

Manual vacuum aspiration: an outpatient alternative for surgical management of miscarriage

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Accepted on 3 March 2015

Key content

- Manual vacuum aspiration (MVA) is a safe and effective alternative method for surgical management of miscarriage.
- MVA can be performed in the outpatient setting under local anaesthesia.
- MVA reduces patient waiting time for surgery, cost of hospital stay and avoids general anaesthesia-related complications and increases patient choice.
- Complication rates are similar to those of electric vacuum aspiration carried out under general anaesthesia in the operating theatre.
- The necessary skills are easy to acquire and require minimal additional training and resources.

Learning objectives

- To understand the indications, procedure and advantages of MVA.

- To review the data on effectiveness and complications of MVA.
- To review the feasibility of implementing the service in National Health Service hospitals while delivering a quality service which is safe, cost-effective and acceptable.

Ethical issues

- How safe is it to perform MVA in an outpatient setting?
- Is it ethical to perform MVA under local anaesthesia, in emotionally vulnerable miscarrying women?
- Is the outpatient department an ideal setting in which to train doctors to perform MVA?

Keywords: manual vacuum aspiration / miscarriage / suction evacuation / surgical management of miscarriage / termination of pregnancy

Please cite this paper as: Sharma M. Manual vacuum aspiration: an outpatient alternative for surgical management of miscarriage. *The Obstetrician & Gynaecologist* 2015;17:157–61.

Introduction

Approximately 10–20% of pregnancies end in miscarriage and early pregnancy loss accounts for over 50 000 admissions in the UK each year.¹ Treatment options for miscarriage include expectant management, surgical and medical management. Each has its own advantages and disadvantages and is selected according to clinical indication and the woman's preferences. Clinical indications for offering surgical evacuation include persistent excessive bleeding, haemodynamic instability, evidence of infected retained tissue and suspected gestational trophoblastic disease. In the National Health Service (NHS) setting, standard surgical management of miscarriage involves suction evacuation under general anaesthesia using electric vacuum aspiration (EVA). However, over the last few decades, manual vacuum aspiration (MVA) has emerged as an effective and safe alternative for surgical management of miscarriage. MVA can be carried out in the outpatient setting under local

anaesthesia as an alternative method for surgical management of miscarriage. MVA is also recommended as an effective and acceptable surgical method of termination of pregnancy in the Royal College of Obstetricians and Gynaecologists (RCOG) evidence-based guideline *The Care of Women Requesting Induced Abortion*.²

Harvey Karman, in 1972, designed the vacuum syringe and described the principles of MVA for surgical uterine evacuation.³ The principle of MVA is exactly the same as routine surgical management of miscarriage except that it involves the use of a handheld syringe as a source of suction instead of an electric suction machine. It has been used for first-trimester termination of pregnancy, incomplete miscarriage, missed miscarriage, endometrial biopsy and following failed medical termination of pregnancy. In particular, in areas with limited resources it has gained wide popularity as a reliable, safe, cost-effective and ambulatory method for managing miscarriage. Slowly but steadily, this method is also gaining acceptance in the NHS setting as an option for the surgical management of miscarriage.

Description

The MVA syringe is made of latex-free plastic and it can be single-valved or doubled-valved. The double-valved syringe is the newer version that is used more frequently. It has a volume of 60 ml and can create a vacuum of 610–660 mmHg; similar to that generated by an electric vacuum machine. Cannulae are 24 cm long and are colour-coded according to their diameter, which ranges from 4 mm to 12 mm. The size of the cannula is chosen according to the period of gestation and the estimated size of the uterus. It has graduations with six marking dots starting at 6 cm from the tip and spaced 1 cm apart. The tube is flexible and the tips are rounded to help minimise the risk of uterine perforation.

Principles of the procedure

The MVA procedure can be performed in an outpatient setting, for example, in a treatment room in an early pregnancy assessment unit. Written consent should be obtained from the woman. Cervical preparation with synthetic prostaglandin E₁ (misoprostol) 2–3 hours prior to the procedure is mostly used for termination of pregnancy or missed miscarriage, especially in women with a tightly closed cervix. Some operators prefer to dilate the cervix by starting with a smaller cannula and increasing the diameter until it is possible to insert the required size cannula.

Misoprostol (400 micrograms) can be taken by the woman sublingually, orally or vaginally 2–3 hours prior to the procedure. This makes the cervix softer and easier to dilate with the plastic Karman cannula, thereby avoiding the use of a metal dilator, which may make the procedure less painful. For pre-emptive pain relief, 500 mg naproxen or 400–800 mg ibuprofen can be given orally 1 hour before the procedure. In women with contraindications to nonsteroidal anti-inflammatory drugs, paracetamol and/or codeine can be used.

Baseline observations of pulse, temperature and blood pressure are taken on admission. The patient is asked to empty her bladder just before the procedure. Vaginal examination is performed after cleaning and draping, with the woman in the lithotomy position. The size and position of the uterus and cervix are assessed.

The MVA syringe is 'charged', that is, a vacuum is created by pressing distal valves of the syringe until they click into the locking position. The plunger is then pulled backwards to generate a vacuum, until it locks. A Cusco's speculum is inserted to visualise and infiltrate the cervix with a local anaesthetic. Lidocaine hydrochloride 2% anaesthetic gel may be applied topically to the cervix, followed by paracervical injection of local anaesthetic, (30 mg/ml prilocaine and 0.03 IU/ml felypressin) into the four quadrants using a dental needle (0.40 x 35 mm, 27 G). About 1–5 ml, that is,

half to two-and-half cartridges of the local anaesthesia can be given.

The anterior lip of the cervix is held with an Allis forceps, tenaculum or vulsellum. An appropriately sized cannula is introduced into the uterus and, if required, the cervical os is gently dilated with the rounded tip of the cannula. Alternatively, Hegar dilators can be used. The charged syringe is then attached to the cannula. Once the syringe is fixed, the proximal valves on either side of the syringe are released and the operator moves the syringe in a rotating motion. The intrauterine contents will start being aspirated via the cannula into the syringe. After the syringe is about 80% full with products of conception, it is detached from the cannula. The contents of the syringe are emptied into a bowl. The syringe is charged again and reattached to the cannula and the process repeated until the uterine cavity is empty. At the end of the procedure the products in the bowl can be inspected for confirmation of products of conception and sent for histology. The woman can then recover in an easy chair and should be allowed to go home within 1 or 2 hours after completion of the procedure.

The procedure room in the outpatient department should be equipped with emergency resuscitation equipment including intravenous cannulae, intravenous fluids, adrenaline (epinephrine), oxygen, atropine, oxytocin, misoprostol and a defibrillator, to handle common medical emergencies. Careful selection of low-risk women is important to reduce the chance of unexpected emergencies.

Selection criteria

There is no consensus in the literature regarding the selection criteria and suitability of the women for MVA in the outpatient department, but the following criteria are used by some:⁴

- haemodynamically stable
- parous women
- well-motivated nulliparous women who can tolerate speculum examination
- ultrasound diagnosis of early fetal demise with crown–rump length <25 mm
- ultrasound diagnosis of an incomplete miscarriage with retained products of conception measuring less than 5 cm (mean diameter).
- no clinical signs of infection (fever, offensive discharge or generalised lower abdominal pain).

Women who are not suitable for outpatient MVA include those with:

- >10 week period of gestation
- panic attacks
- cervical stenosis

- fibroid uterus >12 weeks in size
- uterine malformation
- haemorrhagic disorder and treatment with anticoagulants
- allergy or contraindication to the use of misoprostol or to local anaesthetic agents
- postnatal retained products
- uterine infection
- inability to tolerate pelvic examination
- retained products more than 5 cm.

Role of ultrasound scan during manual vacuum aspiration (MVA) in outpatient setting

There are no studies comparing the benefits of carrying out MVA under ultrasound guidance with a routine procedure without ultrasound guidance. Theoretically, using ultrasound may decrease the rate of perforation, ensure complete evacuation, avoid excessive curettage and thus prevent adhesions, but it depends on the operator's expertise in scanning and may increase the overall duration of the procedure. More studies are required to establish its benefits.

Evidence

Several studies have shown MVA to be a safe, effective and acceptable alternative to electric vacuum aspiration with very high success rates.⁵⁻¹² In 1997 Creinen and Edwards⁷ reported their experience of early surgical termination of pregnancy using MVA under local anaesthesia in 2399 women, with complete uterine evacuation reported in 99.2%. A pilot study in the UK involving 56 women investigated the feasibility and acceptability of MVA and showed that 98% of women had a successful procedure without the need for any further surgical or medical intervention. Also, 98% of women were satisfied with the procedure and 86% said they would recommend it to a friend. Eighty percent said they would undergo the same procedure again, if required in the future.¹¹ Another study in the UK involving 246 women undergoing MVA under local anaesthesia for first-trimester, early fetal demise and mid-trimester incomplete miscarriage reported complete uterine evacuation in 95%, with the remaining 5% requiring additional treatment.⁵ A systematic review of ten randomised trials involving a total of 1660 women compared MVA versus EVA in first-trimester miscarriage. No difference was found in the number of complete evacuations and patient satisfaction. With a gestation period of less than 50 days, MVA was associated with less blood loss and pain. However, operation time was shorter in women in the EVA group and physicians considered it easier to perform. No trials in this systematic

review commented on the economic aspect of either procedure.¹²

How do the complication rates compare?

Complications during MVA could include uterine and cervical injury, pelvic infection, incomplete evacuation, perforation, pain and vasovagal collapse. In 2004 Goldberg et al.¹³ conducted a controlled study of complications of MVA versus EVA in early first-trimester miscarriage. A total of 1726 procedures were included, of which 1002 were MVAs and 724 were EVAs. There was no difference in the rates of reaspiration and complications between the two procedures.¹³

A more recent study carried out in 2013 by Kerure et al.¹⁴ showed that MVA in women with less than 10 weeks of gestation was associated with less blood loss than EVA. In a series of 200 women, 1% of those in the MVA group had incomplete evacuation compared with 4% of those in the EVA group. There were no cervical lacerations in the MVA group compared with 3% in the EVA group.¹⁴

Theoretically, the risk of uterine perforation should be lower in conscious women than in women under anaesthesia as they would be able to give an indication of severe pain before the uterus is perforated.

Cost-effectiveness

The MVA syringe and cannula itself costs about £12. As MVA can be performed in the outpatient setting it also reduces the cost and use of theatre facilities. It has the advantage of early recovery and reduced hospital stay compared with EVA. A study at Michigan University compared 115 women undergoing MVA in an office setting with 50 women undergoing EVA in theatre.¹⁵ Operation room management of early pregnancy failure incurred greater costs and required more resources based on all surrogate measures. The procedure itself took 80% longer and estimated costs were more than two-fold higher in the operating room than in the office setting. For both groups, complication rates were consistent with published rates. Performing MVA in an office setting resulted in almost \$1,000 savings per case. In the same study, a cost-effectiveness model examining different care strategies estimated that using MVA could save \$779 million per year over traditional methods. Blumenthal and Rensburg⁶ performed a cost-analysis of MVA compared with EVA conducted in the operating theatre. MVA procedures resulted in significant savings in terms of both waiting times and costs. Waiting time was reduced by 52% and procedure time was reduced from a mean of 33 to 19 minutes ($P < 0.01$). Total hospital costs were reduced by 41% ($P < 0.01$).⁶

A 2006 UK multicentre randomised trial reported that the overall cost of surgical evacuation for miscarriage under general anaesthesia in theatre is estimated to be £1,585.¹⁶ A study in Sweden estimated that performing MVA in the outpatient setting rather than in an operating room would result in cost savings of 24% from the operating theatre and surveillance time. The authors estimated that, if one-tenth of Sweden's procedures were conducted with MVA, the national savings would be about \$1,140,000 annually.¹⁷ In addition, there is an extrapolated cost saving from the management of fewer post-MVA complications compared with EVA.¹⁷

Pain management

One of the most important factors for the success of outpatient MVA is the appropriate management of pain during and after the procedure. Women's experience with pain during MVA varies widely, with some women feeling no pain while others describe considerable pain. The source of the pain could be anxiety, cervical dilatation and/or uterine manipulation and evacuation. Adequate pain relief should be offered through pre-procedure and post-procedure analgesia, and adequate use of local anaesthesia. Nitrous oxide is useful for women who have severe pain during the procedure. A woman's anxiety level strongly influences her perception of pain. Her level of comfort can be improved by different factors such as a procedure room that is quiet, comfortable and relaxing, and a clear explanation of what to expect before, during and after the procedure. Healthcare professionals who are calm, friendly, empathetic, unhurried and efficient can also make a considerable difference.

The uterine fundus is innervated by T10 to L1 spinal nerves. These nerves follow along the ovarian plexus and uterosacral and utero-ovarian ligament. They are not fully accessible by the paracervical block since they accompany the ovarian vessels and are higher in the pelvis than the local infiltration will reach.¹⁸ Ibuprofen 400–800 mg or naproxen 500 mg given 30–60 minutes prior to the procedure are recommended to decrease the pain caused by uterine cramping.¹⁹

Ethical issues

Miscarriage is an event in a woman's life that is beyond her control. During this vulnerable period some women may not be able to tolerate the procedure under local anaesthesia. The woman's preference should be the primary consideration at the time of this early pregnancy loss. Informed choice should be the underlying aim when offering options for management of miscarriage.

Women should be fully counselled on what to expect with each method and be given an information leaflet and

sufficient time to decide. Detailed counselling about what to expect during the MVA procedure, aftercare and a specific telephone contact number to call if they need further discussion or support will help women to cope with the procedure better.

Training

The RCOG training courses on MVA are helpful for doctors new to the technique. These half-day training courses are organised annually by the RCOG. Trainees should ideally perform their first few MVAs under general anaesthesia in the operating theatre under the supervision of experienced staff using an MVA kit. This would help them familiarise with the equipment and procedure prior to performing MVAs on conscious women in the outpatient setting.

Conclusion

In recent years, MVA has gained increasing popularity in the USA and mainland Europe. It is also gradually gaining acceptance as an alternative procedure for the surgical management of miscarriage in many NHS trusts across the UK. The slower acceptance of MVA in the context of NHS hospitals could be a result of a lack of familiarity with the procedure among women and doctors. Studies have shown no statistical difference in women's acceptability of MVA compared to EVA.^{7,20} National Institute for Health and Care Excellence guidance on the management of miscarriage recommends that when clinically indicated, women should be offered the choice of MVA in the outpatient setting.¹ The acceptability of MVA among women could be considerably enhanced by effective counselling. Motivated, well informed and experienced clinicians, with careful selection of cases, proper training, regular audits and patient feedback would help to establish MVA as a safe and effective choice for women requiring surgical management of miscarriage.

Contribution of authorship

MS solely contributed to conception and design of the article, literature review and writing of article.

Disclosure of interests

The author reports no conflict of interest.

References

- 1 National Institute for Health and Care Excellence. *Ectopic Pregnancy and Miscarriage: Diagnosis and Initial Management in Early Pregnancy of Ectopic Pregnancy and Miscarriage*. NICE Clinical Guideline 154. London: NICE; 2012.
- 2 Royal College of Obstetricians and Gynaecologists. *The Care of Women Requesting Induced Abortion: Evidence-based Green-top Guideline No. 7*. London: RCOG; 2011.

- 3 Karman H, Potts M. Very early abortion using syringe as vacuum source. *Lancet* 1972;**1**:1051–2.
- 4 Jurkovic D, Farquharson R, editors. *Acute Gynaecology and Early Pregnancy: Advanced Skills Series*. London: RCOG Press; 2011.
- 5 Milingos DS, Mathur M, Smith NC, Ashok PW. Manual vacuum aspiration: a safe alternative for the surgical management of early pregnancy loss. *BJOG* 2009;**116**:1268–71.
- 6 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**:261–7.
- 7 Creinin MD, Edwards J. Early abortion: surgical and medical options. *Current Problems in Obstetrics Gynecology and Fertility* 1997;**20**:6–32.
- 8 Macisaac L, Darney P. Early surgical abortion: an alternative to and backup for medical abortion. *Am J Obstet Gynecol* 2000;**183**(2 Suppl):S76–83.
- 9 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.
- 10 Westfall JM, Sophocles A, Burggraf H, Ellis S. Manual vacuum aspiration for first-trimester abortion. *Arch Fam Med* 1998;**7**:559–62.
- 11 Hamoda H, Flett GM, Ashok PW, Templeton A. Surgical abortion using manual vacuum aspiration under local anaesthesia: a pilot study of feasibility and women's acceptability. *J Fam Plann Reprod Health Care* 2005;**31**:185–8.
- 12 Wen J, Cai QY, Deng F, Li YP. Manual versus electric vacuum aspiration for first-trimester abortion: a systematic review. *BJOG* 2008;**115**:5–13.
- 13 Goldberg AB, Dean G, Kang MS, Youssof S, Darney PD. Manual versus electric vacuum aspiration for early first-trimester abortion: a controlled study of complication rates. *Obstet Gynecol* 2004;**103**:101–7.
- 14 Kerure SB, Kerure RD, Sagarad SS, Biradar V. A comparative study of manual vacuum aspiration (MVA) & electric vacuum aspiration (EVA) for pregnancy termination of up to 10 weeks gestation. *Int J Reprod Contracept Obstet Gynecol* 2013;**2**:199–203.
- 15 Dalton VK, Harris L, Weisman CS, Guire K, Castleman L, Lebovic D. Patient preferences, satisfaction, and resource use in office evacuation of early pregnancy failure. *Obstet Gynecol* 2006;**108**:103–10.
- 16 Petrou S, Trinder J, Brocklehurst P, Smith L. Economic evaluation of alternative management methods of first-trimester miscarriage based on results from the MIST trial. *BJOG* 2006;**113**:879–89.
- 17 Hemlin J, Möller B. Manual vacuum aspiration, a safe and effective alternative in early pregnancy termination. *Acta Obstet Gynecol Scand* 2001;**80**:563–7.
- 18 Maltzer DS, Maltzer MC, Wiebe ER, Halvor-Boyd G, Boyd C. Pain management. In: Paul M, Lichtenberg ES, Borgatta L, Grimes DA, Stubblefield PG, editors. *A Clinician's Guide to Medical and Surgical Abortion*. New York NY: Churchill Livingstone; 1999.
- 19 Wiebe ER, Rawling M. Pain control in abortion. *Int J Gynaecol Obstet* 1995;**50**:41–6.
- 20 Bird ST, Harvey SM, Nichols MD, Edelman A. Comparing the acceptability of manual vacuum aspiration and electric vacuum aspiration as methods of early abortion. *J Am Med Womens Assoc* 2001;**56**:124–6.