

Medical and Surgical Induced Abortion

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1. Introduction

No method of contraception is 100% effective; over half the women seeking an abortion are using contraception (Jones et al., 2002). It has been estimated that 42 million abortions are carried out every year, and half of these are illegal and unsafe (Sedgh et al., 2007). A proportion of women of all backgrounds with an unintended pregnancy are going to seek an abortion, legal or illegal, irrespective of the risks involved (Rosenfield, 1994). Unplanned pregnancies are a problem that faces all societies; the Guttmacher Institute in New York determined that 49% of all pregnancies occurring in the USA in 1994 were unintended, 54% of these ending in abortion, and 48% of women aged 15-44 had had at least one unintended pregnancy at some point in their lives (Henshaw, 1998). The United Nations estimated that in 2008 of the 208 million pregnancies worldwide 41% were unintended (Singh et al., 2010). The Guttmacher Institute estimates that 30% of American women will have an abortion by the age of 45 (Jones & Kavanagh, 2011).

Access to abortion varies around the world from completely free access in some developed countries to total prohibition in some undeveloped countries. In developing countries there is often a lack of training and equipment that leads to termination of pregnancies by the outdated procedure of sharp curettage, with consequent higher injury and complication rates (Henshaw, 1990). Rehan, (2011) states that the treatment of unsafe abortion complications consumes a large portion of O&G hospital budgets in developing countries. Shah & Ahman (2010) reported estimates from the World Health Organisation that there were 21.6 million unsafe abortions worldwide in 2008. Rasch (2011) in an overview found that globally an estimated 66,500 women die every year as a result of unsafe abortions, and in Sub-Saharan African states unsafe abortion rates are 18-39 per 1,000 women. Srinil (2011) surveyed complication rates in 170 women treated for unsafe abortion and found incidences of haemorrhage requiring blood transfusion 66.6%, shock 63%, acute renal failure 22.2%, sepsis with disseminated intravascular coagulation 7.4%, and 2 deaths. Shaw (2011) highlighted the dilemma facing many Muslim women because of the fact that there was little knowledge or open discussion of the view that Islam permits the termination of pregnancy for serious abnormality within 120 days of conception.

Where women have no access to legal abortion self administration of misoprostol commonly occurs with women accessing misoprostol from a pharmacy or through the internet. A Google search of "buy mifepristone and/or misoprostol online" produces over 2,000 hits. Before 1970 when the legalisation of abortion began to spread around the world menstrual extraction by manual vacuum aspiration was used to circumvent abortion prohibition (Potts

et al., 1977). Menstrual regulation continued to be used in government funded clinics in some developing countries where abortion has never been legalised because it occurs technically without verification of the presence of a pregnancy (Dixon-Mueller, 1988). A report on the menstrual regulation policy in Bangladesh states that the provision of menstrual regulation averts unsafe abortion and associated maternal morbidity and mortality, and on a per capita basis, saves scarce health system resources (Johnson et al., 2010).

Son preference and sex-selective abortion is another major problem found in some Asian countries. Zhou et al., (2011) report that in China the sex ratio at birth is 120 male births to 100 females. Jha et al., (2011) estimate that in China selective abortion of girls totalled about 4.2 -12.1 million per year from 1980-2010.

Women worldwide want to control the timing and number of their children, not just for personal and family reasons, but in the interest of being able to provide adequately for a child at the point in time in question. Whilst first trimester abortion is accessible to some degree in most western countries, access to second trimester abortion tends to be very restricted. This is despite there being a constant proportion over the years of approximately 12% of legal abortions occurring after 12 weeks gestation (Gamble et al., 2008), most of these being for psycho-social reasons, and a small but increasing proportion being for suspected or confirmed foetal anomaly. Teenagers in all countries seek abortions later; approximately 30% of abortions in girls under 15 years of age take place in the second trimester (Jones et al., 2002). This delay is due to teenagers having little or no experience at recognising pregnancy symptoms, a lack of general knowledge, and the problems associated with emotional immaturity. At any age delay in seeking an abortion may be due to periods normally being irregular, bleeding during pregnancy being mistaken for periods, a past history of infertility, menopausal symptoms, having been conscientiously using contraception, ambivalence due to conflicting beliefs, sudden financial stress, breakdown of a relationship, domestic violence, disorganised or chaotic life associated with substance abuse, delaying by medical attendants with mis-diagnosis of the pregnancy, or obstruction by health advisers with anti-abortion views.

2. Medical abortion to 63 days gestation

Medical abortion has several advantages over surgical abortion in that the overall cost is usually lower, medical staff with surgical skills are not required, and in terminations below 9 weeks gestation no hospital admission is required. Medical abortion virtually eliminates the risks of surgery and anaesthesia, and allows more flexible timing, with out-patient treatment, and the convenience of completion in the home environment; also women feel more in control and many feel that an induced miscarriage is a more natural process. Disadvantages of medical compared with surgical abortion are a higher failure rate, more prolonged bleeding, and a higher risk of retained products of conception complicating recovery.

2.1 Mifepristone and misoprostol

The gold standard of medical abortion is the combination of mifepristone followed by misoprostol. Mifepristone is a potent antiprogesterone with antiglucocorticoid activity; it acts

at the level of the progesterone receptor being a competitive progesterone antagonist, and in combination with a prostaglandin is effective for medical abortion at all gestations (Ashok et al., 2002). The effects of mifepristone on the pregnant uterus are induced contractility, decidual necrosis with bleeding (Garfield et al., 1988), and cervical softening. Oral mifepristone achieves peak serum concentrations in pregnant women in 2 hours, with a half life of 24-29 hours (Heikinheimo, 1989). Contraindications to the use of mifepristone are adrenal failure and hereditary porphyria. Misoprostol is a synthetic prostaglandin E1 analog which regulates various immunologic cascades (Davies et al., 2001). It is a potent uterotonic drug, but its use in obstetrics and gynaecology is in all countries apart from France an off-label use as it is only marketed for the prevention and treatment of peptic ulcer disease. It has been used widely in obstetrics and gynaecology practice because of its effectiveness, low cost, stability in light and hot climate conditions, and ease of administration compared with its licensed counterparts dinoprostone and gemeprost (Song, 2000). Misoprostol is marketed as a 200 mcg tablet that is rapidly absorbed by the vaginal, rectal, oral, sublingual and buccal routes. The sublingual route results in the highest serum peak concentration levels and the highest bioavailability; the vaginal route has the lowest peak concentrations, but the longest duration of peak levels (Tang et al., 2002; 2009). Nevertheless measures of uterine contractility have shown similar effects for both routes (Tang et al., 2007).

Misoprostol has uterotonic and cervical priming actions; its advantage over other prostaglandins is that it is cheap, can be administered through any mucosal surface, can be used by asthmatics, and can be stored at room temperature for years. Misoprostol is a very safe and well tolerated drug. Pre-clinical toxicological studies indicate a safety margin of at least 500-1000 fold between lethal doses in animals and therapeutic doses in humans (Kotsonis et al., 1985). The misoprostol 200 mcg tablet is tolerated even in relatively high dosage; attempted suicide with high single dosage has failed with 30 tablets but succeeded with 60 tablets (Henriques et al., 2007). No clinically significant haematological, endocrine, biochemical, immunological, respiratory, ophthalmic, platelet, or cardiovascular effects have been found with misoprostol; diarrhoea is the major adverse reaction that has been reported consistently with misoprostol, but it is usually mild and self-limiting; nausea and vomiting may also occur and will resolve in 2-6 hours; fever and chills are common with high doses (Tang et al., 2007). Chambers et al., (2009) reported that in 1,000 women taking one misoprostol 200 mcg tablet orally three hours before suction termination of pregnancy the side effects were cramps: mild 52.2%, moderate 4%, severe 0.7%; nausea: mild 28.3%, moderate 4.9%, severe 1.4%; bleeding mild 8.6%, moderate 1.7%, severe 0.1%; diarrhoea: mild 3.8%, moderate 0.2%, severe 0% (Fig. 2).

2.2 Preparation for abortion

A consultation requirement is the completion of a health check questionnaire by the woman of her present and past medical and surgical history including allergies. A health worker should then interview the woman alone, without the presence of her partner or friends, to determine that her decision to terminate her pregnancy is her own and that she is not being unduly influenced by others. If the health worker feels a woman has not made a clear decision she should be offered an appointment with a counsellor for supportive decision making counselling to assist her to clarify her ambivalence. Specialised genetic counselling should be offered to all women seeking termination of pregnancy (TOP) for foetal anomaly.

The different methods of abortion that the clinic can offer are then explained, with the advantages and disadvantages of each method being detailed. It is important to determine the number of weeks' gestation of the woman as medical abortion past 9 weeks (63 days) gestation needs closer medical supervision and it is generally considered that it is not good practice to terminate these pregnancies on an out-patient basis. Bracken et al., (2011) have shown that reliance on a woman's report of her last menstrual period together with a bimanual pelvic examination is almost as accurate as ultrasound examination and therefore safe in determining eligibility for medical abortion at home.

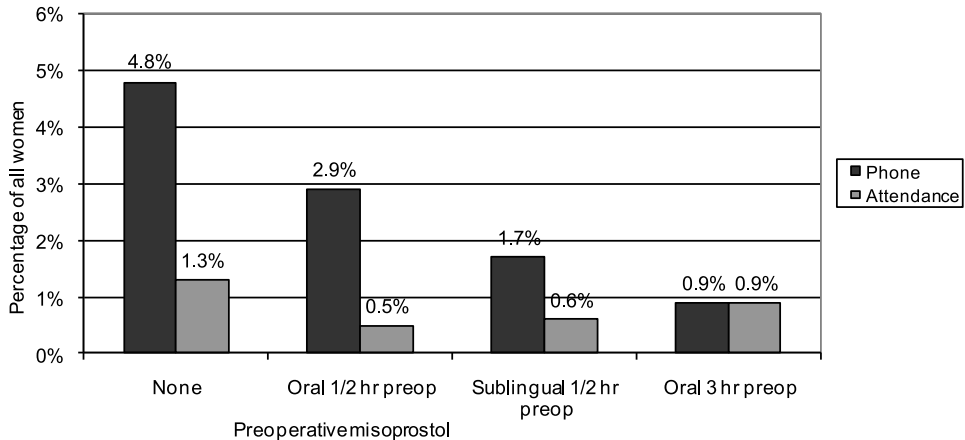


Fig. 1. The percentage of all women making contact by phone or attendance with pain and bleeding following first trimester surgical termination of pregnancy with varying misoprostol single 200mcg tablet regimens (Chambers et al., 2009).

The dosage regimens of the drugs to be used should be explained along with the clinic attendances that will be required. Bleeding with the passage of clots, and cramping of variable intensity, will occur as the expulsion of the pregnancy from the uterus occurs, usually 2-4 hours after the initial dose of misoprostol. Strong analgesic drugs including codeine, tramadol and ibuprofen should be prescribed to ease the severity of the cramping pains; antiemetic metoclopramide tablets should also be prescribed. Bleeding may continue for up to 2 weeks, and occasionally up to 4 weeks. Possible side effects of nausea, vomiting, diarrhoea, chills or mild fever are discussed. The risk of birth defects if the woman decides to continue the pregnancy after taking the abortion drugs should be emphasised. The possible complications of retained products of conception, heavy bleeding, infection and continuing pregnancy should be discussed. An emergency 24 hour contact number should be given for the woman to seek help if bleeding is heavier than soaking a pad an hour for 2 hours or if there is a persistent temperature over 38°C. Blood testing for blood group, haemoglobin and quantitative beta-human chorionic gonadotrophin (hCG) should be performed. Medical abortion is contraindicated if the haemoglobin level is less than 9.5 g/dl. Previous caesarean section operations are not a contraindication; the incidence of caesarean scar rupture from misoprostol uterine contraction stimulation is extremely low. Explain that Rh(D) negative women with no anti-D antibodies will need anti-D immune

globulin in a dose of 50 mcg (250 IU) under 13 weeks and 300 mcg (1500 IU) over 13 weeks (Lubusky et al., 2010). The risk of an ectopic pregnancy should be explained if relevant; pelvic ultrasound examination and repeat quantitative beta-hCG should be ordered if an ectopic pregnancy has not been excluded. Kaneshiro et al., (2011) state that medical abortion can be provided in a safe and effective manner up to 63 days gestation without the routine use of ultrasound. It is important to discuss contraceptive methods that can be offered: a prescription for the oral contraceptive pill; long acting slow release progesterone intrauterine device (IUD) or implant – the latter should be inserted with the misoprostol dose not the mifepristone dose as this reduces the efficacy of the mifepristone (Church et al., 2010). Immediate IUD insertion after abortion has been shown to result in higher rates of IUD use at 6 months than delayed insertion, without an increased risk of complications (Bednarek et al., 2011). It is important to ensure that informed consent is given in writing for all procedures before any treatment is commenced.

2.3 Induction with mifepristone and misoprostol

The initial medication is one oral tablet of mifepristone 200 mg. It has been shown that increasing the dosage of mifepristone beyond this level markedly increases the cost with no additional benefit in outcomes (Shannon et al., 2005). The optimal time interval before the administration of misoprostol 800 µg is 48 hours. My personal experience of over 2000 women with the use of a 48 hour interval is a success rate of 99.9%. Ashok et al (1998) reported a success rate of 99.4% in 2000 women. Alternatives to the 48 hour interval are immediate with no interval, or a 24-36 hour interval; although the success rates for these are lower they are still in the high nineties (Goel et al., 2011). The highest success rates for stimulating expulsive uterine contractions are with the woman, after washing her hands and wetting the tablets with a quick dip in water, inserting the four misoprostol 200 mcg tablets vaginally. An alternative route of administration is buccally with a success rate almost as high. The misoprostol may be administered by the woman in the clinic or at home, providing there is no legal restriction of this. Prospective cohort studies have shown no difference in effectiveness of acceptability between home-based and clinic based medical abortion across countries (Ngo et al., 2011). It has been demonstrated that early first-trimester abortion provided by certified nurses and auxiliary nurse midwives is as safe and effective as that provided by doctors (Warriner et al., 2011). Women should be provided with strong analgesic tablets to use, commencing with the first dose one hour before the administration of misoprostol. I have found that adding a home dosage of one sublingual misoprostol 200 mcg tablet three times a day on the two days following the initial misoprostol dose reduces the incidence of surgical intervention for complications.

Follow up two weeks later is essential to exclude the rare event of a continuing pregnancy. Grossman and Grindlay (2011) have reviewed the various alternatives to ultrasound and concluded that the most promising modalities include serum hCG measurement (a fall of at least 50%), standardised assessment of women's symptoms, low-sensitivity urine pregnancy testing and telephone consultation. Although ultrasound reliably detects the removal of a previously detected gestation sac, it has been shown to be unreliable in determining completion or otherwise of the abortion process, the serum hCG level being a more reliable indicator of the amount of any retained tissue. The commonest complication of medical abortion is retained products of conception causing prolonged bleeding. Published D&C

rates for retained products vary from 0.9% (Clark et al., 2010) to 18.9% (Odeh et al., 2010) and 25.3% (Liao et al., 2010). These wide variations reflect the varying sensitivity thresholds of clinicians for diagnosing the need for surgical intervention. The highest figure is from China where the authors state that post-abortion curettage would be performed if the client continues to have vaginal bleeding 2 weeks after administration of mifepristone; this figure corresponds with my experience that approximately 25% of women are still bleeding at 2 weeks. The lower figure corresponds with my experience that most women with retained products will settle if given more time, surgery being reserved for persistent heavy bleeding. Although bleeding ceases in the majority of women in less than two weeks, some women will bleed for up to four weeks. Further treatment with misoprostol is a reasonable option for persistent or heavy bleeding, its efficacy having been shown in treating retained products following spontaneous miscarriage (Bui, 2011) and in retained products following surgical termination of pregnancy (Chambers & Mulligan, 2009). Using my experience of treating retained products of conception following surgical abortion with misoprostol the effective dosage has been determined as being four misoprostol 200 mcg tablets vaginally or buccally followed by two tablets sublingually or buccally four times a day for the next two days. Lower doses are ineffective, the non-pregnant uterus being much less responsive to misoprostol than the pregnant uterus, and the woman can be reassured that even this much higher dosage will not result in strong cramping pains.

The convenience of medical abortion has to be balanced against a higher complication rate than surgical abortion. Ninimäki et al., (2009) reported on the comparative complication rates in two cohorts of over 20,000 women each in Finland and found that the overall incidence of adverse events was fourfold higher in the medical compared with surgical abortion cohort, 20.0% compared with 5.6%; haemorrhage 15.6% compared with 2.1%, incomplete abortion 6.7% compared with 1.6%, surgical (re)evacuation 5.9% compared with 1.8%. There was no difference in infection rates, both being 1.7%. Operative complications occurred in 0.03% of medical and 0.6% of surgical cohorts. In a smaller South Australian study of women requiring hospital treatment for complications Mulligan & Messenger (2011) concluded that complication rates of early medical abortion compared favourably to early surgical abortion: haemorrhage 0.5% medical compared with 0.03% surgical, and admission for sepsis 0.2% medical compared with 0.06% surgical. It is noteworthy that no prophylactic antibiotics were used in either the medical or surgical cohorts in this study. Whilst doxycycline antibiotic infection prophylaxis is commonly used, Achilles & Reeves (2011) note that the universal requirement for such treatment has not been established, and Fjerstad et al., (2011) conclude there is no evidence that it offers any benefit, a finding that I concur with (Chambers et al., 2009).

2.4 Induction with misoprostol alone

When the cost of mifepristone which is up to 100 times that of misoprostol, precludes its use, misoprostol alone in the single dosage of 800 mcg vaginally has been widely used. Prasad et al., (2008) reported a complete abortion rate of 94.2% with this method. However Salakos et al., (2008) reported a success rate of only 85.2% with the same single dose method. Fekih et al., (2010) used a regimen of sublingual misoprostol 800mcg four hourly to a maximum of three doses with a success rate of 92.1%. Cheng et al., (2010) have reported a 100% success rate in terminating second trimester pregnancies with oral misoprostol alone

given at doses of 200 mcg/hr for the first 12 hours and 400 mcg/hr after 12 hours until delivery; the most common side effect was diarrhoea, which was easily relieved by medication. This paper illustrates the safety of higher doses of misoprostol than previously used, with a much higher success rate that should be replicable in the first trimester. Whenever misoprostol is used it is essential that women are warned of the possible adverse consequences for the foetus of deciding to continue the pregnancy after already commencing misoprostol. Barbero et al., (2011) have reported that they have found a significant association between prenatal exposure to misoprostol and the occurrence of major congenital anomalies.

3. Medical abortion beyond 63 days gestation

Late first trimester and second trimester medical termination of pregnancy is more challenging than early first trimester medical abortion and should only take place in an in-patient setting, either in a hospital, or in a day clinic that can stay open for extended hours. Although second trimester termination by D&E can take place in a day-surgery clinic in a shorter time, and has been shown to have a lower complication rate than medical abortion (Bryant et al., 2011), there are many institutions that do not have the facilities, specialised equipment, or staff with the required expertise to offer a D&E service. Medical termination can be performed with a lower level of staff training. The mifepristone and misoprostol combination is the method of choice, but where mifepristone is not available induction with misoprostol alone can be used.

3.1 Induction with mifepristone and misoprostol

The priming dose of mifepristone is one 200 mg tablet administered orally 48 hours before admission for misoprostol induction. If the woman is nauseous an anti-emetic should be administered first. Hou et al., (2010) have compared one and two day intervals and have determined that a 2-day mifepristone-misoprostol interval resulted in fewer incomplete abortions than a 1-day interval for second trimester termination of pregnancy. Misoprostol historically has been administered vaginally in the second trimester, but a meta-analysis of published randomised controlled trials that compared sublingual and vaginal routes concluded that the sublingual route shortened the induction-foetal expulsion interval and was the route preferred among women and staff (Cabrera et al., 2011). No statistically significant differences between treatment groups were observed for placental retention or for side effect except for fever, which was more common in the vaginal group; the preferred route is therefore sublingual. Brouns et al., (2010) have compared misoprostol 200 mcg or 400 mcg given at 4 hour intervals, with a maximum of 10 administrations in 48 hours, until the foetus was delivered. They found that both regimens were equally effective, but the time to delivery of the foetus was significantly longer in the 200 mcg group; they concluded that the misoprostol 400 mcg four-hourly regimen is the one of choice.

3.2 Induction with misoprostol alone

Where mifepristone is not available misoprostol alone can be used. Cheng et al., (2010) have reported a 100% success rate in gestation up to 25 weeks with a regimen of oral misoprostol given in a dose of 200 mcg hourly for the first 12 hours and 400 mcg hourly after 12 hours

until delivery. The median induction to delivery interval was 12.0 hours, with a range of 6.3 to 30.9 hours. Delivery occurred within 24 hours in 81.3% of women. The median dosage of misoprostol was 2,600 mcg (13 misoprostol 200 mcg tablets). The most common side effect was diarrhoea which was easily relieved by medication.

3.3 Complications of medical abortion

The three main complications of second trimester medical abortion are placental retention, infection and haemorrhage. A large retrospective study of misoprostol induced terminations by Green et al., (2007) reported that the retained placenta rate needing surgical intervention was 6%; in 59% of women the placenta was expelled naturally within one hour of the delivery of the foetus, and expectant management did not increase the haemorrhage rate. In another large retrospective study by Ashok et al., (2004) the infection rate was 2.6% and the haemorrhage requiring transfusion rate was less than 1%. Lavoué et al., (2011) have performed a retrospective study of a medical abortion series at 12 to 14 weeks gestations and reported that the secondary manual revision or vacuum aspiration rate was 41%. Bryant et al., (2011) have compared the complication rates of medical and surgical termination of second trimester pregnancies for foetal anomalies or foetal death. In this retrospective cohort study they found that labour-induction abortions had higher complication rates and lower effectiveness than did D&E. They reported that 24% of women undergoing labour induction experienced one or more complications, in contrast to 3% undergoing D&E. They concluded that D&E is significantly safer and more effective than labour induction for second-trimester abortion for foetal indications and women should be offered a choice of method.

4. Surgical induced abortion

The surgical abortion method varies according to the gestation. In early gestations the procedure is done mainly by suction curettage. In very early gestations vacuum aspiration is commonly used. In later gestations the products of conception are too large and too rigid to be all evacuated through a suction curette and manual removal with forceps is required for at least some of the products of conception. The cut off point is traditionally 12-13 weeks, with the operation before this being a suction or vacuum termination of pregnancy (STOP or VTOP) and the operation after that point being a dilatation and evacuation (D&E). For abortion statistics therefore the second trimester is calculated from the 13th week.

4.1 Misoprostol cervical priming

Having now used preoperative misoprostol routinely before surgical termination of pregnancy for the last 17 years I have no doubt that it should be standard procedure before every operation. Misoprostol in the correct dose for the gestation, and at the optimum time interval preoperatively, is highly effective in softening and dilating the cervix in order to minimise the need for rigid dilator use. The most effective dosage regimen for each gestation has been determined by incremental changes over the years and they are detailed in Table 1. The optimal effect on the cervix from administering misoprostol is achieved after 3 hours (Tang et al., 2002) so whenever possible I use a regimen with an interval as close to 3 hours as the time frame will allow. This is most difficult when women are scheduled for

operation the same day as the initial consultation. Therefore only women whose residence is a long distance from the clinic are scheduled for same day surgery. All other women are seen at a clinic consultation on a day prior to their surgery and given a misoprostol tablet to take home and use 3 hours before their operation appointment. Satisfactory cervical priming is achieved in first trimester gestations up to 9 weeks gestation with one misoprostol 200 mcg tablet taken orally. The oral route is preferred to minimise side effects occurring before the woman arrives for surgery, distressing cramping being more likely to occur with the sublingual, buccal or vaginal route (Aronsson et al., 2004).

Chambers et al., (2009) surveyed the number of women making either a phone or an attendance contact with pain and bleeding after surgical termination of a first trimester pregnancy following four different regimens. The first regimen included no misoprostol priming, in the second regimen oral misoprostol 200 mcg was administered 30 minutes preoperatively, in the third regimen sublingual misoprostol 200 mcg was administered 30 minutes preoperatively, and in the fourth regimen oral misoprostol 200 mcg was administered 3 hours preoperatively. All women receiving preoperative misoprostol also were administered misoprostol 200 mcg vaginally at the end of the operation. Figure 1 shows the results of the survey: each new regimen led to an approximate halving of the number of women making contact with symptoms of retained products of conception.

The results of a survey (Chambers et al., 2009) of side effects occurring in 1,000 women taking one oral tablet of misoprostol 200 mcg at home 3 hours before surgery are shown in Figure 2.

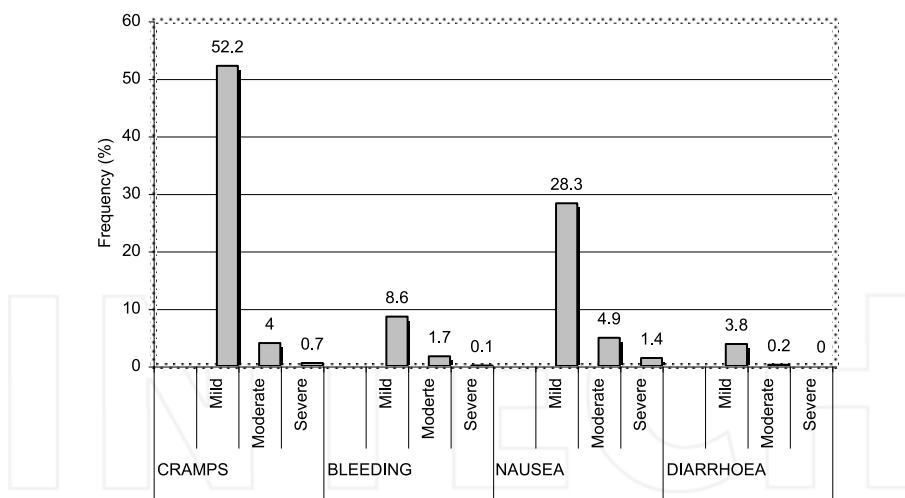


Fig. 2. Side effects in 1,000 women taking one misoprostol 200µg tablet orally 3 hours before surgery (Chambers et al., 2009).

The only significant side effect was mild cramping in 52.2% of women. Mild nausea was reported in 28.3% of women, but this was difficult to separate from pregnancy morning sickness. If the operator wishes to avoid mechanical dilatation completely then a higher dose of misoprostol should be used; 2 or 3 misoprostol 200 mcg tablets sublingually can be

used, but this will be at the expense of women requiring strong analgesics prescribed for the relief of strong uterine cramping pains and therefore needing to be admitted to the clinic for a longer period preoperatively. It has been shown that there is no advantage in administering the misoprostol vaginally as was once common practice (Parveen et al., 2011) and both women and clinic staff prefer other routes to the vaginal one. For gestations beyond 9 weeks a single tablet of misoprostol does not produce reliably adequate cervical priming and the dose required increases incrementally as shown in Table 1. Adequate cervical priming at higher gestations is essential; inadequate priming followed by difficult mechanical dilatation has been shown to be one of the prime causes of cervical laceration and perforation of the uterus (Pridmore & Chambers, 1999). At 10 weeks the dose should be doubled to 2 misoprostol 200mcg tablets. At higher gestations than 10 weeks the total dose required is more than two tablets and the dosage is then split into $\frac{1}{2}$ hourly doses as administering more than two tablets together produces too many side effects with the risk of excessively strong contractions and the risk of uterine rupture. At 11 weeks gestation the dose is 3 misoprostol 200 mcg tablets, at 12 to 13 weeks gestation the total dose is 5 tablets, and at 14 to 16 weeks the total dose is 7 tablets. Whenever possible a single dose of one oral tablet of misoprostol 200 mcg taken 3 hours before admission at gestations up to 16 weeks enhances the priming effect on the cervix, greatly improving the ease and safety of the operation.

GESTATION	MISOPROSTOL
5-9 weeks prebooked client	200 mcg orally at home 3 hours before admission
5-9 weeks same day service	200 mcg sublingually with theatre $\frac{1}{2}$ - 1 hour later
10 weeks	200 mcg orally at home 3 hours before admission + 200 mcg sublingually on admission with theatre $\frac{1}{2}$ hour later
11 weeks	200 mcg orally at home 3 hours before admission + 2x200 mcg sublingually on admission with theatre $\frac{1}{2}$ hour later
12-13 weeks	200 mcg orally at home 3 hours before admission + 2 doses 2 x 200 mcg $\frac{1}{2}$ hourly on admission with theatre 1-2 hours later
14-16 weeks	200 mcg orally at home 3 hours before admission + 3 doses 2 x 200 mcg $\frac{1}{2}$ hourly on admission with theatre 3 hours later
17-22 weeks before osmotic dilator procedure on day 2	2x200 mcg sublingually at home at 7am + 2 doses 2 x 200 mcg $\frac{1}{2}$ hourly after admission with theatre $\frac{1}{2}$ -1 hour after last dose.
17-22 weeks after osmotic dilator and before D&E	2 x 200mcg PR at end osmotic dilator operation + 4 doses 200mcg sublingual $\frac{1}{2}$ hourly with D&E 3 hours after the last dose.

Table 1. Misoprostol dosage regimens at each gestation for cervical priming before surgical termination of pregnancy (Chambers et al., 2009).

Pridmore & Chambers (1999) found that although previous caesarean section was a risk factor for perforation in the second trimester, it was not a risk factor in the first trimester. Misoprostol should be routinely administered at the end of every surgical abortion procedure to tone the uterus; this has been proved to reduce the incidence of postoperative

bleeding and retained products of conception as shown in Figure 1 (Chambers et al., 2009). In the first trimester one misoprostol 200mcg tablet should be inserted into the posterior fornix of the vagina; in the second trimester two tablets should be inserted into the rectum. If for any reason misoprostol cannot be administered in the theatre other research (Mulayim et al., 2009) has shown that similar benefits can be achieved by administering one misoprostol 200 mcg tablet sublingually immediately after every first trimester procedure.

4.2 Manual vacuum aspiration

Manual vacuum aspirators (MVA) are widely used in developing countries where cost barriers prohibit the use of the more sophisticated and expensive electrical suction pumps. However there has been an increase in their use in developed countries in recent years, particularly in the first 9 weeks of pregnancy. These hand held pumps consist of a large syringe cylinder with a valve mechanism that allows a negative suction pressure to be built up as the plunger is withdrawn against closed valves. A sterile suction cannula is then attached and suction is generated by releasing the valves. The process can be repeated as often as necessary to empty the uterus and the aspirator can generate a suction pressure of up to 60 mm Hg. The MVA has the advantage of not only cheapness, but portability because of the small size and light weight. They are also very quiet in action compared to electric pumps which many women appreciate when the procedure is carried out under a local anaesthetic. Aspirators do not need to be sterilised, but the reusable models do need to be dismantled and thoroughly cleansed and disinfected between uses.

4.3 Surgical abortion in the first trimester

Anaesthesia can be either local, general or a combination of both. The woman is placed in the lithotomy position on the operating table and if ultrasound is available in the theatre it is useful to do a preoperative vaginal probe ultrasound to confirm the gestation and assess the position of the uterus. The pudendal area and vagina are then cleaned with an antiseptic solution such as povidone-iodine or chlorhexidine. An alternative is to only cleanse the cervix and use prophylactic antibiotic cover with doxycycline. I prefer the preparation of the whole operative field and the use of a sterile drape. A no-touch technique is used throughout the operation, the surgeon avoiding touching the parts of instruments that will enter the uterine cavity, and clean instruments are kept separate from used ones on the instrument trolley. With this approach antibiotic cover has never been used in clinics I have operated in and the resulting infection rate has been no higher than that reported for clinics where routine antibiotics are always prescribed. If ultrasound is not used in the theatre a bimanual pelvic examination should be carried out to determine the size and position of the uterus. Determining the lie of the uterus is very important; the commonest cause of perforation of the posterior wall of the uterus is failure to recognise the presence of an acutely anteverted uterus, and perforation of the anterior wall occurs when an acute retroversion is not detected. There is a wide choice of vaginal specula that are available and operator preferences vary. I prefer a single bladed Sim's speculum that rests on the perineum as it allows more room to manipulate instruments than does the bi-valve speculum; this is important in avoiding damage to the anterior or posterior wall of a uterus that is acutely flexed forwards or backwards. The anterior lip of the cervix is then grasped with either vulsellum forceps or a tenaculum. I do not like the single tooth tenaculum as it

can tear the cervix and it partially obstructs access to the cervical canal. I prefer to use two multi-tooth vulsellum forceps side by side as they do not tear the cervix if they do slip off and they improve access to the cervical canal. Where the cervix is small and conical applying even a single forceps to the small anterior lip can obstruct access to the external os; in this situation one forceps should be applied laterally on each side of the cervix.

Local anaesthetic of lignocaine with adrenaline or vasopressin is now injected whether or not a general anaesthetic is being used. The addition of a local anaesthetic to a propofol general anaesthetic means less propofol is required and the vasoconstrictor greatly reduces blood loss. In all women over 6 weeks gestation I routinely use 5-10 mls of 2% lignocaine with adrenaline 1:200,000 injected bilaterally directly into the cervix at the level of the internal os through a 1½" 21 gauge needle passed up the cervical canal. This measure greatly reduces blood loss, removes the need for deep general anaesthesia, and gives some pain relief post-operatively. I prefer the intracervical to the paracervical block as it is quicker acting. For gestations 4-6 weeks I use lignocaine without adrenaline because in these very early gestations the uterine arteries are still small and there is a risk of prolonged vasospasm and tissue necrosis if adrenaline is used.

The cervical canal is now gently explored with the smallest metal dilator or uterine sound to determine its direction; this is a crucial step in the dilating process as if any force is used at this stage a false canal can easily be made which with further dilatation can easily perforate the wall of the uterus. If the direction of the cervical canal into the uterus cannot be found a bimanual examination should be performed to determine the position of the body of the uterus above the cervix. A common cause of difficulty is an acutely anteverted uterus; if this is detected as the problem a nurse assistant should be asked to apply manual suprapubic pressure to push the uterus backwards, when cannulation of the cervical canal can then usually be easily achieved. If the problem is an acutely retroverted uterus cannulation should be done with a curved dilator or sound with the curvature directed posteriorly. Problems with cannulation of the cervical canal are greatly reduced by ensuring adequate priming with misoprostol; when the problem persists, the procedure should be rescheduled with priming with a larger dosage of misoprostol and a minimum time interval of 3 hours between the last dose and the operation.

Dilatation of the cervix with graded dilators should not commence until the direction of the canal has been determined with certainty, and a small dilator has been passed with ease into the uterine cavity. The cervix should then be dilated to the number of weeks gestation converted to millimetres. The safest and easiest to use dilators are the well tapered dilators such as the Pratt or Hawkin-Ambler. The much cheaper but blunter Hegar dilators are often the only ones available and these are adequate provided sufficient misoprostol priming of the cervix has occurred. The Pratt dilators have the French circumferential system of sizing and need to have the size divided by 3 (π) to determine the millimetre dilatation being achieved. If Hegar dilators are the ones routinely available it is very helpful to have a set of Pratt or Hawkin-Ambler dilators held in reserve for the occasional very tight cervix. If a point is reached in dilatation where resistance increases and a degree of force has to be used, the dilator shaft should be guarded with a finger at a length from the tip less than the length of the cervico-uterine canal to avoid the risk of perforating the uterine wall. Perforation of the uterus is most likely to occur when there is difficulty dilating the cervix; perforation is usually recognised by an instrument passing endlessly with no sensation of stopping at the

expected level of the fundus. Perforation by a dilator alone rarely causes a problem, but if it is not recognised and a suction curette is then passed through the perforation damage to viscera is then a risk. When a perforation is suspected of having occurred, the woman should be observed for 3-4 hours post-operatively to ascertain that there are no signs of peritoneal irritation before she is discharged. If peritonism is present at this time the woman will require transfer to an in-patient facility for further observation.

The size of suction curette used will correspond to the dilatation achieved. The two main types of suction curette used are flexible and rigid and operators have their own preferences. The main disadvantage of the rigid curette is that it has a terminal bevelled orifice that is relatively sharp compared with the blunt end of the flexible curette, and it is therefore the only one likely to be at risk of causing a perforation. To avoid this risk the rigid curette should be introduced very gently up to the fundus of the uterus and then withdrawn in a rotating spiral manner. The flexible curette being blunt ended can safely be used with a rapid in and out motion, achieving quicker evacuation; the disadvantage of the flexible curette is that it cannot be steered into the cornual angles where tissue may be missed. The rigid curette can be either straight or curved, and the curved is the one I prefer for the very reason that the angle allows the cornual recesses to be adequately suctioned. In summary, a combination of use of the two types is the ideal solution. A minimum suction pressure of 60 mm Hg is required by either a manual vacuum aspirator or electric suction. Electric suction has the advantage of greater speed, particularly if set at 75 to 90 mm Hg suction pressure. From 10 to 12 weeks gestations solid placental tissue may lodge in the cervical canal and require removal with a small forceps. At 12 weeks gestation solid tissue may not be removable from the body of the uterus by suction alone and the use of ovum forceps may be needed to evacuate all products of conception. To complete the evacuation of the pregnancy a sharp curette should be gently used to explore the uterine cavity to ensure that no small pieces of tissue have been missed; when the whole amniotic sac has been evacuated the feel of scraping the uterine wall changes from a smooth to a rough gritty sensation. It is important to avoid any vigorous use of the sharp curette as this can lead to removal of the basal layer of the endometrium and risk the formation of intrauterine synechial adhesions and the consequent development of Asherman's syndrome with amenorrhoea or hypomenorrhoea and pelvic pain which will require treatment by hysteroscopic division of the adhesive bands (March, 2011).

The commonest post-operative complication of suction termination of pregnancy is bleeding and cramping from retained products of conception, and in the majority of cases where this occurs the missed tissue is located in a retroverted uterus. In all women where the uterine cavity on curettage is defined as not being anteverted, it is important not to assume that the position of the body of the uterus is midline without excluding a retroflexed position. This is done by exploring with a sharp curette along the posterior wall of the uterus, and as the fundus is approached applying posterior pressure whilst angling the curette to point backwards. It is surprising how often this manoeuvre suddenly reveals a missed collection of tissue in an acutely retroflexed uterus, the curette passing backwards at almost 90 degrees to the line of the utero-cervical canal to reach the fundus.

The use of the intravenous uterotonic oxytocin has been shown to have no value in the first trimester (Nygaard et al., 2011), and similarly methylergometrine is of no value in the first

trimester. The value of the routine postoperative use of the uterotonic misoprostol 200 mcg inserted into the posterior fornix of the vagina at the conclusion of first trimester surgical abortion has been researched and established by Chambers et al., (2009); its routine introduction was found to have led to a marked decrease in the number of women contacting the clinic post-operatively with bleeding and cramping due to retained products of conception as shown in Fig. 1.

If ultrasound is available in the theatre a check with the ultrasound vaginal probe will confirm that the pregnancy has been completely evacuated and that a possible twin pregnancy sac has not been missed; if a twin sac remains in a bicornuate uterus, the abdominal ultrasound should be used to guide the operator as the uterus is re-explored for the twin sac. If ultrasound is not available the evacuated products should be examined to confirm completion of the procedure. Some clinics routinely use laboratory histological confirmation, but there is a possible problem here in that confirmation of the presence of trophoblastic material can be taken as evidence of completion when only a small portion of trophoblastic material has been removed and there is actually a continuing pregnancy. Examination of products in the theatre after each case is routine in many clinics. The evacuated tissue is floated in a small amount of water in a backlit glass dish; magnification is used to identify the transparent gestational sac, the frond like chorionic villi, clear decidual tissue and small foetal parts at gestations over 8 weeks. If evacuation of a pregnancy cannot be confirmed the woman should be investigated for the possible presence of an ectopic pregnancy, particularly if the serum beta-hCG is over 1,500 IU/ml.

Scheduling all women for a follow-up appointment has been shown to have no value in improving outcomes. What is important is that all women on discharge should be given a 24 hour telephone contact number they can use to discuss any post-operative symptoms they are concerned about. Most symptoms will only require reassurance, and the minority with possible symptoms of concern can be given an appointment to return to the clinic for examination. Perriera et al., (2010) have reported that telephone follow-up combined with urine pregnancy testing is a feasible alternative to routine ultrasound or serial hCG measurements after medical abortion. The commonest complication requiring investigation and treatment after surgical abortion is persistent bleeding and cramping; that these symptoms are due to the presence of retained products of conception can be confirmed with an ultrasound examination. The simplest treatment in this situation is the administration of misoprostol 200 mcg sublingually three times a day for 2 days. Chambers & Mulligan (2009) have reported this regimen to be 93% effective in the first week following the operation; in the second week a higher dosage is required of 4 misoprostol 200 mcg tablets initially vaginally, sublingually or buccally followed by 2 tablets four times a day sublingually for 2 days. Figure 3 shows the marked reduction in the repeat D&C rate following the introduction of this treatment for retained products in their clinic.

4.4 Surgical abortion at 13 to 16 weeks

Approximately 9% of all pregnancy terminations occur at 13-16 weeks gestation. In the first four weeks of the second trimester termination of pregnancy can reliably be performed as a one stage procedure with D&E performed in one day after adequate cervical priming with misoprostol (Chambers et al., 2011a). As shown in Table 1, the dosage of misoprostol required increases with the gestation. At 12-13 weeks for a same day service client 2

sublingual doses of misoprostol 400 mcg are given 30 minutes apart with D&E 1 to 2 hours after the last dose. For a prebooked client this dosage regimen is preceded by one oral dose of misoprostol 200 mcg at home 3 hours before admission to the clinic, with D&E ½ to 1 hour after the last dose. At 14-16 weeks an additional third sublingual dose of misoprostol 400 mcg is given 30 minutes after the second sublingual dose, with D&E 3 hours after the last dose. A retrospective study I performed with colleagues (Chambers et al., 2011a) showed that the simple addition of one oral tablet of misoprostol 200 mcg at home 3 hours before admission to the regimen of 2 tablets ½ hourly for two or three doses on admission increased the probability of all women at 13-16 weeks gestation completing a termination of pregnancy in one day with a single D&E procedure to 100%, and with a reduced theatre time, the operators noting operations to be easier to perform with the extra priming from the one oral tablet taken 3 hours before admission.

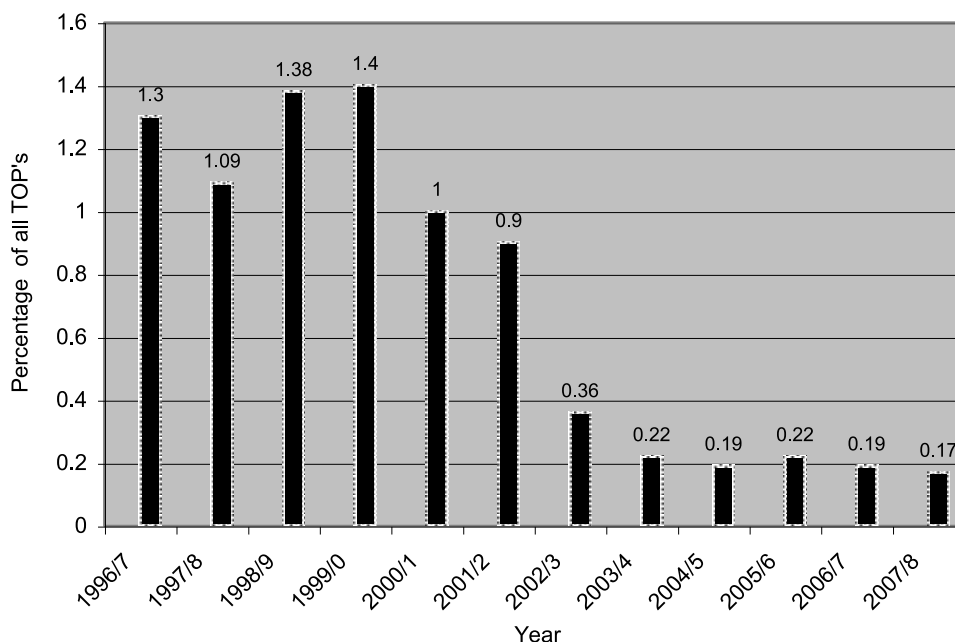


Fig. 3. Percentage repeat D&C rate per 12 months period for retained products of conception following suction TOP. The routine use of misoprostol for treatment of retained products began in 2002 (Chambers & Mulligan, 2009).

Preparation of the woman in the theatre is as in first trimester up to dilatation of the cervix. Dilatation again should be equal to the number of weeks' gestation in millimetres. Bierer type forceps of a size appropriate the dilatation are then used to evacuate the contents of the uterus, the manual removal of tissue being supplemented by the use of a rigid suction curette. My preference is for the use of a 12 mm curved rigid suction curette for all second trimester gestations, but curettes up to 16 mm are available and preferred by some operators. Real time ultrasound guidance is very useful when available, a nurse assistant using the abdominal ultrasound probe to show the operator where the end of his/her

instrument is working and the location of tissue still to be evacuated. The evacuation of the uterus is concluded by checking with a large size 3 or 4 sharp curette, and a 12mm curved rigid suction curette followed by an 8mm flexible suction curette to determine that the uterus is completely empty. An intravenous injection of uterotonic oxytocin 5-10 units is given. Finally two misoprostol 200 mcg tablets should be inserted into the posterior fornix of the vagina for further prolonged uterotonic effect.

The commonest difficulty met performing a D&E at these gestations is the foetal head being trapped in the cornual recess on one side of the fundus. A moderately large size 3 or 4 sharp curette can often be used to prise the head out of its trapped position, allowing forceps to grasp and extract it. Alternatively a suction curette can be used to draw the head down. If the problem persists administering sevoflurane will often relax the uterus enough to free the trapped foetal part. When all these measures fail, rather than persisting and risking perforating the uterus, 2 misoprostol 200 mcg tablets should be inserted into the posterior vaginal fornix or rectum and the woman returned to the ward where 4 sublingual doses of misoprostol 200 mcg are administered at 30 minute intervals. The woman is returned to the theatre 2-3 hours later when the foetal head will be found lying in the lower segment of the uterine cavity.

4.5 Surgical abortion at 17 to 22 weeks

Approximately 4% of all pregnancy terminations occur at 17 to 22 weeks gestation. At these gestations it becomes increasingly difficult to safely terminate the pregnancy in one day. Safety is proportional to the ease with which the cervix can be dilated to an extent appropriate to the gestation before D&E. It is cervical trauma from excessive mechanical dilatation of a cervix that has been scarred from previous gynaecological or other pelvic surgery that is the prime factor leading to tearing and perforation of the uterus in second trimester D&E (Pridmore & Chambers, 1999). As it is not possible to predict which women will be easy to dilate I prefer to treat all women from 17 weeks gestation as having the potential for difficulty in dilatation so use a multistage regimen for them all. The first stage on day 1 consists of two parts, the insertion of osmotic cervical dilators and the injection of a foeticide under a short intravenous propofol anaesthetic. After induction of the anaesthetic the woman is prepared as described for surgical abortion at 13-16 weeks. When the cervix has been secured with vulsellum forceps at 17-19 weeks gestation one 4 mm x 65 mm Dilapan-S™ osmotic dilator is inserted into the cervical canal and at 20-22 weeks two Dilapan-S™ dilators are inserted. Dilapan-S™ is a hydrophilic polymer rod manufactured from a proprietary hydrogel, which is hygroscopic and expands radially more rapidly, consistently and to a greater degree than the seaweed preparation laminaria tents, with the result that fewer Dilapan-S™ can be inserted for shorter periods of time (Lohr, 2008). A povidone-iodine soaked pack is inserted into the vagina to prevent expulsion of the dilators before swelling has occurred.

The foeticide digoxin 1 mg is then injected into the chest or head of the foetus under ultrasound guidance if available. Molaei et al., (2008) have reported that the injection of digoxin into either the foetus or amniotic fluid without ultrasound guidance has a high success rate. Consent for the digoxin injection is included on the operation consent form and the woman is informed that the injection causes progressive slowing of the foetal heart until it stops; the advantages of the procedure are that it averts the risk of the foetus being inadvertently born alive, with the possibility of resuscitation attempts being made, and that

maceration of the foetal tissues produces softening of the ligaments which facilitates easy and safe evacuation of the foetus from the uterus (Hern, 2001).

The woman is discharged home with anti-emetic metoclopramide 10 mg tablets, analgesic tramadol 50 mg tablets, sleeping sedative temazepam 10 mg tablets, and antibiotic tablets azithromycin 1 g and tinidazole 2 g to be taken that evening. The next morning she takes 2 misoprostol 200 mcg tablets sublingually at home at 7am, the dose is repeated on arrival back at the clinic a 7.45am and a third dose of two tablets sublingually is give 30 minutes later. She is also given 5-10 mg of oxycodone orally, this being by far the most effective analgesic in this situation in my experience. Half to one hour after this last dose the woman is taken to theatre and intravenous propofol anaesthesia induced. Preparation for the operation is as before. The general anaesthetic is augmented with an intracervical injection of 10 to 15 ml of 2% lignocaine with 1:200,000 adrenaline. The osmotic dilators are removed and the amount of dilatation achieved is measured by passing Hegar dilators until the first resistance is met. This measurement determines whether there is sufficient dilatation for an immediate safe D&E or whether further dilatation is required. Table 2 shows the amount of dilatation required for safe D&E at each gestation.

Gestation in weeks	16	17	18	19	20	21	22
Cervical dilators	14	15	16	17	18	19	20
D&E	16	18	20	22	24	26	28

Table 2. Minimum mm dilatations required before insertion of cervical dilators and before D&E (Chambers et al., 2011b).

Table 2 also shows the amount of dilatation that is required at each gestation before the insertion of further osmotic dilators if the woman is to be safe for return for D&E the same day. These safe limits have been determined by me from 17 years experience performing late second trimester terminations. It has been determined from a review of women with complications that it is cervical trauma from excessive mechanical dilatation of a cervix that has been scarred from previous gynaecological or other pelvic surgery that is the prime factor leading to tearing and perforation of the uterus in second trimester D&E (Pridmore & Chambers, 1999). In this review I also analysed in each case the amount of mechanical dilatation that was used before tearing occurred and the parity of each woman with tearing. With this information I have been able to draw up some guidelines for the mechanical dilatation limits for safe dilatation. My survey found that no primiparous woman had ever sustained a second trimester perforation of the uterus, with mechanical dilatation up to 10 mm being used beyond the point of first resistance in several women. Survey of the parous women with perforations revealed that that for each pregnancy of a woman's parity the perforation occurred after approximately 2 mm less mechanical dilation. The rough guideline that I use therefore is that a limit of 10 mm of mechanical dilatation beyond the point of first resistance should not be passed in primiparous women and this limit should be reduced by 2mm for each pregnancy of parity. This guideline should only be used in combination with the high total dose misoprostol cervical priming described. High total dose misoprostol regimens have been proved to be very effective and safe, even in women with caesarean scars (Malapati et al., 2011).The dilatation at which first resistance occurred having been determined, if this plus

minimal rigid dilatation equals the minimum dilatation for safe D&E at the woman's gestation, which increases from 17 mm at 17 weeks to 28 mm at 22 weeks, as in Table 2, the pregnancy can be terminated forthwith by D&E as for 13-16 weeks gestation.

If the minimum dilatation for safe D&E has not been achieved the cervix is dilated with Hawkin Ambler or Pratt dilators to a dilatation equal to the weeks gestation minus 2 mm as in Table 2. In parous women, and women with a history of previous gynaecological surgery, the protocol described above limiting mechanical dilatation is applied. The membranes should be ruptured routinely at this stage, and all liquor is expressed by abdominal pressure, with a small forceps being used to displace the presenting foetal part to allow free drainage. If part of the umbilical cord prolapses it should be excised. The cervical canal is then filled with 3 to 5 Dilapan-S™ synthetic hygroscopic dilators dipped in an antiseptic solution such as povidone-iodine. The number of dilators is recorded on the operation sheet. A vaginal pack is soaked in the antiseptic solution and placed in the vagina to hold the laminaria in place until they start swelling. At the end of the procedure an indomethacin or diclofenac 100 mg suppository and a prochlorperazine 25 mg suppository are placed in the rectum along with 2 moistened misoprostol 200 mcg tablets if the woman is to be returned to theatre for D&E the same day; 98% of women are suitable for same day D&E. The woman is returned to the ward where she is administered 1 misoprostol 200 mcg tablet sublingually at half hour intervals for four doses. She is returned to theatre 3 hours after the last dose or earlier if delivery is imminent. I have found that 1-2% of women are extremely poor responders to misoprostol (Chambers et al., 2009) and in these women the D&E will not be the same day. Because the membranes will be ruptured for 24 hours a single dose of intravenous antibiotics is injected, amoxicillin 2 g (or a third generation cephalosporin if there is allergy to amoxicillin) and gentamycin 160 mg and the post-operative misoprostol regimen as described for same day return for D&E is omitted.

4.5.1 D&E technique 17-22 weeks

The vaginal pack and cervical dilators are removed and the number checked. If either the pack or dilators are not visible, the posterior fornix should be explored for them by bimanual examination at the end of the procedure rather than assuming that they had been passed spontaneously. Further mechanical dilatation is carried out if required to reach the target dilatation for safe D&E at that gestation listed in Table 2; the amount of mechanical dilatation should again be limited by the guidelines for women with risk factors as previously detailed. A nurse assistant should hold the vulsellum forceps handles through the sterile drape to leave both hands of the operator free. The uterus is evacuated at 17 to 18 weeks with 11 x 3/4" Sopher forceps, at 19 to 20 weeks with the 11' x 1/2" Bierer forceps and at 21 - 22 weeks with the 11 x 3/4" Bierer forceps. The Sopher forceps are used at smaller gestations as they have smaller teeth and are less likely to catch the uterine wall; the Bierer forceps are heavier with larger teeth and are used at later gestations to enable a better grip to be obtained on the larger foetal parts. The foetal head can usually be decompressed by crushing with forceps, using 2 hands if necessary. If at 21-22 weeks the cervix is widely dilated the presenting head may be tightly engaged in the cervical canal, in which case the base of the skull or presenting part should be punctured with a pointed size 11 disposable scalpel or scissors and decompressed by suction of the cranial contents with a 6 mm rigid suction curette.

When delivering an intact foetus body first, the arms must be brought down from alongside the head individually by hooking a finger in each axilla in turn. When the body delivers first it is rotated so that the back is uppermost, and traction is applied through the body; a scalpel or scissors is then used to puncture the occiput via the back of the neck, and the head decompressed by suction as described above.

Second trimester D&E procedures should be carried out under ultrasound control when this is available, a nurse assistant positioning the abdominal probe in the sagittal plane under the sterile drape. Observing the foetal image moving when forceps are rotated confirms that the forceps are grasping the foetus and not the uterine wall, which can happen with the Bierer forceps that have much more prominent teeth on the blades than the Sopher forceps. The Sopher forceps cannot be used in later gestations because the small teeth will not grip onto larger foetal parts without slipping. Intravenous oxytocin 5-10 units should be given as soon as all major foetal parts and the placenta have been delivered. The uterine cavity is then suction curetted with a 12 mm curved rigid suction curette. A size 3 or 4 sharp curette is used to check the emptiness of the uterus and the continuity of the utero-cervical wall, particularly after difficult evacuations. A final suction with an 8mm flexible curette is carried out.

At the conclusion of the operation, to confirm that the uterus is completely empty, a transvaginal probe ultrasound examination may be carried out if there was any difficulty obtaining a good view of the uterus with the abdominal probe, particularly if the woman is obese. If ultrasound has not been used all the tissues removed must be examined to ensure that all the major parts of the foetus and the whole placenta have been evacuated. Two moistened tablets of misoprostol 200 mcg and an indomethacin 100 mg suppository are then inserted through the anus. Alternatively the misoprostol tablets may be placed in the posterior fornix of the vagina for a more rapid effect. For 20-22 weeks gestations in parous women whose uterus is lacking in tone at the end of the procedure 40 units of oxytocin in 500 ml of IV fluid is run in over 1-2 hours post-operatively. When bleeding occurs in the immediate post operative period it should be treated by administering to the woman 2 sublingual tablets of misoprostol 200 mcg every 30 minutes until the bleeding stops. If there is no slowing of the blood loss after three doses of misoprostol the woman will need to be returned to theatre to exclude retained products in the uterus, a cervical or uterine laceration, or a spurting arteriole on the surface of the cervix. Published rates for serious D&E complications are Hern (2001) 0.0%, Patel et al., (2006) 0.45%, Chambers et al., (2011b) 0.0%. A Cochrane review by Newmann et al., (2010) concluded that mifepristone does not appear to be useful for cervical preparation in the second trimester because of the high rates of pre-procedural expulsions. I have trialled the addition of mifepristone to misoprostol and osmotic dilators in late second trimester terminations to enhance cervical dilatation, but after 21 cases the use of mifepristone was ceased due to one overnight delivery at home and excessive softening of the cervix causing a 19% incidence of cervical laceration (Chambers et al., 2011b).

4.6 Intact D&E beyond 22 weeks

Most clinics offering second trimester surgical terminations have a gestation limit of 22 weeks. A very small number of women seek termination of pregnancy beyond 22 weeks for mental health and social reasons. Hospital clinics offering medical terminations beyond 22

weeks are predominantly there for the treatment of women with either foetal death or severe foetal anomaly; these clinics are usually not prepared to accept women for termination of pregnancy for mental health and social reasons. A limited number of private clinics will accept these women. The technique used is injection of a foeticide, serial osmotic cervical dilators over 2-3 days followed by induction of labour with an oxytocin drip and evacuation of the uterus by intact D&E under a general anaesthetic when delivery is imminent. Chasen et al., (2004) have reported a series comparing D&E with intact D&E for terminations of pregnancy at 20 weeks gestation and over, and found that complication rates were the same, being approximately 5% for all complications in each of the two groups, with no difference in procedure time or estimated blood loss.

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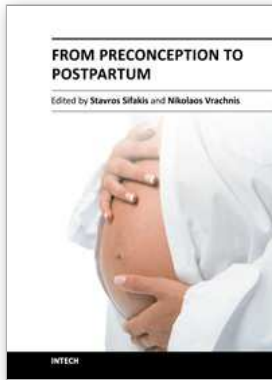
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Obstetrics is evolving rapidly and finds itself today at the forefront of numerous developments. Providing selected updates on contemporary issues of basic research and clinical practice, as well as dealing with preconception, pregnancy, labor and postpartum, the present book guides the reader through the tough and complex decisions in the clinical management. Furthermore, it deepens the scientific understanding in the pathogenetic mechanisms implicated in pregnancy and motivates further research by providing evidence of the current knowledge and future perspectives in this field. Written by an international panel of distinguished authors who have produced stimulating articles, the multidisciplinary readers will find this book a valuable tool in the understanding of the maternal, placental and fetal interactions which are crucial for a successful pregnancy outcome.

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