Manual vacuum aspiration (MVA) is an alternative to the standard surgical curettage, performed under local anaesthetic in the setting of a treatment room. The aim of our study was to assess the efficacy of MVA in the management of first trimester early fetal demise and first- and mid-trimester incomplete miscarriage. This was a retrospective study of 246 patients who were scheduled to undergo MVA for first trimester early fetal demise and first- and mid-trimester incomplete miscarriage. One woman was excluded in the analysis because of the procedure being abandoned prior to MVA. Efficacy of the procedure was 94.7% (232/245). Incomplete uterine evacuation was seen in 5.3% (13/245) patients. Although not widely used in the UK, MVA could be considered routinely, thus avoiding general anaesthesia and the need for access to theatre.

**Keywords** Early pregnancy loss, manual vacuum aspiration, miscarriage, surgical evacuation.

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**Introduction**

Miscarriage occurs in 10–20% of clinically recognised pregnancies and accounts for 50,000 inpatient admissions in the United Kingdom annually. Treatment options for first and early second-trimester miscarriage include surgical, medical and expectant management. Up to 88% of women with miscarriage undergo surgical evacuation under general anaesthesia. Manual vacuum aspiration (MVA) is an alternative to the standard electrical vacuum curettage and can be performed under local anaesthetic.

During MVA, a 60-ml hand held syringe with a self-locking plunger is used to produce the vacuum needed for the aspiration of products of conception. It is performed under local anaesthetic in the setting of a treatment ('procedure') room, thus avoiding the need for the use of an operating theatre and the risks of general anaesthesia.

Complications of MVA are similar to suction curettage and include failure to completely evacuate the uterus, uterine perforation, infection, bleeding and cervical laceration.

Material vacuum aspiration was first described in the 1970s, initially for the management of incomplete miscarriage, but its use has been extended for the management of missed miscarriage and termination of pregnancy. Although MVA has been widely used in the USA and many African, Asian and European countries, its use in the UK has been limited.

The aim of our study was to assess the effectiveness of MVA following the diagnosis of first trimester early fetal demise and first- and mid-trimester incomplete miscarriage.

**Material and methods**

This retrospective observational study was conducted in Aberdeen Maternity hospital, Aberdeen. All women who underwent MVA for early pregnancy loss and first- and mid-trimester incomplete miscarriage in Aberdeen Maternity Hospital between January 2003 and December 2005 were identified from the database of the early pregnancy unit. Data were collected retrospectively from the medical records in a specially designed datasheet for consistency. The primary outcome measure was to assess the efficacy of the procedure defined as complete uterine evacuation without the need for further treatment medical or surgical (re)curettage. Secondary outcome measures included safety of the procedure and rate of complications. The data were entered into the SPSS Version 15.0 database (SPSS Inc., Chicago, IL, USA) and analysed using the same software package.
The procedure was undertaken in a dedicated early pregnancy assessment unit, according to a predesigned protocol. MVA was offered as a treatment option to women who had been diagnosed with an early fetal demise, or required an evacuation following failed medical treatment of miscarriage or incomplete miscarriage at gestational age (GA) <13 weeks. MVA was also offered to women with mid-trimester incomplete miscarriage. Gestational age was calculated by date of the last menstrual period and/or ultrasound. Apart from MVA all women were offered the choice of medical, surgical and expectant management. Women were offered the option of MVA after full counselling on what to expect during the procedure and if it was felt that they would be able to tolerate it.

As per protocol all women were administered 400 μg of sublingual Misoprostol (Pharmacia Ltd, Milton Keynes, UK) for cervical priming 3 hours or more prior to the procedure, unless the procedure was planned following failed medical treatment. If after the administration of Misoprostol, women experienced heavy vaginal bleeding or passed products of conception, a pelvic examination and/or ultrasound was performed to ensure that MVA was still indicated. Prophylactic antibiotics were not routinely administered. All women were screened for genital tract infection, including Chlamydia trachomatis and treated accordingly. The procedure was performed by one doctor and the assistance of a midwife. During the MVA, anaesthetic gel (Instillage®, lidocaine hydrochloride 2%; Clini Med Ltd, Loudwater, UK) was applied to the cervix and subsequently local anaesthetic (Citanest with Octapressin®, 3% prilocaine; Dentsply Ltd, Addlestone, UK) was administered intracervically at 2-, 4-, 8- and 10-O’clock. This was administered using Terumo dental needle (0.40 × 35 mm, 27G). A Karman suction curette of 6 or 8 mm was used and negative pressure was obtained using a 60-ml self-locking Rocket syringe (Rocket Medical plc, Watford, UK) attached to the curette. Products of conception were sent to pathology for histology evaluation. Anti-D prophylaxis was administered to all Rh positive women. Patients could be discharged 2-hour post-MVA, if they were clinically well, haemodynamically stable, with minimal bleeding and pain. Patients were managed in a dedicated pregnancy loss ward and were advised to contact the ward with any problems on a 24 hour basis. All women were offered a follow-up appointment with a midwife.

**Results**

A total of 246 patients were identified. In one case, MVA was abandoned prior to procedure because of patient’s increased anxiety and intolerance of the Cusco’s speculum. This patient has been excluded from the statistical analysis of our results.

The mean patient age was 32.98 (SD 6.13) years. Ninety-three (38%) women included in our study were nulliparous, 33.1% (n = 81) had a history of previous miscarriage and 12.2% (n = 30) had a history of previous termination of pregnancy that had been managed surgically or medically.

The indications for the MVA were early fetal demise in 185 (75.5%) patients, whereas failed medical treatment and incomplete miscarriage accounted for 33 (13.5%) and 27 (11%) patients respectively. The mean gestational age by ultrasound scan was 56.99 (SD 13.9) days. Gestational age was ≤63 days in 164 (66.9%) patients, between 64 and 91 days in 76 (31.1%) and >91 days in five (2%) patients (Table 1). According to our protocol MVA is offered as a treatment option for gestations up to 91 days. However, the five patients that had MVA at gestation greater than that were all patients with an incomplete miscarriage.

Cervical priming was administered in 207 (84.5%) patients. Thirty-eight patients (15.5%) did not receive Misoprostol because they had failed medical treatment or incomplete miscarriage and cervical priming was not required. The mean time interval between Misoprostol and MVA was 260 (SD 86.19) minutes. The procedure was performed in 56.3% (n = 138) of cases by a specialist registrar, in 18% (n = 44) by a consultant, in 15.1% (n = 37) by a senior house officer and in 10.6% (n = 26) by a senior specialist registrar.

There were no major complications in the form of uterine perforation or heavy bleeding requiring blood transfusion.

![Table 1. Characteristics and results of women in the study, n (%)](image-url)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age (years)</td>
<td>32.98 (SD 6.13)</td>
</tr>
<tr>
<td>Primigravid</td>
<td>93 (38)</td>
</tr>
<tr>
<td>Previous miscarriage</td>
<td>81 (33.1)</td>
</tr>
<tr>
<td>Previous termination of pregnancy</td>
<td>30 (12.2)</td>
</tr>
<tr>
<td>Indication for MVA</td>
<td></td>
</tr>
<tr>
<td>Early fetal demise</td>
<td>185 (75.5)</td>
</tr>
<tr>
<td>Incomplete miscarriage</td>
<td>27 (11.0)</td>
</tr>
<tr>
<td>Failed medical treatment</td>
<td>33 (13.5)</td>
</tr>
<tr>
<td>Mean gestational age by ultrasound scan (days)</td>
<td>56.99 (SD 13.9)</td>
</tr>
<tr>
<td>&lt;63</td>
<td>164 (66.9)</td>
</tr>
<tr>
<td>64-91</td>
<td>76 (31.1)</td>
</tr>
<tr>
<td>&gt;91</td>
<td>5 (2)</td>
</tr>
<tr>
<td>Uterine perforation</td>
<td>0</td>
</tr>
<tr>
<td>Severe blood loss, need for blood transfusion</td>
<td>0</td>
</tr>
<tr>
<td>Retained products of conception</td>
<td></td>
</tr>
<tr>
<td>Surgical evacuation</td>
<td>8 (3.26)</td>
</tr>
<tr>
<td>Expectant management</td>
<td>4 (1.63)</td>
</tr>
<tr>
<td>Moderate blood loss (&gt;100 ml)</td>
<td>6 (2.4)</td>
</tr>
<tr>
<td>Endometritis</td>
<td>4 (1.63)</td>
</tr>
</tbody>
</table>

*One patient has been excluded from statistical analysis.*
sion. Overall efficacy of the procedure was 94.7% (n = 232). Of the 13 (5.3%) patients that MVA failed, in one patient creation of false passage was queried and the procedure was abandoned without obtaining products of conception. Of the remaining 12 (4.89%) patients that had retained products of conception, standard curettage was undertaken in eight (3.26%) patients, whereas four patients (1.63%) were managed expectantly and eventually had complete miscarriage with a negative pregnancy test.

In 97.6% (n = 239) of cases vaginal bleeding was minimal or mild. Six women (2.4%) had moderate bleeding (>100 ml) requiring Syntometrine. None of the patients required a blood transfusion. Four patients (1.63%) were readmitted in the hospital for presumed endometritis and were treated with oral antibiotics (Table 1).

The mean total hospital stay was 15.27 (SD 25.1) hours. Overall, 216 (88.2%) patients were managed as a day case and 29 (11.8%) patients had a total hospital stay more than 24 hours. The primary causes for the prolonged stay were geographical reasons, failed medical treatment before the MVA and delay of the procedure due to prioritised workload of the on-call doctor who would perform the MVA.

The mean hospital stay post-MVA was 3.72 (SD 5.41) hours. Five patients (2.04%) stayed in hospital more than 12-hour postprocedure. Two women stayed overnight for geographical reasons and one for severe pain post-MVA requiring regular parental analgesia. Of the other two patients, one had moderate bleeding during the procedure and one underwent an emergency MVA for incomplete miscarriage late in the night and it was decided to keep them both overnight.

**Discussion**

It has been shown that MVA is a safe and effective method of uterine evacuation and has been successfully used for the management of incomplete miscarriage and first-trimester termination of pregnancy. MVA has been routinely offered in our institution as a treatment option for first trimester missed miscarriage and first- and mid-trimester incomplete miscarriage. The aim for our study was to assess and document the efficacy and safety of MVA in the management of early pregnancy loss. Patients are advised to contact us on a 24-hour basis, if any concerns or problems arise following the MVA. Because of the unique location of Aberdeen maternity hospital and absence of other referral hospital within a 50-mile radius, we are confident that all patients with complications are referred back to our unit, thus ensuring complete follow up and recording of complications. However, it is possible that a few patients may have presented to their GP with insignificant problems not requiring hospital referral and these would not have been identified in this analysis.

The risk for any complication with surgical uterine evacuation is relatively small. In our sample, we did not have any major complications such as uterine perforation or heavy bleeding. We acknowledge the small cohort of patients in our study and that a large number of patients would be required to accurately compare the complication risk. Creation of a false passage was queried during cervical dilatation in one patient and the procedure was abandoned. The rate of incomplete evacuation after a dilatation and curettage is reported approximately 2–3% and this is approximately the same for MVA. Our results showed a slightly increased rate of incomplete evacuation of 4.89%. However, only 3.26% required a repeat surgical evacuation and the remaining were managed conservatively. This higher rate than the average reported in the literature, could be attributed to the relatively increased number of MVAs performed by junior residents and the unfamiliarity of some of them with the procedure.

The procedure in general was very well tolerated. Only in one case we had to abandon the procedure because of patient's anxiety and intolerance of the Cusco's speculum. One of the reasons for the low abandonment rate of the procedure is that our sample was a selected population who opted for the procedure and was fully counselled about what to expect. Furthermore, only women thought to be capable of tolerating the procedure were encouraged to undergo MVA as assessed by midwifery and medical staff. In our study, we did not assess separately women's perceptions and expectations before and after the procedure and this is something that should be evaluated in the future. However, in a study performed in our unit on surgical abortion using MVA, high acceptability of the procedure was reported, and 98% of women were satisfied with the procedure.

It has been suggested that MVA has advantages over standard surgical curettage for both the patient and the healthcare provider in reducing hospital cost, waiting time and hospital stay. In our clinical application, we perform all MVAs under local anaesthetic in a treatment room in the early pregnancy unit. This prevents the need for a general anaesthetic with all the associated risks and allows earlier discharge from the hospital. It also reduces waiting time and total hospital stay for the patient since there is no need for available operating theatre. This is beneficial for our practice since our operating theatre is used for obstetric emergencies. Manual vacuum aspiration as an alternative surgical option for managing early pregnancy loss is thus well tolerated and may have potential economic benefits. This should ideally be corroborated in the context of randomised controlled studies comparing MVA and standard suction curettage. However, we considered that this would not be possible or ethical and that patient preference was of primary consideration at the time of such pregnancy loss.
Even though MVA is a simple procedure, which does not require sophisticated equipment, it is infrequently used in the UK. Access to operating theatre facilities and general anaesthetic render standard surgical curettage more preferable in managing early pregnancy loss. Furthermore, unfamiliarity of clinicians with this technique and lack of confidence among midwifery staff in counselling women could be contributing factors. In addition, staff training could be an issue due to the high anxiety in this cohort of women and the fact that the procedure is being undertaken under local anaesthetic. We believe that our study may help to raise awareness and interest in this method and increase its acceptance in the UK for management of miscarriage.

Conclusion

Manual vacuum aspiration is an effective alternative to conventional suction curettage, avoiding general anaesthesia and the need for access to theatre. Complications such as uterine perforation, bleeding and retained products of conception are minimal. It is a safe, easily performed and possibly cost-effective procedure, with advantages for both the patient and the healthcare system. It could be considered routinely as an alternative option for the management of early pregnancy loss, thus increasing women’s choice of available methods.

Disclosure of interests

There is no conflict of interests that should be disclosed.

Contribution to authorship

All four authors have contributed to the conception and design of the study, acquisition and analysis of data, revising and writing the article and final approval of the version to be published.

Details of ethics approval

Not applicable.

Funding

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