Manual vacuum aspiration: a safe and cost-effective substitute for dilatation and curettage on the surgical management of First-Trimester Abortion

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Abstract: Objective: To compare the efficacy and safety of manual vacuum aspiration (MVA) with dilatation and curettage in the management of first trimester abortion. **Study Design:** A prospective randomized study was conducted between January 2010 to December 2012, at the Obstetrics and Gynecology department, Salman Bin Abdulaziz University Hospital. Four hundred women presenting with spontaneous miscarriage with gestational age <12 weeks were included in the study, these patients underwent either MVA group (n=200) or D&C group (n=200). Primary outcome measures were efficacy and secondary outcome measures were duration of hospital stay, operating time and cost. **Results:** Overall, (MVA) was 97 % effective in terminating pregnancy through 12 weeks of gestation. The mean duration of procedure was significantly higher (p<0.001) in D&C (14.3±3.8 minutes) as compared to (6.3±1.6 minutes) in MVA. The duration of hospital stay was significantly lower (p<0.001) in MVA group (3.5±0.9 hours) as compared to (19.2±3.1 hours) in D&C group. Similarly the cost of procedure was also significantly lower (p<0.001) in MVA group ($48.8±6.5) compared to ($ 146.1±13.7) in D&C group. **Conclusion:** MVA is as effective as conventional dilatation and curettage for treatment of early pregnancy failure while it causes less time consuming, requires a shorter hospital stay and thus costs less. It does not require general anesthesia and complication rate is less than dilatation and curettage.

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1. Introduction

The miscarriage of an early pregnancy is the commonest medical complication, effecting 10-20% of clinically recognized pregnancies [5,11,15]. The treatment options for early pregnancy failure include expectant management, medical termination with misoprostol and surgical evacuation. Traditionally, first-line surgical management has been dilatation and curettage (D&C) which requires a trained personnel, operating room, presence of an anesthetist and sometimes blood transfusion[4]. Despite careful and skilled intervention, even in best hands complications like haemorrhage, incomplete evacuation, perforation and infection can occur [19].

Manual vacuum aspiration (MVA), a portable hand-held vacuum aspirator connected to a semi-flexible plastic cannula, can be performed in a clinic or a hospital procedure room [8, 15, 22]. Common techniques of pain control in such case are analgesic drugs or Para cervical block [9, 14]. MVA has been clinically proven to be as effective as and safer than sharp curettage when employed in the management of first-trimester abortions. Complications after the MVA procedure in regard to cervical injuries, febrile morbidity, blood transfusion, or incomplete or repeated uterine evacuation procedures are not different when compared with those of traditional curettage [1].

For many years, MVA has been used in many countries in treating incomplete abortions and inducing first- trimester abortions. In 2003, the World Health Organization [23] recommended MVA for performing a first-trimester termination of pregnancy. However, in Saudi Arabia, MVA is still not widely used in clinics and many healthcare providers are not trained to use MVA. In addition, almost all medical schools Saudi Arabia are still teaching D&C to evacuate the contents of the uterus instead of vacuum aspiration. The present study was conducted to compare the safety and efficacy of most commonly used method of evacuation of uterus, D&C with a simpler and cheaper method of evacuation, MVA.

2. Material and Methods

This prospective randomized study was conducted between January 2010 to December 2012, at the Obstetrics and Gynecology departments, Salman Bin Abdulaziz University Hospital- KSA. The study protocol was approved by Hospital Ethics Committee.

Four hundred women presenting with spontaneous miscarriage (an embryonic pregnancy, incomplete or missed) with gestational age <12

weeks and no signs of septic abortion (fever >37.7 ºC, purulent vaginal discharge, tachycardia or abdominal distension) were included in the study. Diagnosis was established using a history, physical examination and ultrasonographic (US) scanning. Urinary pregnancy test and serum βHCG were done when ultrasound was suggestive of retained products of conception while the history and examination were inconclusive of pregnancy. Patients with septic abortion, bleeding disorders, molar pregnancies, pregnancies more than 12 weeks, severe anxieties and unwilling patients were excluded from study.

For the purpose of study foetal demise was defined as lack of cardiac activity at crown-rump length (CRL) of ≥ 5mm [7]. In addition, criteria for an an embryonic pregnancy included gestational sac with a mean diameter of ≥ 16mm without an embryo[16]. An incomplete miscarriage was defined as passage of products of conception with the residual anterior-posterior endometrial lining of ≥ 30mm and uterine size less than 13 weeks [10].

Using a Random Number Table, these patients were assigned to undergo either D&C group (n=200) or MVA group (n=200). Written informed consent was taken and procedure and its complications were explained to the patients.

Dilatation and Curettage was done in the operation theatre under general or regional anesthesia. MVA was carried out in the examination room under Local anesthesia with Ipas MVA system which consists of an aspirator and cannula. Local anesthesia was achieved by para-cervical block (20 ml of 0.5% Xylocain); 4 ml were injected at 12 O`clock, position, where tenaculum was supposed to be applied. Eight milliliter of xylocain administered intra-cervical at 4 and 8 O'clock position. The patients in each group with missed abortion and closed cervical os were asked to take 400mcg of misoprostol sublingually 2 hours before coming to hospital. Four hundred milligram of iboprufen was given to the patient orally half an hour before MVA. Products of conception were sent for histopathology for confirmation of intrauterine pregnancy. The primary outcome measures assessed were the success rate of the procedure and procedure related complications including uterine perforation, bleeding, infection and vagal shock. Success rate defined as complete uterine evacuation (confirmed through sharp curettage). Secondary outcome measures included duration of hospital stay, operating time and cost of procedure. Blood loss was assessed by the amount of blood present in the aspirator cannula while in D&C the blood lost was collected in kidney tray and measured. After the procedure patients were transferred to recovery room. Most of the patients with MVA were discharged from there within 2–4 hours, while most of the patients who had D&C were shifted to the ward and discharged from there later when stable.

Patients were followed-up after one week to see pathological results and any signs of infection including pain lower abdomen, vaginal discharge and fever. Bimanual examination was done to assess size of uterus and vaginal bleeding. In case of any complication management was done accordingly.

Data registration and Statistical analysis:

The results were tabulated and statistically analyzed using a computer program SPSS version 15 (statistic a package for social science). The sample mean (X), standard deviation (SD), and standard error of the mean as well as the range were obtained for numerical variables. For non-numerical variables, the frequency, distribution and percentage were calculated. The student's (t) test was used to test the significance of the difference between 2 independent means. The Chi square test (X^2) was used to test whether the distribution of a certain phenomenon among two or more groups was equal or not. The probability (*P*) value was calculated and a *P*-value < 0.05 was considered statistically significant.

3. Results

Between January 2010 to December 2012, 400 patients with first trimester spontaneous abortion were enrolled in the study, underwent either an MVA group (n=200) or D&C group (n=200). The patients in the MVA group were referred from either the Out-patient Department or the Emergency Room while the patients in the D&C group referred from the Out-patient Department and an appointment was made for a curettage procedure in an operating room. Table 1 shows demonstrates the seven variables obtained: age, parity, gestational age, indication of procedures, ultrasonographic parameters, risk factor, and previous history of abortion. There were no statistically significant differences in the demographic and obstetric variables between the MVA and D&C groups.

All patients of D&C group procedures were performed under general or regional anesthesia. On the other hand majority of MVA procedures were performed under Para cervical block alone (64.5%) or in combination with systemic analgesia (34%). In (1.5%) of the MVA cases, required additional administration of general anesthesia due to intolerability of pain despite Para cervical and systemic analgesia.

There were no statistically significant differences in the complete evacuation rate (success rate) 97% for MVA group and 99% for D&C group (p=0.153). The remaining cases required sharp curettage to complete the process in MVA group.

Tissue obtained from uterine cavity (g) which was significant higher in D&C group(20.5±1.3) compared to (23.3±1.9) in MVA group (p<0.001). The mean duration of procedure was significantly higher (p<0.001) in D&C group (14.3±3.8minutes) compared to (6.3±1.6 minutes) in MVA group. The duration of hospital stay was significantly lower (p<0.001) in MVA group (3.5±0.9 hours) as compared to (19.2±3.1 hours) in D&C group. Similarly the cost of procedure was also significantly lower (p <0.001) in MVA group ($48.8±6.5) compared to($ 146.1±13.7)in D&C group (Table-3). Overall, the procedure-related and post procedure costs were significantly reduced roughly by 67 %among MVA group as compared to those of D&C group.

The number of visits to the hospital showed a significant statistical difference; 88 % of those in the MVA group had one visit compare to 70% in the D&C group (p <0.001).

The complications included anaesthetic complications , perforation, incomplete evacuation, blood loss >100 ml, infection and cervical trauma. Overall, the complications was significantly higher (p <0.003) in D&C group 27 (13%) compared to 9 (4.5%) in MVA group (Table-2).There was no mortality or blood transfusion. Eight patients in both groups had incomplete evacuation and underwent standard curettage in operation room. The two cases of uterine perforation in both groups did not required surgery. All of pathological reports indicated product of conception.

Table I Baseline Characteristics of the study Population

	MVA (n= 200)	**D & C (n= 200)**	***P* value**
Age (years)	24.8±3.2	25.1±3.4	0.270
Parity (%) ▪ PG ▪ MG	 74(37%) 126(63%)	 82(41%) 118(59%)	 0.412
Gestational age (weeks)	9.8±1.1	9.9±1.3	0.408
Indication for procedure (%) ▪ Blighted ovum ▪ Missed abortion ▪ Incomplete abortion	 16(8%) 76(38%) 108(54%)	 32(16%) 70(35%) 98(49%)	 0.048
Ultrasonographic parameters ▪ Crown-rump length (CRL), mm ▪ Gestational sac diameter ▪ PPOCS	 51.5±7 55.8±10.4 34.6±8.7	 50.2±6.5 53.5±9.5 35.6±8.8	 0.239 0.457 0.418
Risk factor (%) Low risk patients High risk patients ▪ Hypertension ▪ Diabetes mellitus ▪ Previous LSCS ▪ Previous Gynecological surgeries	 177(88.5%) 23(11.5%) 2 2 13 6	 183(91.5%) 17(8.5%) 1 2 9 5	 0.317
Previous history of abortion	42(21%)	50(25%)	0.342

Table 2 Complication in both groups

Complications	**MVA (n=200)**	**D & C (n= 200)**	***P* value**
Early			
▪ Anesthetic	0	12 (6%)	0.001
▪ Blood loss > 100	0	8 (4%)	0.004
▪ Cervical trauma	0	1 (0.5%)	0.317
▪ Uterine perforation	1 (0.5%)	1 (0.5%)	1
Late			
▪ Incompetent evacuation	6 (3%)	2 (1%)	0.153
▪ Infection	2 (1%)	2 (1%)	1
Total	9(4.5%)	26(13%)	0.003

Table 3 Outcome of Procedure in both groups

Outcome of Procedure	**MVA (n= 200)**	**D & C (n= 200)**	***P* value**
Tissue from uterine cavity (g)	20.5±1.3	23.3±1.9	0.001
Duration of procedure (min)	6.3±1.6	14.3±3.8	0.001
Duration of hospital stay (h)	3.5±0.9	19.2±3.1	0.001
Hospital cost ($)	48.8±6.5	146.1±13.7	0.001

4. Discussion

This study confirms the benefit of MVA over D&C in terms of less hospital visits, shorter duration of the procedure and hospitalization, less complication and less hospital cost.

Uterine emptying accomplished via MVA in first trimester abortion is presented by many authors as an alternative therapy to dilatation and curettage, with the advantage of replacement of general anaesthesia by analgesics or Para cervical block, less complication rate, shortening of hospital stay, the reduction of hospital costs and utilisation of fewer resources [2,3]. Despite being simple, inexpensive and easy to handle, its use has been restricted because most of clinicians are not familiar with its use. MVA is being used in our department for the last 4 years and we have found it effective, safe, cheap and easy to handle.

In the present study the procedure time was significantly reduced by 44 % for MVA group . Furthermore, an 18 % reduction in hospital visits was achieved because most of the patients in the MVA group visited either the Emergency Room or the Out-patient Department; hence, the procedure was promptly carried out. These patients only needed one visit while the patients in the sharp curettage group visited the Out-patient Department to undergo laboratory check-ups and make an appointment for the curettage in the operating room; thus, needing more than one visit. Also the mean duration of the procedure was significantly higher (p <0.001) in D&C compared to MVA. The duration of hospital stay was significantly lower (p <0.001) in MVA group. These results were agreed with those of many previous reports [13, 14, 20] .The hospital cost was also significantly reduce by 67% in MVA group when compared with those for the D&C group. This finding were agreed with Thanapan *et al*.[18]

In our study complete evacuation rate was 97% for MVA group vs 100% for D&C group. Data from a major retrospective study of 1,677 MVA procedures for elective abortion (99% <10 weeks gestational age) showed 99.5% effectiveness and minimal complications (0.5% repeat aspirations, 0.7% infections and 0.6% uterine perforations) [21]. Fonseca et al evaluated 30 patients with diagnosis of incomplete abortion; divided into two groups and each one was subjected to a treatment modality. They concluded that patients treated with MVA needed 77% less hospital stay and consumed 41% less hospital resources than patients treated with DNC[6]. Data from a prospective study of 115 women with early pregnancy loss cared for in the outpatient setting (MVA) shows minimal complications; repeat aspirations (3%), post-procedure infections (2%) [4]. In another study conducted by Khani et al, comparing MVA with curettage, the duration of surgery was significantly shorter in the MVA group and patients had more bleeding in curettage group [12]. Various other trials reported 95–100% efficacy with MVA [17,18] These results correlate well with the findings of our study.

In the present study manual vacuum aspiration was associated with a low rate of complications.

Most of these were minor complications and were managed easily. One patient (0.5%) on each group had uterine perforation which managed conservative. Six patients (3%) in the MVA group and two(1%) in curettage group had re-evacuation of uterus by standard curettage due to retained products of conception which was confirmed by ultrasonography. High vaginal swabs of the patients with infection were taken and they were given antibiotics according to culture and sensitivity. Two factors may be associated with MVA procedure's low complication rates. The procedure requires only small cervical dilators, decreasing the chance for cervical injury or uterine perforation. The physician in this study is quite experienced in MVA and is very comfortable with intrauterine procedures.

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References

1. Abernathy M, Hord C, Nicholson LA, Benson J, Johnson BR. A guide to assessing resource use for the treatment of incomplete abortion. Ipas, Carrboro 1993.
2. 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;56:124–26.
3. Chen BA, Creinin MD. Contemporary management of early pregnancy failure. Clin Obstet Gynecol 2007;50(1):67–88.
4. Dalton V K, Harris L, Weisman Carol S, Guire K, Castleman L, Lebovic D. Patient Preferences, Satisfaction, and Resource Use in Office Evacuation of Early Pregnancy Failure. Obstet Gynecol 2006;108(1):103–10.
5. Edwards S, Tureck R, Fredrick M. Patient Acceptability of Manual versus Elective Vacuum Aspiration for Early Pregnancy loss. J Women's Health 2005;16:1429-39
6. Fonseca W, Misago C, Fernandes L, Correia L, Silveira D. Use of manual vacuum aspiration in reducing cost and duration of hospitalization due to incomplete abortion in an urban area of northeastern Brazil. Rev Saúde Pública 1997;31:472–78. [Article in Portuguese]
7. Goldstein SR. Significance of cardiac activity on endovaginal ultrasound in very early embryos. Obstet Gynecol 1992; 80: 670-72.
8. Gomez PI, Gaitan H, Nova C, Paradas A. Para cervical block in incomplete abortion using manual vacuum aspiration: randomized clinical trial. Obstet Gynecol 2004; 103:943–951.
9. Hamoda H, Flett GM, Ashok PW, Templeton A. Surgical abortion using manual vacuum aspiration under local anaesthesia: a pilot study of feasibility and woman's acceptability. J Fam Plann Reprod Health Care 2005; 31:185–88.
10. Harwood B, Meckstroth KR, Mishell DR, Jain JK. Serum beta-human chorionic gonadotropin levels and endometrial thickness after medical abortion. Contraception 2001; 63: 255-56.
11. Khan F.M., Amina A., Ahmed F.L., Naeem N.K. Medical termination of first trimester miscarriages.Annals 2007;13:154-7.
12. Khani B, Karami N, Khodakarami N, Solgi T. Comparison of incomplete abortion treatment between Manual Vacuum Aspiration and Curettage. Journal of Isfahan Medical School 2010;27(102):753–60.
13. Koontz SL, Perez OM, Leon K, Rosales AF. Treating incomplete abortion in El Salvador: cost savings with manual vacuum aspiration. Contraception 2003;68:345–351.
14. Kulier R, Fekih A, Hofmeyr GJ, Campana A. Surgical methods for first trimester termination of pregnancy. Cochrane Database Syst Rev 2001; 4:CD002900.
15. Milingos D, Mathur M, Smith N, Ashok P. Manual vaccum a safe alternative for surgical management of early pregnancy loss. Br J Obstet Gynecol 2009;116:1268-71.
16. Rowling SE, Coleman BG, Langer JE, Arger PH, Nisenbaum HL, Horii SC. First-trimester US parameters of failed pregnancy. Radiology 1997; 203: 211-17.
17. Say L, Kulier R, Gulmezoglu M, Campana A. Medical versus surgical methods for first trimester termination of pregnancy. Cochrane Database Syst Rev 2005;25:CD003037.
18. Thanapan CH, Siwatchaya SI, , Sutham PI. A comparative study of cost of care and duration of management for first-trimester abortion with manual vacuum aspiration (MVA) and sharp curettage. Arch Gynecol Obstet 2012; 286:1161–1164.
19. Tristan SB, Gilliam M.) First trimester surgical abortion. Clin Obstet Gynecol 2009;52:151–159.
20. Tunc¸alp O, Gu¨ lmezoglu AM, Souza JP. Surgical procedures for evacuating incomplete miscarriage. Cochrane Database Syst Rev 2010;8:CD001993.
21. Westfall JM, Sophocles, Burggraf H, Ellis S. Manual vacuum aspiration for first-trimester abortion. Arch Fam Med 1998;7:559–62.
22. Wiebe ER, Byczko B, Johnson M. Benefits of manual vacuum aspiration for abortion. Int J Gynecol Obstet 2011; 114:155–56.
23. World Health Organization. Safe abortion: technical and policy guidance for health systems. World Health Organization, Geneva 2003.

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