleeding, or ongoing symptoms of pregnancy), if her hCG had not declined by at least 80%, or if the provider was in any other way uncertain about her history. If the sonogram demonstrated a continuing pregnancy, further treatment (an additional 800 μg of vaginal misoprostol or a manual vacuum aspiration procedure) was decided on by the patient and her physician. Surgical intervention was also performed if there was heavy bleeding not tolerated by the patient or upon patient request. The medication abortion was regarded as a success only if no surgical treatment was necessary.

We used Pearson's chi-square and both one-sided and two-sided Fisher's Exact Test to calculate the p value on the difference in outcomes between women who had sonograms and those who did not.

3. Results

Of the 172 patients included in our review, 21 (12.2%) did not return for a follow-up visit (either at our clinic or with their primary care doctor) and were untraceable both by telephone and by mail. These cases were considered lost to follow-up.

Of the remaining 151 patients, 96 (64%) were referred for pretreatment sonography, while 55 were not. As detailed above, sonography may have been prescribed because a patient met criteria that our protocol defined as requiring

sonography, because the patient herself requested it, or because the referring physician (who may not have been familiar with our protocol) decided for some other reason that one should be performed. Some women had pretreatment sonograms and initial hCG measurements; for these women, completion could be confirmed by a postprocedure hCG according to our protocol.

Ninety-nine percent (95/96) of those with pretreatment sonograms and 98.2% (54/55) of those without pretreatment sonograms had successful medication abortions. This difference was not statistically significant. The actual p value by Pearson's chi-square was .688; by one-sided Fisher's Exact Test, it is .597; and by two-sided Fisher's Exact Test, it is 1.000.

Thirty women had the success of their medication abortion confirmed by follow-up sonography, while in 119 cases, physicians confirmed success by alternate methods (quantitative serum hCG level if the patient returned as planned within 2 weeks following the medical abortion, high-sensitivity qualitative urine hCG if the follow-up was more than 3 weeks later). The two treatment failures noted above went to non-study facilities before their scheduled follow-up visits. Although they did receive sonograms at these other facilities, they are excluded from these figures since their sonograms were received outside of study protocols.

Two women who did not follow-up were reached by phone, and 13 others came back for another medical issue later than the routine follow-up visit; all of these women had success confirmed by the patient reporting an uneventful course of treatment and no more symptoms of pregnancy in the months following. Ninety-one women in our study (60% of those not lost to follow-up) had both initial and final hCG measurements. Of these 91 women, all of whom had successful abortions, only 4 had posttreatment/pretreatment hCG ratios higher than 0.2.

4. Discussion

The findings in this case series suggest that careful preprocedure examination and screening in combination with hCG monitoring provides a safe, effective alternative to routine sonography in medication abortion provision. We will discuss the specific aspects of this conclusion sequentially.

4.1. Gestational dating accurate enough for the purposes of medication abortion can be established by clinical examination and history, without the need for routine preprocedure sonography

Although clinicians may not always be able to depend solely on history or clinical examination for accurate dating of pregnancy [5], two recent studies report that sonograms provide estimates of gestation only 1.7 to 3.5 days more accurate than estimates based on reported date of LMP [6] and that the mean difference between gestational age as calculated by sonogram vs. LMP is only 1 day [7]. Furthermore, there is evidence that examining clinicians very rarely underestimate the duration of a pregnancy, even without the use of ultrasound [3]. Since errors in pregnancy dating of 1 week or less are not likely to affect the outcome of a medication abortion, these results suggest that it may not be necessary to rely on sonography to obtain a precise estimate of gestational age prior to medication abortion. Instead, as our results confirm, it may be efficient and safe to obtain a sonogram only if (1) there are indications that dating by LMP may be inaccurate, (2) pelvic examination suggests a gestational age greater than 8 weeks, or (3) examination and/or history indicate that there is an elevated risk of ectopic pregnancy (Table 1).

Since there was no statistical difference in medication abortion success between patients who received a pretreatment sonogram and patients who did not, we can suggest that the success rate of our "sonography-as-needed" protocol is the same as the high success rate of medication abortion in general. Our protocol did not result in any complications related to not providing routine pretreatment sonography. The one treatment failure among women who did not have a preprocedure sonogram was a failure only under the strictest definition of the term. This woman presented at an emergency room because of concern about the amount of bleeding. Upon sonographic examination, she appeared to have successfully aborted, with no retained products of conception and no need for blood transfusion. The emergency room physicians, who were not part of our study team, nevertheless performed a dilatation and curettage procedure. It is because she had this procedure—and not because of any untoward outcomes related to her not having received a pretreatment sonogram—that this woman is classed as a failure.

4.2. Assessing risk for ectopic pregnancy and other complications

Factors triggering further evaluation for possible ectopic pregnancy in our protocol included symptoms or history consistent with ectopic pregnancy at initial visit, not bleeding after misoprostol use (in which case patients were instructed to call clinic staff immediately), and continuing symptoms of pregnancy or rising or plateauing hCG levels, less than 15% decline. Since we encountered no ectopic pregnancies in our case series, we are unable to determine the effectiveness of our protocol in managing them.

4.3. Serial hCG measures offer a good alternative to routine postabortion sonography for confirming successful pregnancy termination

Depending on posttreatment sonograms to evaluate abortion completion can limit provision of medication abortion by practitioners lacking sonography equipment. In addition, when operators unfamiliar with the range of normal uterine contents after successful pregnancy termination perform the sonograms, the number of abortions defined as "incomplete" may increase, leading to unnecessary interventions.

In our protocol, we relied on pre- and posttreatment hCG levels to confirm pregnancy expulsion. Mean serum hCG levels are highly correlated with duration of gestation during early pregnancy [8] and begin to fall immediately after a pregnancy is terminated, with an initial rapid phase of decline of approximately 50% within the first 24 h, followed by a more gradual decline [9]. Schaff et al. [10], in a study of mifepristone abortion in 29 women, found that a decrease in hCG concentrations of >50% by 24 h and >99% by 14 days was consistent with a complete medication abortion.

Our approach to using hCG measurements in this study was based on routine practice in France and on the work of Fiala et al. [11]. These investigators concluded, in a study of 217 women at <49 weeks LMP undergoing medication abortion, that a cutoff of 0.2 in the ratio of postprocedure to preprocedure hCG readings had a positive predictive value of 0.995 for successfully terminated pregnancy. Thus, only 1 patient out of 211 whose postprocedure hCG level was 20% or less of her preprocedure level had not truly expelled her pregnancy (and even this one exception had successfully terminated her pregnancy, although without successfully expelling it). The negative predictive value of the 20% cutoff was 0.5 (3 out of 6 patients with an hCG ratio more than 0.2 had not successfully expelled their pregnancies, while 3 had done so The work of Fiala et al. suggests that if a follow-up hCG level that is 20% or less of the initial level is used as an indicator of successful medication abortion, few if any cases requiring further treatment will be missed and only a small number of women with false-positive results will be referred for additional testing or treatment.

Our hCG data confirm the work of Fiala et al. [11] and suggest guidelines that might be used, in place of postabortion sonography, to confirm successful medication abortion. Since we had no ongoing pregnancies or incomplete abortions requiring further treatment, it is impossible to say what hCG ratios might have occurred in such instances. In this study, only 4 of 91 women with successful medication abortions had follow-up-to-initial hCG ratios of greater than 0.2 (or 20%). Thus, using the 80% fall in hCG levels proposed by Fiala et al. would have correctly confirmed 96% of the successful medication abortions, while unnecessarily referring only 4 women for further evaluation via sonogram. While an even better indicator is theoretically possible, this rate of false positives is very low. Fiala et al. found, in fact, that hCG testing is more effective than even sonography in confirming successful medical abortion in early pregnancy. The 80% drop in hCG value, is a promising technique for minimizing the overuse of transvaginal sonography while sacrificing little or nothing in the way of safety.

4.4. Limitations of our case series review

This protocol was put in place to provide clinical services, not as a randomized clinical trial. Our information was collected retrospectively with data from our logbook and from patient charts. Although we anticipated that all patients would have pre- and postabortion hCG measurements, only 60% of women actually did. In our busy primary care residency clinic, there is an inevitable turnover of providers. Thus, at their initial visit, patients sometimes received sonograms because the provider who did the options counseling before referral to us was unfamiliar with this protocol, or because the patient had not yet decided on treatment. After medication abortion, many patients followed up with their primary provider, who again may have ordered a sonogram instead of an hCG measurement to confirm completion. In some cases, chart review did not reveal all the clinical reasoning behind the clinician's choice of method. Twenty-one (12.2%) patients were lost to follow-up, despite all reasonable efforts to contact them. However, we have included and analyzed all cases as part of our intention-to-treat protocol. We predict that over time at our clinic, the number of sonograms ordered will decrease as providers become more familiar with following patients through their abortions and learn to interpret and rely on hCG testing, clinical examination, and history.

It should also be noted that only 151 patients were fully analyzed in our review, which is not a large enough number to allow us to determine how successfully or unsuccessfully our approach would have dealt with rare complications in the medical abortion process, such as ectopic, molar, or ongoing pregnancy, hemorrhage, or infection. We encountered none of these complications in our study population. The fact that we did not, however, is one more confirmation that for the large majority of women, medication abortion is a simple, safe, and effective treatment.

5. Conclusions

If medication abortion is to become increasingly available as a safe and effective alternative to suction abortion in the first 9 weeks of pregnancy, more primary care practitioners need to be able to provide this service to patients. We need to continue to explore and develop safe and effective criteria that include sonography as an adjunctive, not a routine, screening and follow-up tool, so that more primary care clinics both in the United States and internationally can offer an evidence-based standard of care and safety to patients desiring medication abortion. In our clinic's protocol, we attempted to minimize use of sonography (which is not available on-site at many primary care clinics) by establishing criteria for patients for whom sonography was not necessary and who could thus be safely followed up by examination, history, and serum hCG levels.

Clarification of the expected hCG decline is needed for establishing clear cutoff values. More rigorously designed large multicenter studies are necessary to document the validity of the 20% cutoff discussed here as well as the safety and efficacy of this protocol. However, the literature to date and our clinical series suggest that monitoring serum hCG levels, with the addition of clinical history and exam, may be a safe alternative to routine pre- and postprocedure

sonography. This approach could help make medication abortion as accessible and convenient as possible for women by ensuring that primary care providers could easily integrate it into their practices. Randomized trials of sonography and no sonography are needed to confirm these preliminary results.

References

[1] Blinder V, Elul B, Winikoff B. Mifepristone–misoprostol medical abortion: who will use it and why? Am Obstet Gynecol 1998;179:1376.
[2] Boonstra H. Mifepristone in the United States: status and future. The Guttmacher report on public policy, 2002. p. 4–7.
[3] Fielding SL, Schaff EA, Nam NY. Clinicians' perception of sonogram indication for mifepristone abortion up to 63 days. Contraception 2002;66:27–31.
[4] Newhall E, Winikoff B. Abortion with mifepristone and misoprostol: regimens, efficacy, acceptability and future directions. Am J Obstet Gynecol 2000;183(Suppl 2):S44–S53.
[5] Paul M, Schaff E, Nichols M. The roles of clinical assessment, human chorionic gonadotropin assays and ultrasonography in medical abortion practice. Am Obstet Gynecol 2000;183(Suppl 2):S34–S43.
[6] Taipale P, Hiilesmaa V. Predicting delivery date by ultrasound and last menstrual period in early gestation. Obstet Gynecol 2001;97:189–94.
[7] McGalliard C, Gaudoin M. Routine ultrasound for pregnancy termination requests increases women's choice and reduces inappropriate treatments. Br J Obstet Gynecol 2004;111:79–82.
[8] Lagrew DC, Wilson EA, Jawad MJ. Determination of gestational age by serum concentrations of human chorionic gonadotropin. Obstet Gynecol 1983;62:37–40.
[9] Creinin MD. Change in serum beta-human chorionic gonadotropin after abortion with methotrexate and misoprostol. Am Obstet Gynecol 1996;174:776–8.
[10] Schaff E, Walker K, Fielding S, Fuller L. Monitoring serum chorionic gonadotropin levels after mifepristone abortion. Contraception 2001; 64:271–3.
[11] Fiala C, Safar P, Bygdeman M, Gemzell-Danielsson K. Verifying the effectiveness of medical abortion: ultrasound versus hCG testing. Eur Obstet Gynecol Reprod Biol 2003;109:190–5.