Medical and Surgical Treatment of First-trimester Silent Miscarriage: a Three-year Review

KY CHEUK MBChB, MRCOG, Dip Med (CUHK)
Department of Obstetrics and Gynaecology, United Christian Hospital, Kwun Tong, Kowloon, Hong Kong
SW TSANG MBBS, FRCOG, FHKAM (O&G)
Department of Obstetrics and Gynaecology, Tseung Kwan O Hospital, Tseung Kwan O, Kowloon, Hong Kong
KM MOK MBBS, FRCOG, FHKAM (O&G)
Department of Obstetrics and Gynaecology, United Christian Hospital, Kwun Tong, Kowloon, Hong Kong

Objective:
The primary objective was to compare the overall efficacy (including frequency of side-effects and complications) following medical and surgical treatment of first-trimester silent miscarriage in the Department of Obstetrics and Gynaecology, Tseung Kwan O Hospital, Hong Kong. The secondary objective was to evaluate any demographic differences between women opting for medical or surgical treatment and identify any clinical and / or ultrasonographic factors predictive of successful medical treatment.

Methods:
A retrospective review was conducted on individual patient records of women treated between January 2006 and December 2008. Data of women receiving medical and surgical treatment were analysed and major parameters such as success (clinical outcome, side-effects) and demographic characteristics were compared. Appropriate statistical tests were applied. A p value of less than 0.05 was regarded as statistically significant.

Results:
Of 173 women whose records were analysed, 70 received medical treatment and 73 were treated surgically. The success rates of medical and surgical treatments were 79% and 99%, respectively. In the medical treatment group, the median interval between misoprostol to passage of the tissue mass was 8 hours; 86% passed the mass during hospitalisation, and the median duration of vaginal bleeding was 14 days. The most common side-effect was fever (54%), abdominal pain (31% received oral analgesics and 11% received parenteral analgesia), and vomiting (7%), which were significantly more common than women treated surgically. Respective frequencies for medical and surgical groups were diarrhoea (4% vs 0%), nausea (4% vs 0%), emergency readmission (6 vs 4%), antibiotic treatment for presumed infection (11 vs 7%), and interval till return of menstruation (34 vs 31 days). Nulliparous women had a higher preference for medical treatment (p = 0.02; odds ratio = 2.2; 95% confidence interval, 1.1-4.4). None of the clinical or ultrasonographic features could effectively predict successful outcomes for medical treatment.

Conclusion:
Both medical and surgical treatment had success rates comparable to published studies. Side-effects were significantly higher in those opting for medical treatment. Most side-effects were self-limiting. Nulliparous women had higher preference for medical treatment. No clinical or ultrasonographic feature was predictive of the success of medical treatment.

Hong Kong J Gynaecol Obstet Midwifery 2011; 11:30-9

Keywords: Abortifacient agents, nonsteroids; Abortion, spontaneous; Misoprostol; Pregnancy trimester, first; Treatment outcome

Correspondence to: Dr Kwan-yiu Cheuk
Email: dingcky@yahoo.com.hk

Introduction

Miscarriage occurs in 10 to 20% of clinical pregnancies. In the UK, it accounts for 50,000 inpatient admissions annually[1]. According to the Hong Kong College of Obstetricians and Gynaecologists (HKCOG) Territory-wide Audit Report 2004, miscarriage ranked the second most common diagnosis for admission in the past 10 years; for admissions to the obstetrics and gynaecology service, its frequency was 13.5% in 1994, 11.3% in 1999, and 9.7% in 2004[2]. In the past century, surgical evacuation was the gold standard of management, as it was well-demonstrated to be quick and effective with success rates up to 98%[3]. However, it could be associated with complications (cervical tear, uterine perforation, bleeding, pelvic infection, and intra-uterine adhesions). The overall complication rate varies between 4 and 10%[4]. With the advent of transvaginal ultrasound, first-trimester miscarriages were frequently diagnosed before the onset of symptoms. Consequently, the management of miscarriage has changed considerably over the past 10 years. This was also shown in the HKCOG Territory-wide Audit Report 2004[2]; notably the use of surgical treatment for miscarriage was progressively decreasing (12% in 1994, 9.2% in 1999, and 6.9% in 2004).

Medical treatment using prostaglandin analogues alone or in combination with antiprogesterone have been shown to be effective in the management of spontaneous miscarriage[5-7]. In first-trimester silent miscarriage, using a combination of mifepristone and repeated doses of misoprostol the success rate was reported to be 84%[8]. This approach was also cost saving compared to surgical management[9]. The option to avoid surgery and its associated complications could give women the choice of "avoidance of general anaesthesia" and the feeling of being "more in control"[1]. On the other hand, compared to expectant management, it was associated with a higher and more predictable success rate. A meta-analysis showed that medical treatment was 2.8-fold more likely to induce a complete miscarriage than expectant treatment[10].

Misoprostol is a synthetic prostaglandin E1 analogue, which softens the cervix and stimulates uterine contraction. It is the drug of choice as it is cheap, stable at room temperature, readily available, and can be given orally, vaginally or sublingually. A Cochrane review showed that the vaginal route was more effective than the oral dosing and led to fewer side-effects, such as nausea and diarrhoea[11].

According to the literature, there was no optimal regimen for the medical treatment, because it is difficult to compare different regimens across studies with different inclusion criteria, types of miscarriage, waiting periods, and definitions of success.

The primary aim of this study was to evaluate the overall efficacy (including the frequency of side-effects and complications) following medical and surgical treatment of first-trimester silent miscarriage. The secondary aim was to explore any demographic differences between women opting for the medical or surgical method. An additional aim was to identify any clinical or ultrasonographic factors, which could predict the success of medical treatment.

Methods

A retrospective study was conducted by reviewing relevant data over a 3-year period in the Department of Obstetrics and Gynaecology, Tseung Kwan O Hospital (TKOH), Hong Kong. Women seen from January 2006 to December 2008 with a diagnosis of silent miscarriage and gestation up to 12 weeks were identified via the departmental database. Both outpatient and inpatient medical records were reviewed.

Inclusion criteria for the diagnosis of silent miscarriage were as follows[12]:

1. A gestational sac with diameter of more than 20 mm without an embryonic pole or yolk sac.
2. A fetal pole with crown-lump length of more than 6 mm without heartbeat.
3. A gestational sac with diameter of less than 20 mm with no interval growth in 7 to 10 days.
4. A fetal pole with crown-lump length of less than 6 mm with no heartbeat and no growth in 7 to 10 days.

Exclusion criteria for medical treatment in this study were as follows:

1. suspected ectopic pregnancy
2. molar pregnancy or hydropic abortion
3. allergy to misoprostol

4. contraindications to misoprostol (asthma, glaucoma, mitral stenosis)
5. severe vaginal bleeding or pain at presentation
6. sepsis, pelvic infection, or 'fever' (>37.6°C)

All women diagnosed with a silent miscarriage were managed according to the protocol of TKOH. They were offered the choice of medical or surgical treatment, and provided with detailed counselling and fact sheets. Women, who had made a decision soon after counselling, were treated on the next morning. Those who required more time to decide on the treatment were followed up in the Early Pregnancy Assessment Clinic (EPAC) 1 week later.

Women who opted for medical treatment were admitted into the Gynaecology Ward in the morning. Misoprostol (Cytotec; Apotex Inc, Toronto, Canada) 600 μg was given vaginally every 3 hours for a maximum of three doses. Any tissue mass passed was sent for histological examination. The women were discharged the next morning if they had no excessive vaginal bleeding or significant abdominal pain. They were also given a plain specimen bottle to collect any tissue mass passed after discharge and advised to bring the same back for histological examination. They continued to be followed up in the EPAC 1 week later, whereupon they had a transvaginal scan. They continued to be reassessed every 2 to 3 weeks, until the uterus was empty or until menses had resumed, whichever was earlier. They were followed up in the general gynaecology clinic 6 weeks after medical treatment was completed.

Those who opted for surgical treatment were advised to fast after midnight before the morning of the admission for the procedure. Misoprostol (Cytotec; Apotex) 400 μg was given vaginally before the operation. Suction evacuation was performed under general anaesthesia. They were discharged the next morning if clinically well, and followed up 6 weeks later. A call-back system was activated if they defaulted follow-up or if abnormal histology was reported. Treatment failure was defined as having a subsequent surgical evacuation, for any reason.

Data retrieved included the women's demographic data, gestation age, ultrasonographic features, presenting symptoms, total dosage of misoprostol given, side-effects of the treatment, intra-operative findings, complications of surgical treatment, clinical success, duration of bleeding, interval to return of menses, interval between misoprostol insertion to passage of tissue mass (timed from the first dose), histology of the product of conception (POC), products of gestation being retained and treated by suction evacuation, presumed infection treated by antibiotics, severe bleeding and abdominal pain resulting in readmission, and the duration of follow-up. The entire study was approved by the Kowloon East Cluster Research Ethics Committee.

Descriptive statistics were performed on various demographic parameters, successful clinical outcomes, side-effects, and complications of treatment. Two-sample *t* tests or Mann Whitney *U* tests were used to compare continuous variables of the two groups. Chi-square or Fisher's exact tests were used to compare categorical variables between groups as appropriate. A p value of less than 0.05 was considered significant. The data were analysed using the Statistical Package for the Social Sciences (Windows version 15.0; SPSS Inc, Chicago [IL], USA).

Results

Between January 2006 and December 2008, 173 women with a diagnosis of silent miscarriage were identified. Among these women, 30 were excluded from the analysis — five because they defaulted follow-up, seven preferred continuing treatment in other hospitals, seven had complete spontaneous miscarriages opting for the treatment modality, six opting for surgical treatment had a spontaneous miscarriage after preoperative misoprostol insertion, and five had hydropic miscarriages. Thus, in the final analysis, 70 women received medical treatment and 73 received surgery (Figure).

Regarding the 70 women who received medical treatment, their mean age was 34 years and their mean gestational age was 66 days; these figures were similar to those in the surgical group (34 years and 66 days, respectively). The overall success rate for medical treatment was 79%, whereas it was 99% for surgical treatment. Fifteen women failed medical treatment, including three who had surgical evacuation immediately after finishing their course of treatment, and 12 due to

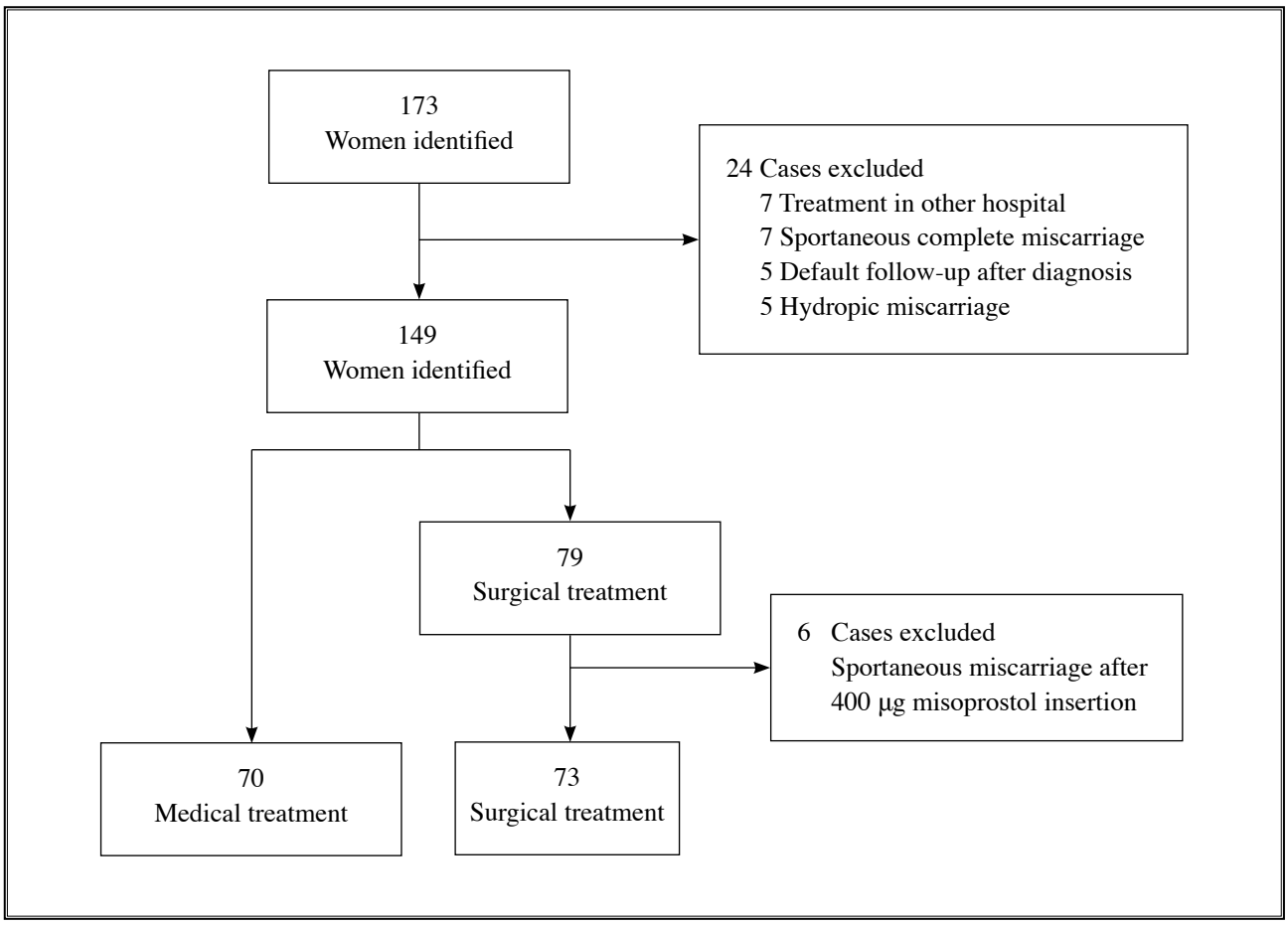

Figure. Flowchart of study patients

Table 1. The success rate of medical and surgical treatment*

	Medical treatment (n = 70)	Surgical treatment (n = 73)
Age (years)	34 ± 5	34 ± 5
Gestational age (days)	66 ± 9	66 ± 10
Overall success	55 (79%)	72 (99%)
Treatment failure		
Failure due to retained products of conception	12 (17%)	1 (1%)
Failure due to change in women's decision	3 (4%)	0 (0%)

* Data are shown as mean ± standard deviation, or No. (%)

retained POC. Only one woman who had surgery had a second surgical evacuation for retained POC (Table 1).

Among women who received medical treatment, 61% had three doses of misoprostol before expulsion of POC. The remaining 39% received less than three doses of misoprostol before expulsion. The median interval between misoprostol to passage of a tissue mass was 8 hours. Most of the women (86%) passed their tissue mass while hospitalised; 18 (26%) passed their tissue mass after discharge. After medical treatment, 38 (54%) had fever, 5 (7%) had vomiting, and 30 had abdominal pain, for which 22 (31%) received oral and 8 (11%) received parenteral analgesia. These adverse effects ensued more commonly in the medical group than in the surgical group (respective p values were <0.01, 0.03, <0.01, 0.02). The frequencies of nausea (medical 4% vs surgical 0%), diarrhoea (4% vs 0%), and recourse to oxytocic drugs (7% vs 1%, p = 0.11) revealed no statistically significant differences between the groups. No women had massive bleeding necessitating emergency surgical evacuation or blood transfusion during treatment, none experienced

uterine perforation. The mean blood loss during suction evacuation was 34 ml (Table 2).

After discharge from hospital, 14 women were readmitted after medical treatment, which was significantly more frequent than that after surgery (20% vs. 4%, p < 0.01). Most were because of persistent bleeding and retained POC (i.e. treatment failure), and underwent surgical evacuation. Regarding respective emergency readmission rates, there was no significant difference between the groups (medical 6% vs. surgical 4%, p = 0.72). Eight women in the medical group had presumed infections treated with antibiotics, but the difference in rates between the respective groups was not statistically significant (11% vs. 7%, p = 0.34) [Table 2].

Women in the medical treatment group had significant longer periods of bleeding compared to those having surgery (median, 14 vs. 7 days; p < 0.01), though the majority had minimal bleeding. However there was no significant difference for the respective intervals to return of menses between the two groups (median interval, 34 vs. 31 days; p = 0.26). More women defaulted follow-up since discharge in the surgical group than medical group (medical 7% vs. surgical 23%; p = 0.01). Women who received medical treatment had more follow-up visits than those who had surgery (median number, 2 vs. 1; p < 0.01) [Table 2].

Various demographic characteristics were compared in women who opted for medical and surgical

Table 2. Treatment details and clinical outcome of medical and surgical treatments*

	Medical treatment (n = 70)	Surgical treatment (n = 73)	p Value†
Dosage of misoprostol needed			
1	3 (4%)	–	
2	24 (34%)	–	
3	43 (61%)	–	
Interval between misoprostol and passage of tissue mass (hours)	8 (4-25)	–	
Tissue mass pass in hospital	60 (86%)	–	
Tissue mass pass after discharge	18 (26%)	–	
Blood loss duration operation (ml)	–	34 ± 47	
Side-effect / complication during treatment			
Nausea	3 (4%)	0 (0%)	0.11
Vomiting	5 (7%)	0 (0%)	0.03
Diarrhoea	3 (4%)	0 (0%)	0.11
Fever (≥37.6°C)	38 (54%)	6 (8%)	<0.01
Abdominal pain requiring oral analgesic	22 (31%)	5 (7%)	<0.01
Abdominal pain requiring parenteral injection	8 (11%)	1 (1%)	0.02
Oxytocic drug used	5 (7%)	1 (1%)	0.11
Severe bleeding needing emergency surgical evacuation / blood transfusion	0 (0%)	0 (0%)	1
Uterine perforation	–	0 (0%)	–
Complication after discharge			
Readmission	14 (20%)	3 (4%)	<0.01
Emergency / unplanned readmission	4 (6%)	3 (4%)	0.72
Antibiotic required for presumed infection	8 (11%)	5 (7%)	0.34
No. of follow-ups	2 (1-4)	1 (0-1)	<0.01
Never returned for follow-up post discharge	5 (7%)	17 (23%)	0.01
Duration of vaginal bleeding (days)	14 (7-22)	7 (5-14)	<0.01
Duration of menses return (days)	34 (25-53)	31 (24-53)	0.26

* Data are shown as mean ± standard deviation, median (10th – 90th quartile), or No. (%)

† p values calculated by Fisher's exact test , Chi-square test, or Mann-Whitney *U* test

treatment. However, two patients in the former group were excluded from this analysis as they were advised to have medical treatment in view of a large gestation sac, as were five cases in the surgical group because their history of severe asthma precluded medical treatment. Thus, 68 women in each group were included for further analysis. Only the difference in parity was statistically significant (p = 0.02). We used a logistic regression model with parity equal to or greater than 1 as reference for further analysis. This showed that nulliparous women had a higher preference for medical treatment (odds ratio = 2.2; 95% confidence interval,

Table 3. Demographic difference between women with medical and surgical treatment*

	Medical treatment (n = 68)	Surgical treatment (n = 68)	p Value†
Age (years)	34 ± 5	34 ± 5	0.83
Gestational age (days)	65 ± 9	66 ± 10	0.74
Parity			0.02
0	36 (53%)	23 (34%)	
≥1	32 (47%)	45 (66%)	
Previous miscarriage			0.83
0	48 (71%)	51 (75%)	
1	16 (24%)	14 (21%)	
2	4 (6%)	3 (4%)	
Previous TOP‡			0.32
0	51 (75%)	43 (63%)	
1	14 (21%)	19 (28%)	
2	3 (4%)	6 (9%)	
Marital status			0.44
Single	2 (4%)	4 (6%)	
Married	66 (97%)	64 (94%)	
Ethnicity			0.21
Chinese	67 (99%)	63 (93%)	
Others	1 (1%)	5 (7%)	
Smoker	1 (1%)	5 (7%)	0.30
Drinker	1 (1%)	5 (7%)	0.21
Substance misuse	0 (0%)	0 (0%)	1
Occupation			0.67
Housewife	43 (63%)	40 (59%)	
Non-housewife	25 (37%)	28 (41%)	
Education level			0.08
Non-tertiary	55 (81%)	52 (76%)	
Tertiary	13 (19%)	24 (24%)	
Living district			0.64
Tseung Kwan O	56 (82%)	58 (85%)	
Non–Tseung Kwan O	12 (18%)	10 (15%)	
Presence of symptom at presentation	35 (51%)	39 (57%)	0.49
Duration of symptom (days)	3 (1-14)	3 (1-23)	0.47
Previous usage of medical treatment for miscarriage/TOP	5 (7%)	3 (4%)	0.72
Previous usage of surgical treatment for miscarriage/TOP	21 (31%)	30 (44%)	0.11

* Data are shown as mean ± standard deviation, median (10th – 90th quartile), or No. (%)

† p Values refer to Fisher's exact, Chi-square, Mann-Whitney *U* tests, and 2-sample *t* tests

‡ TOP denotes termination of pregnancy

Table 4. Clinical and ultrasonographic findings in women with success and failure of medical treatment*

	Success (n = 55)	Failure (n = 12)	p Value†
Age (years)	34 ± 5	31 ± 6	0.11
Gestational age (days)	65 ± 10	66 ± 10	0.7
Parity			0.61
0	27 (49%)	8 (67%)	
1	20 (36%)	3 (25%)	
≥2	8 (15%)	1 (8%)	
Previous miscarriage			1
0	38 (69%)	9 (75%)	
1	13 (24%)	3 (25%)	
2	4 (7%)	0 (0%)	
Previous termination of pregnancy			0.23
0	43 (78%)	7 (58%)	
1	10 (18%)	4 (33%)	
≥2ß	2 (4%)	1 (8%)	
Presence of symptoms	29 (53%)	5 (42%)	0.49
Abdominal pain at presentation	15 (27%)	3 (25%)	1
Vaginal bleeding at presentation	52 (95%)	11 (92%)	0.59
Tissue mass passed at presentation	0 (0%)	1 (8%)	0.18
Duration of symptoms (days)	0 (0-14)	1 (0-6)	0.81
Ultrasound features			
Pregnancy type			0.09
Fetal demise	34 (62%)	11 (92%)	
Anembryonic sac	21 (38%)	1 (8%)	
Presence of subchorionic haematoma	5 (9%)	3 (25%)	0.15
Interval between misoprostol and passage of tissue mass (hours)	8 (4.5-24)	13.165 (6-33.5)	0.16
Tissue mass pass during hospitalisation	50 (91%)	8 (67%)	0.15
Tissue mass pass after discharge	14 (26%)	4 (33%)	0.48

* Data are shown as mean ± standard deviation, median (10th – 90th quartile), or No. (%)

† p Values refer to Fisher's exact test, two-sample t tests, Mann-whitney *U* tests, and Chi-square tests

1.1-4.4). Other parameters including age, gestational age, history of miscarriage, previous deliveries, marital status, ethnicity, being a smoker or drinker, occupation, education level, district where they lived, previous use of medical or surgical treatment for miscarriage, presence of symptoms, and duration of symptoms did not attain significant difference between the two groups (Table 3).

Different clinical and ultrasound parameters in the medical treatment group were evaluated as potential predictors of successful treatment, though three cases were excluded because the women changed their decision after medical treatment. The remaining 67 cases were included for analysis. The parameters evaluated were age, parity, gestational age, history of miscarriage or termination of pregnancy, presence of symptoms, duration of symptoms, interval between misoprostol and passage of tissue mass, tissue mass passed during hospitalisation or after discharge, and ultrasonographic features (e.g. anembryonic sac, early fetal demise, presence of subchorionic haematoma). There was no statistically significant difference between those in whom medical treatment was successful or failed, with respect to the parameters evaluated in the univariate analysis. Even when using the logistic regression model, no parameter between the successful and the failed medical treatment groups yielded a statistically significant difference. Thus, none of these

factors could be used to predict the success of medical treatment (Table 4).

Discussion

In this retrospective study, the success rate for medical and surgical treatment was 79% and 99%, respectively. These figures were comparable to those revealed in other studies using the similar regimens, success rates being 80 to 93% for medical and about 98% for surgical treatment[3,13-15]. Three women in the medical group failed treatment, because they changed their decision immediately after the course of misoprostol. Excluding the latter, the actual medical treatment success rate would be higher (83%) and more comparable to published success rates.

For the medical treatment group, the median induction to expulsion interval, duration of bleeding, frequency of fever, and frequency of severe bleeding (treated by suction evacuation or blood transfusion) were all comparable with previously reported results[13-15]. The frequency of nausea, vomiting and diarrhoea appeared to be lower, probably due to underreporting as the documentation of side-effects might not have been exhaustive. This was obviously a drawback of this retrospective study.

Our results showed that women with medical treatment were significantly more likely to endure side-effects than those treated surgically, but most of them were tolerable and self-limiting. No women abandoned treatment because of intolerable side-effects. The extra oral or parenteral analgesics in the medical treatment group could have been because the women were aborting while awake, as opposed to being under general anaesthesia during surgery. Moreover, no women in our study endured massive bleeding during treatment, such that they had emergency suction evacuation or a blood transfusion. Thus, despite an increase in frequency of minor side-effects, there was no major morbidity.

Our data showed no difference in emergency readmission rates between the medically and surgically treated groups. Nor was there any difference in infection rates between the two groups, which concurred with findings from the MIST trial[16]. This trial evaluated the frequency of gynaecological infections in surgically, expectant, and medically managed patients with miscarriage, whether the infections were clinical overt or presumed (antibiotic-treated). Clinical infection was defined as two or more of purulent vaginal discharges, pyrexia of >38.0°C, tenderness over uterus on abdominal examination and a white cell count of >15 x 10^9 /l. That study encountered no difference in the frequency of clinical infections between the respective medically and surgically treated patients at 14 days (3% vs. 2%) and 8 weeks (3% vs. 4%). The frequency of presumed (antibiotic-treated) infections was also similar in both groups at 14 days (8% vs. 8%) and 8 weeks (11% vs. 11%). Our study was retrospective, hence documentation of criteria for clinical infection was incomplete. Thus, we only included patients with presumed infections (antibiotic-treated), but our findings were comparable to those in the MIST trial. This suggested that medical treatment was a safe alternative management strategy for miscarriage.

Although the median duration of bleeding was longer in the medical group, intervals to return of menstruation were similar in both groups, indicating that medical treatment does not delay reproductive recovery. There was some evidence that the long-term conception rate and pregnancy outcomes were similar in both groups[17]. Further research with longer follow-up appears necessary regarding this issue.

Significantly more women in the surgical group defaulted follow-up. After surgical evacuation, the per protocol first follow-up appointment was scheduled in 6 weeks, so by then women who had full recovery were likely to default. On the contrary, the first follow-up appointment after medical treatment was in 1 week, when most patients might still have symptoms (such as bleeding) resulting in a higher rate of attendance.

Regarding secondary outcomes, analysis of putative demographic factors that might affect the choice of treatment indicated that nulliparous women had a higher preference for medical treatment. This finding was similar to that reported previously[18]. Ethnicity, age and residency status did not appear to influence the choice. Apparently, nulliparous women preferred less invasive methods for management of silent miscarriages

and avoid the risks of surgical treatment that might affect future fertility.

Regarding clinical or ultrasonographic features that might possibly help predict the success of medical treatment, available evidence from published studies was heterogeneous. Creinin et al[19] suggested that lower abdominal pain or vaginal bleeding within 24 hours and nulliparity were predictive for overall success, while pregnancy type (fetal demise or anembryonic pregnancy), gestation age, and previous miscarriage were not predictive. On the other hand, Grønlund et al[20] found that gestational age of <75 days responded better to medical treatment. Vejborg et al[21] suggested that pregnancy type affected success rate, with the highest rate being in women with silent miscarriages with crown-rump length of ≤6 mm, and the lowest rate when the embryonic sac was ≥18 mm. Such conflicting evidence was probably due to different treatment regimens, definitions of success, and waiting period durations.

We found that age, parity, gestational age, history of miscarriage, presence of symptom, duration of symptom, interval between misoprostol and passage of tissue mass, tissue mass passed during hospitalisation and ultrasonographic features (anembryonic sac, early fetal demise, presence of subchorionic haematoma) were all not predictive of successful medical treatment. So when counselling women with first-trimester silent miscarriage, surgical treatment was preferred for those with contraindication to medical treatment. Otherwise, women were allowed to choose either option according to their own preferences and willingness for follow-up.

Medical treatment is increasingly being used as an alternative for the management of miscarriage. However, its efficacy varies widely, being between 13 and 96%[1]. It has a higher success rate for incomplete than silent miscarriages. Many studies have attempted to determine the optimal regimen, but up till now there is no consensus. Comparison of results across studies is difficult, due to differences in inclusion criteria, types of miscarriage, definitions of success, and durations of the waiting period. The addition of mifepristone is also controversial, there being some evidence suggesting that its addition does not improve the success rate[20]. Most studies showed that the vaginal dosing route is effective and associated with fewer side-effects. One of the most common regimens used was misoprostol 800 μg vaginally on day 1, followed by a second 800 μg dose vaginally on day 3 if the miscarriage remained incomplete. Surgical evacuation would be performed on day 8, if the miscarriage was still not complete, in which case success rates of 74 to 84% have been reported[22,23]. We used misoprostol 600 μg given vaginally every 3 hours for a maximum of three doses on the same day, of which the regimen had the advantage of completion within 1 day. It also facilitated offering early follow-up visits for ultrasonography, before further doses of misoprostol (if indicated). In addition, most women passed their tissue mass during hospitalisation, so they would be more certain about the outcome before being discharged. Our study showed comparable complete evacuation rates (79%) to those reported in other studies. The disadvantage of this regimen is that the rate of side-effects from misoprostol appear to be frequent, presumably because they are dose-related. In our study, most of the side-effects were self-limiting and no women abandoned treatment because they were intolerable.

A limitation of this study was that it was retrospective and so depended on reviewing outpatient and inpatient case notes in which clinical details might not always be adequately documented. Moreover, a relatively high proportion of women in the surgical group had defaulted follow-up, in which case some of the comparisons (e.g. complications after discharge) may not reflect what actually ensued. Most of the women were discharged from the clinic after return of normal menstruation, so the long-term impact of these treatments (e.g. on future fertility) could not be assessed. Furthermore, it would have been informative to evaluate acceptability, satisfaction, and quality of life in each treatment group, so as to assess whether the increased liability to minor complications in those having medical treatment mattered.

Conclusion

The success rates of medical and surgical treatment were 79 and 99%, respectively; these figures were comparable to other published results. Side-effects were significantly more common in those treated medically, though most were self-limiting and resulted in no serious morbidity. There was no significant difference

between the groups with respect to the frequency of presumed (antibiotic-treated) infections or the interval till return of menstruation. Nulliparous women tended to prefer medical treatment. There was no specific clinical or ultrasonographic feature, which could effectively predict the success of medical treatment.

References

1. ROCG Green-top guideline No 25 Oct 2006 the management of early pregnancy loss. *The Royal College of Obstetrics and Gynaecologists*; 2006.
2. Territory-wide audit in Obstetrics and Gynaecology in Hong Kong 2004. *The Hong Kong College of Obstetricians and Gynaecologists*; 2004
3. Chung TK, Cheung LP, Sahota DS, et al. Spontaneous abortion: short-term complications following either conservative or surgical management. *Aust N Z J Obstet Gynaecol* 1998; 38:61-4.
4. Farell RG, Stonington DT, Ridgeway RA. Incomplete and inevitable abortion: treatment by suction curettage in the emergency department. *Ann Emerg Med* 1982; 11:652-8.
5. Chung TK, Cheung LP, Leung TY, et al. Misoprostol in the management of spontaneous abortion. *Br J Obstet Gynaecol* 1995; 102:832-5.
6. Henshaw RC, Cooper K, el-Refaey H, et al. Medical management of miscarriage: non-surgical uterine evacuation of incomplete and inevitable spontaneous abortion. *BMJ* 1993; 306:894-5.
7. Nielsen S, Hahlin M. Expectant management of first-trimester spontaneous abortion. *Lancet* 1995; 345:84-6.
8. Wagaarachchi PT, Ashok PW, Narvekar N, et al. Medical management of early fetal demise using a combination of mifepristone and misoprostol. *Hum Reprod* 2001; 16:1849-53.
9. You JH, Chung TK. Expectant, medical or surgical treatment for spontaneous abortion in first trimester of pregnancy: a cost analysis. *Hum Reprod* 2005; 20:2873-8.
10. Sotiriadis A, Makrydimas G, Papatheodorou S, et al. Expectant, medical, or surgical management of first-trimester miscarriage: a meta-analysis. *Obstet Gynecol* 2005; 105:1104-13.
11. Kulier R, Gülmezoglu AM, Hofmeyr GJ, et al. Medical methods for first trimester abortion. *Cochrane Database Syst Rev* 2004; (2):CD002855.
12. RCR/RCOG Working Party. Early pregnancy assessment. London: *RCOG Press*; 1996.
13. Ngai SW, Chan YM, Tang OS, et al. Vaginal misoprostol as medical treatment for first trimester spontaneous miscarriage. *Hum Reprod* 2001; 6:1493-6.
14. Tang OS, Lau WN, Ng EH, et al. A prospective randomized study to compare the use of repeated doses of vaginal with sublingal misoprostol in the management of first trimester silent miscarriages. *Hum Reprod* 2003; 18:176-81.
15. Tang OS, Ong CY, Tse KY, et al. A randomized trial to compare the use of sublingual misoprostol with or without an additional 1 week course for the management of first trimester silent miscarriage. *Hum Reprod* 2006; 21:189-92.
16. Trinder J, Brocklehurst P, Porter R, et al. Management of miscarriage: expectant, medical, or surgical? Results of randomised controlled trial (miscarriage treatment (MIST) trial). *BMJ* 2006; 332:1235-40.
17. Tam WH, Tsui MH, Lok IH, et al. Long-term reproductive outcome subsequent to medical versus surgical treatment for miscarriage. *Hum Reprod* 2005; 20:3355-9.
18. Goodyear-Smith F, Knowles A. Choosing medical or surgical terminations of pregnancy in the first trimester: what is the difference? *Aust N Z J Obstet Gynaecol* 2009; 49:211-5.
19. Creinin MD, Huang X, Westhoff C, et al. Factors related to successful misoprostol treatment for early pregnancy failure. *Obstet Gynecol* 2006; 107:901-7.
20. Grønlund A, Grønlund L, Clevin L, et al. Management of missed abortion: comparison of medical treatment with either mifepristone + misoprostol or misoprostol alone with surgical evacuation. A multi-center trial in Copenhagen county, Denmark. *Acta Obstet Gynecol Scand* 2002; 81:1060-5.
21. Vejborg TS, Nilas L, Rørbye C. Medical management of first trimester miscarriage according to ultrasonographic findings. *Acta Obstet Gynecol Scand* 2007; 86:604-9.
22. Stockheim D, Machtinger R, Wiser A, et al. A randomized prospective study of misoprostol or mifepristone followed by misoprostol when needed for the treatment of women with early pregnancy failure. *Fertil Steril* 2006; 86:956-60.
23. Zhang J, Gilles JM, Barnhart K, et al. A comparison of medical management with misoprostol and surgical management for early pregnancy failure. *N Engl J Med* 2005; 353:761-9.