

# Manual Vacuum Aspiration for First-Trimester Abortion

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**Objective:** To assess the safety and effectiveness of manual vacuum aspiration for abortion in a primary care office setting.

**Design:** Retrospective chart audit.

**Setting:** Private family practice office.

**Patients:** A total of 1769 consecutive women who obtained an abortion in this office between January 1, 1993, and December 31, 1995, for whom 1677 medical charts were available for review.

**Main Outcome Measures:** Rate of complete abortion, estimated blood loss, and rate of complications. Complications included early complications of uterine per-

foration, cervical injury, and hospitalization, and late complications of pelvic infection and retained products of conception.

**Results:** Overall, manual vacuum aspiration was 99.5% effective in terminating pregnancy through 12 weeks of gestation. There were no major complications, and the minor complications of retained products of conception and infection were easily treated.

**Conclusion:** Manual vacuum aspiration performed in a primary care office setting is safe and effective in terminating pregnancy through the end of the 10th week of gestation.

*Arch Fam Med. 1998;7:559-562*

**R**ECENT REPORTS of first-trimester abortion using mifepristone and methotrexate reveal higher complication rates and need for surgical intervention compared with suction curettage.<sup>1</sup> The rates of successful medical abortion are 90% to 98% for less than 6 weeks of gestation, 89% to 98% at 7 weeks of gestation, 82% to 96% at 8 weeks of gestation, and 60% at greater than 8 weeks of gestation.<sup>2-8</sup> The perceived benefits of medical abortion are the abilities to avoid surgery, its discomfort, and associated morbidity; improve the privacy of the abortion; and better enable integration into the primary care office.<sup>9,10</sup> Even though medical abortion has been well accepted by patients, it routinely requires multiple visits, and the need for unplanned, after-hours intervention is not uncommon.

Manual vacuum aspiration (MVA) is a technique of suction curettage for first-trimester abortion that has been performed for many years. It is performed using a handheld syringe attached to a uterine catheter. It has been used internationally for many years and been shown to be safe and

effective for early abortion, menstrual extraction, and completing incomplete abortions.<sup>11-14</sup> Several authors have reported on the use of MVA in the United States for management of incomplete abortion and menstrual extraction.<sup>15-18</sup> A textbook description in the 1980s on MVA reported the ease of this procedure in the private office.<sup>19</sup> Freedman et al<sup>20</sup> mention the safety and efficacy of MVA through 8 weeks' gestation. Despite these reports, MVA is not widely used. To our knowledge, this report is the first evaluation on the safety and efficacy of MVA through 12 weeks of gestation in the United States.

## RESULTS

A total of 1769 women obtained a first-trimester abortion in this office between January 1, 1993, and December 31, 1995. Ninety-two charts were not available at the time of initial data abstraction, leaving a total of 1677 charts available for review. **Table 1** describes the characteristics of the patients, the duration of their pregnancy, and their prior pregnancy experience.

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## SUBJECTS AND METHODS

### STUDY POPULATION

All patients who underwent MVA in one office between January 1, 1993, and December 31, 1995, were identified from the office appointment record. Using a retrospective audit, all charts were reviewed by 1 of 2 medical reviewers (H.B. and S.E.) trained in chart abstraction and MVA, with an interrater agreement of 98.6%. Data were abstracted directly into a database (Microsoft Access; Microsoft Corporation, Redmond, Wash) via a laptop computer. Data included demographic variables, diagnosis, gestational age, immediate and late complications, telephone messages, and follow-up visits. At the time of the procedure, the physician (J.M.W. or A.S.) obtained information from patients on age, last menstrual period, gravidity, parity, birth control use and reason for failure, medicine allergies, and medical history. A urine pregnancy test and Rh typing were done and vital signs recorded in the chart. The physician discussed the history, birth control tried and desired, and the procedure, including risks. Written informed consent was obtained from all patients.

During the time our data abstractors were available, a small number of charts ( $n = 92$ ) were not available. The office setting with paper records meant that a few charts were most likely at the copier, were misfiled, or were misplaced. As of this writing, we were able to locate 16 of these charts, and analysis revealed no differences in gestational age or missed complications. There was no systematic or repetitive reason for the missing charts.

### SETTING

The site was a solo family practice office, with approximately 5000 visits per year, of which approximately 550 were for abortion. Manual vacuum aspiration is the only abortion procedure performed in this office. Patients with an intrauterine pregnancy believed to be greater than 11 to 12 weeks were referred elsewhere for termination. Subjects were already patients in this office (12%), were referred by another physician (4% with referring physician identified), or were new patients to the office (84%). When identified, a consult letter was sent to the referring physician.

Overall, MVA was 99.5% effective for termination of pregnancy in this study. There were 8 cases (0.5%) of retained products of conception requiring another procedure. The rate of retained products of conception was not related to gestational age.

Complications are listed in **Table 2**. No blood transfusions, hospitalizations, or deaths were reported in this group. The 1 case of uterine perforation did not require hospitalization or surgery. Complication rates were not related to gestational age.

**Table 3** shows estimated blood loss stratified by gestational age. Patients with blood loss greater than 250 mL were given intramuscular methylergonovine male-

ate (Methergine) immediately after the procedure in addition to oral methylergonovine to take home. No patients with blood loss greater than 250 mL had a later complication. Estimated blood loss was directly related to gestational age ( $P < .001$ ).

There were 151 patient telephone calls to the office, the vast majority to report bleeding and cramping or to request refills on pain medicines. Two calls reported visits to an emergency department where retained products of conception were diagnosed. No hospitalizations were reported by telephone contact. Only 34.7% of patients returned for their follow-up appointment. An additional 4.3% contacted the office by telephone. Seventy percent of those with a complication of pelvic infection or retained products of conception (14 of 20 patients) were seen in this office for follow-up. A full 30% of the patients with an identified complication (6 of 20 patients) were seen elsewhere and notified this office by telephone.

Congruence between gestational age based on the patient's report of last menstrual period and the physician's clinical examination was 89.5%. Congruence between gestational age based on the physician's clinical examination and evacuated products of conception within 1 week was 99.7% and within 0.5 weeks was 99.0%.

### COMMENT

Our primary purpose was to document the safety and effectiveness of MVA in the United States. Manual vacuum aspiration was effective in terminating pregnancy of less than 12 weeks' gestation in more than 99.5% of patients and was associated with a very low rate of complications.

Several factors may be associated with this procedure's low complication rates. Limiting the procedure to 7 to 10 weeks' gestational age is one. Only 0.6% ( $n = 10$ ) of pregnancies were greater than 10 weeks' gestation. The procedure requires only small cervical dilators, decreasing the chance for cervical injury or uterine perforation. The physician in this study (A.S.) is quite experienced in MVA and is very comfortable with intrauterine procedures. However, a considerable number of procedures were performed by resident or student physicians under the direct supervision of the principal operator. Immediate analysis of the products of conception by the physician performing the procedure may have decreased the chance for retained products of conception. Routine use of methylergonovine may decrease the amount of bleeding and chance for intrauterine clot formation that would necessitate later evacuation and may aid in expulsion of small fragments of products of conception not evacuated by the suction catheter. Anecdotally, the addition of oral methylergonovine to the protocol has dramatically decreased the number of after-hours telephone calls related to cramping and bleeding. Routine use of antibiotics may decrease the chance for cervicitis, endometritis, and pelvic inflammatory disease. Specifically, postoperative use of doxycycline hyclate, as used in this office, may decrease the chance for spread of

**Table 1. Characteristics of 1677 Women Obtaining Abortion by Manual Vacuum Aspiration**

| Characteristic   | No. (%) of Patients |
|--|---------------------|
| Residence  |                     |
| Local metropolitan area                                | 1151 (68.7)         |
| In state   | 392 (23.3)          |
| Out of state   | 112 (6.7)           |
| Not stated   | 22 (1.3)            |
| Race   |                     |
| White  | 718 (43.0)          |
| Hispanic   | 169 (10.0)          |
| Black  | 140 (8.4)           |
| Asian  | 39 (2.3)            |
| Other  | 12 (0.7)            |
| Not stated   | 599 (35.6)          |
| Marital status   |                     |
| Married  | 302 (18.0)          |
| Single   | 1095 (65.3)         |
| Divorced or separated                                  | 203 (12.1)          |
| Not stated   | 77 (4.6)            |
| Age, y   |                     |
| <15  | 1 (0.1)             |
| 15-17  | 50 (2.9)            |
| 18-19  | 124 (7.4)           |
| 20-24  | 606 (36.2)          |
| 25-29  | 460 (27.4)          |
| 30-34  | 257 (15.3)          |
| 35-39  | 121 (7.2)           |
| >39  | 36 (2.2)            |
| Not stated   | 22 (1.3)            |
| No. of living children                                 |                     |
| 0  | 781 (46.6)          |
| 1  | 452 (27.0)          |
| 2  | 291 (17.3)          |
| 3  | 102 (6.1)           |
| >3   | 45 (2.7)            |
| Not stated   | 6 (0.3)             |
| Previous therapeutic abortions                         |                     |
| 0  | 881 (52.5)          |
| 1  | 537 (32.0)          |
| 2  | 184 (11.0)          |
| >2   | 71 (4.3)            |
| Not stated   | 4 (0.2)             |
| Gestation by examination of products of conception, wk |                     |
| Not pregnant or not stated                             | 24 (1.4)            |
| <8   | 659 (39.3)          |
| 8-9  | 846 (50.5)          |
| 10   | 138 (8.2)           |
| >10  | 10 (0.6)            |

undiagnosed chlamydial infection into the uterus and adnexa.

Differences between estimated gestational age and evacuated products of conception are important in discussions about new methods for abortion. They are particularly important when ultrasound is not used. Physicians who provide MVA should be trained in the evaluation of products of conception and/or early vaginal ultrasound.

Another important use for MVA will be in completing medical abortions that require subsequent suction evacuation of the uterus. This may be a particularly effective option, as these patients are all at an early gesta-

**Table 2. Complications Associated With Manual Vacuum Aspiration**

| Complication                    | No. (%) of Patients |
|---------------------------------|---------------------|
| Early                           |                     |
| Uterine perforation             | 1 (0.05)            |
| Cervical injury                 | 0                   |
| Anesthesia related              | 0                   |
| Blood transfusion               | 0                   |
| Hospitalization                 | 0                   |
| Late                            |                     |
| Pelvic infection                | 12 (0.7)            |
| Retained products of conception | 8 (0.5)             |
| Hospitalization                 | 0                   |
| <b>Total</b>                    | <b>21 (1.25)</b>    |

**Table 3. Estimated Blood Loss by Gestational Age**

| Gestation, wk | No. | Estimated Blood Loss, mL |         | No. (%) >250 mL |
|---------------|-----|--------------------------|---------|-----------------|
|               |     | Average                  | Maximum |                 |
| <8            | 654 | 49                       | 150     | 0               |
| 8-9           | 854 | 103                      | 350     | 8 (0.9)         |
| 10            | 143 | 175                      | 500     | 19 (13.3)       |
| >10           | 10  | 275                      | 600     | 6 (60.0)        |

tional age (<8 weeks) and already have a partially dilated cervix from misoprostol. In addition, a physician could perform these 2 procedures, medical abortion and MVA, in concert, without a large financial outlay for medical equipment.

Manual vacuum aspiration performed at gestational age greater than 10 weeks was associated with a high rate of blood loss greater than 250 mL (60.0%). Patients with blood loss greater than 250 mL were given intramuscular methylergonovine in addition to oral methylergonovine. Despite the increased incidence of higher blood loss, no major complications were noted in this group. Nonetheless, we have chosen to limit MVA to those with an estimated gestational age less than 11 weeks.

A benefit of medical abortion is the sense of autonomy and control felt by many women obtaining a medical abortion. Manual vacuum aspiration does not totally resolve this issue. However, many women prefer this quiet procedure performed in the primary care setting to the sometimes less personal care received in large abortion clinics, which typically use electric power suction. Karman and Potts<sup>17</sup> reported in the *Lancet* that "unlike conventional vacuum aspiration, the procedure is silent, and the woman may be unaware when aspiration is taking place."

Another benefit of medical abortion is the ability to integrate the provision of this service into the primary care family practice or obstetrician-gynecologist office. A recent survey found that nearly 26% of family physicians reported they might be willing to provide medical abortion in their offices.<sup>21</sup> As shown in this study, MVA also can be easily integrated into a busy primary care office without additional expensive equipment, such as power-suction equipment or an ultrasound machine. We found that 30.0% of the patients in this study were from out of town, and

6.7% were from out of state. If used more widely in primary care offices, MVA might decrease the need for lengthy and expensive travel to obtain an abortion.

All of the patients who underwent MVA in this study were scheduled for a follow-up appointment in this office or encouraged to follow-up with their local primary care physician. In fact, the consent form included an agreement to return for follow-up, yet a majority of women (65.3%) did not return for follow-up. Low follow-up rates are common in surgical abortion research, and we believe this is due to the overall safety and low rate of complications.

Several limitations to this study should be mentioned. First, it is a chart abstraction with 2 separate reviewers. We believe the interrater agreement was excellent and did not compromise the data. Within a medical office setting, it is common for a number of charts to be temporarily unavailable. Our later analysis of a portion of the unavailable charts revealed no systematic reasons for charts to be unavailable, and we believe this small number does not compromise our findings. Second, the physician in this study is quite experienced in MVA, so the results may not translate to the family physician just learning the procedure or one who does very few procedures. The physician in this study teaches many medical students and residents how to perform MVA and continues to have very low rates of complications. Finally, the follow-up rate of only 34.7% presents the possibility that a number of complications or incomplete procedures went undetected. Because many of the minor complications were identified only by telephone contact, we believe that we identified all of the significant complications. Follow-up less than 50% is common in surgical abortion.

At a time when interest in medical abortion techniques is on the rise, it is important to understand each procedure's relative benefits and limitations and to explore the available alternatives. According to the Joint Program for the Study of Abortion definition of major complication, there were no documented major complications in this study.<sup>22</sup> The rates of complication and incomplete abortion we report are at or below those reported for power vacuum suction.<sup>1</sup> Only 8 patients had retained products of conception requiring repeated suction (0.5%). Manual vacuum aspiration is well tolerated, safe, and effective, and easily integrated into a busy primary care office without expensive capital investment of ultrasound or power-suction equipment. Manual vacuum aspiration may also represent an important complementary procedure to medical abortion.

Accepted for publication August 8, 1997.

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## REFERENCES

1. Council on Scientific Affairs, American Medical Association. Induced termination of pregnancy before and after *Roe v Wade*. *JAMA*. 1992;268:3231-3239.
2. Silvestre L, Dubois C, Renault M, et al. Voluntary interruption of pregnancy with mifepristone (RU 486) and a prostaglandin analogue. *N Engl J Med*. 1990;322:645-648.
3. Hausknecht RU. Methotrexate and misoprostol to terminate early pregnancy. *N Engl J Med*. 1995;333:537-540.
4. Schaff EA, Eisinger SH, Franks P, et al. Methotrexate and misoprostol for early abortion. *Fam Med*. 1996;28:95-100.
5. Wiebe ER. Abortion induced with methotrexate and misoprostol. *CMAJ*. 1996; 54:43-48.
6. Creinin MD, Darney PD. Methotrexate and misoprostol for early abortion. *Contraception*. 1993;48:127-136.
7. Creinin MD, Vittinghoff E, Galbraith S, et al. A randomized trial comparing misoprostol three and seven days after methotrexate for early abortion. *Am J Obstet Gynecol*. 1995;173:137-143.
8. Creinin MD. Methotrexate and misoprostol for abortion at 57-63 days gestation. *Contraception*. 1994;50:511-515.
9. Creinin MD, Park M. Acceptability of medical abortion with methotrexate and misoprostol. *Contraception*. 1995;53:41-44.
10. Harvey SM, Beckman LJ, Castle MA, et al. Knowledge and perceptions of medical abortion among potential users. *Fam Plann Perspect*. 1995;27:203-207.
11. Greenslade FC. *Manual Vacuum Aspiration: A Summary of Clinical and Programmatic Experience Worldwide*. Carrboro, NC: IPAS; 1993.
12. Caspi B, Appelman Y, Barash A, et al. Early pregnancy termination: an improved technique for "menstrual regulation" with ultrasound assistance. *Adv Contracept*. 1992;8:349-353.
13. Mahomed K, Healy J, Tandon S. A comparison of manual vacuum aspiration (MVA) and sharp curettage in the management of incomplete abortion. *Int J Gynaecol Obstet*. 1994;46:27-32.
14. Mandelin M, Karjalainen O. Menstrual regulation as a method for early termination of pregnancy. *Acta Obstet Gynecol Scand*. 1979;58:169-173.
15. Blumenthal PD, Remsburg RE. A time and cost analysis of the management of incomplete abortion with manual vacuum aspiration. *Int J Gynaecol Obstet*. 1994; 45:261-267.
16. Hale RW, Kobara TY, Sharma SD, et al. Office termination of pregnancy by menstrual aspiration. *Am J Obstet Gynecol*. 1979;134:213-218.
17. Karman H, Potts M. Very early abortion using syringe as vacuum source. *Lancet*. 1972;13:1051-1052.
18. Atienza MF, Burkman RT, King TM, et al. Menstrual extraction. *Am J Obstet Gynecol*. 1975;121:490-495.
19. Stubblefield PG. Surgical techniques of uterine evacuation in first- and second-trimester abortion. *Clin Obstet Gynaecol*. 1986;13:53-70.
20. Freedman MA, Jillson DA, Coffin RR, et al. Comparison of complication rates in first trimester abortions performed by physician assistants and physicians. *Am J Public Health*. 1986;76:550-554.
21. Rosenblatt RA, Mattis R, Hart LG. Abortions in rural Idaho: physicians' attitudes and practices. *Am J Public Health*. 1995;85:1423-1425.
22. Binkin NJ. Trends in induced legal abortion morbidity and mortality. *Clin Obstet Gynaecol*. 1986;3:83-93.